



*In the Community to Serve*

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July 31, 2020

Oregon Public Utility Commission  
Attn: Filing Center  
P.O. Box 1088  
Salem, OR 97308-1088

**RE: LC 76 Cascade Natural Gas Corporation's 2020 Integrated Resource Plan (“IRP”)**

Attention: Filing Center

Pursuant to Order No. 07-002 and Order No. 07-047, enclosed for filing is Cascade Natural Gas Corporation's (Cascade or Company) 2020 Integrated Resource Plan (IRP or Plan). Cascade has filed 20 hard copies to arrive in the next few days.

Pursuant to Order No. 20-088, the filing also contains confidential information. Appendices E, I, and J contain confidential information. The redacted versions are indicated with an (R) at the end of the file name and the confidential version contain (C) at the end of the file name. Details in those appendices include valuable commercial information that would put Cascade at a negotiation disadvantage. This in turn could potentially negatively impact the gas costs paid by the Company's customers.

Cascade thanks OPUC Staff and the other stakeholders for their focused attention throughout the entire IRP process. The feedback, suggestions and guidance we received from the public via the Technical Advisory Group (TAG) meetings greatly assisted Cascade in meeting today's milestone.

If there are any questions regarding this request, please contact me at (509) 734-4589 or via email at [mark.sellers-vaughn@cngc.com](mailto:mark.sellers-vaughn@cngc.com) or Brian Robertson at (509) 734-4546 or via email at [Brian.Robertson@cngc.com](mailto:Brian.Robertson@cngc.com).

Sincerely,  
CASCADE NATURAL GAS CORPORATION

Mark Sellers-Vaughn  
Manager, Supply Resource Planning

## LC 76 CNGC Enclosed

LC 76 CNGC Cascade's 2020 OR IRP.pdf  
LC 76 CNGC Appendix A – IRP Process.pdf  
LC 76 CNGC Appendix B – Demand Forecast.pdf  
LC 76 CNGC Appendix C – Regulatory Compliance Matrix.pdf  
LC 76 CNGC Appendix D – Demand Side Management.pdf  
LC 76 CNGC Appendix E – Current & Alternative Resources (C).pdf  
LC 76 CNGC Appendix E – Current & Alternative Resources (R).pdf  
LC 76 CNGC Appendix F – Capacity Requirements and Peak Day Planning.pdf  
LC 76 CNGC Appendix G – Weather & Price Uncertainty Analysis.pdf  
LC 76 CNGC Appendix H – Avoided Cost.pdf  
LC 76 CNGC Appendix I – Distribution System Planning (C).pdf  
LC 76 CNGC Appendix I – Distribution System Planning (R).pdf  
LC 76 CNGC Appendix J – Renewable Natural Gas (C).pdf  
LC 76 CNGC Appendix J – Renewable Natural Gas (R).pdf  
LC 76 CNGC Appendix K – Comments Matrix.pdf



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**2020  
Integrated Resource Plan**

**July 31, 2020**



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## **CHAPTER 1**

### **EXECUTIVE SUMMARY**

## Introduction

Cascade Natural Gas Corporation's (Cascade, CNGC, or the Company) Integrated Resource Plan (IRP or Plan) forecasts 20 years of expected system-wide customer and demand growth, and analyzes the most reliable and least cost supply side and demand side resources that could be used to fulfill future customers' gas service needs. Planning how to best meet customers' future demand includes the consideration of possible policy changes and the resulting impact on customer prices, the Company's operations, and the ability of Cascade's distribution system to serve gas reliably as regional demand increases. This plan discusses these elements that impact how the Company may serve its customers from 2020 through 2039. While the Plan cannot predict the future, it is a useful guide. Below is a short summary of each chapter included in this IRP. The details regarding methodologies as well as specific results are found in the chapters and appendices.

### Key Points

- Cascade's first material deficiency occurs in 2023.
- The Company's four-year action plan provides the road map for resource acquisition.
- Load growth is forecasted average 1.26% per year over the 20-year planning horizon.
- Cascade modeled Cap and Trade as its main carbon forecast.
- The total avoided cost ranges between \$0.26/therm and \$1.11/therm over the 20-year planning horizon.
- Cascade projects 12.09 million therms of energy efficiency in Oregon over the 20-year planning horizon.
- This plan was informed by five Technical Advisory Group meetings, with active engagement by stakeholders.
- Cascade continues to be fully committed to the IRP process.
- Each chapter provides an *at-a-glance* summary of the key points.

## Chapter 2: Company Overview

Cascade has been providing natural gas service since 1953. Over the years, the Company has expanded its service territory by purchasing and merging with other small natural gas utilities. As of 2007, Cascade is a subsidiary of Montana Dakota Utilities (MDU) Resources Inc., which is based in Bismarck, North Dakota.

Cascade serves over 299,000 customers located in smaller, mostly rural communities spread across Oregon and Washington. The Company's service territory poses some challenges for operating an energy distribution system, including the fact that the areas served are noncontiguous and the weather in each area can be vastly different. To capture this, Cascade groups its citygates into seven weather zones.

Cascade purchases natural gas from a variety of suppliers and transports gas supplies to its distribution system using primarily three natural gas pipeline

companies. Northwest Pipeline LLC (NWP) provides access to British Columbia and domestic Rocky Mountain gas, Gas Transmission Northwest (GTN) provides access to Alberta and Malin gas, and Enbridge (Westcoast Transmission) provides British Columbia gas directly into the Company's distribution system.

### **Chapter 3: Demand Forecast**

Forecasting demand is useful for both long- and short-term planning. The Company initiates its demand forecasting process by looking at each citygate serving firm or uninterruptible service. These citygates were then assigned a weather zone because a significant portion of Cascade's customer usage fluctuates with temperature and wind.

Cascade developed a normal, or expected, future weather year by shaping 30 years of proprietary, historical weather data. Heating degree day (HDD values) were assigned to each day in the model weather year. To ensure the Company will be able to serve its firm customers during extreme weather, the Company tested a system weighted peak HDD (the system weighted coldest day in the last 30 years).

Peak day demand was then derived for each weather scenario by applying the HDD to the peak day forecast for each citygate.

Demand forecasting first requires a customer forecast. The Company developed a unique customer forecast for each county by incorporating population and employment growth data from Woods and Poole as well as from internal market intelligence into a dynamic regression model.

Load growth across Cascade's system through 2039 is expected to fluctuate between 0.78% and 1.80% annually. Load growth is split between residential, commercial, and industrial customers. Residential and commercial customer classes are expected to grow at an annual rate near 1.66% and 0.91%, respectively, while industrial expects a growth rate of around 0.51%.

After determining system-wide demand over the planning period by multiplying the use per customer times the number of customers in the forecast, Cascade stress tested its results with high and low scenarios for varying future economic conditions.

In absolute numbers, system load under normal weather conditions is expected to exceed 434 million therms in 2039. Residential customers are expected to grow from 54.5% of the total core load to 57% of the total core load by 2039.

Load across Cascade's two-state service territory is expected to increase 1.26% annually over the planning horizon, with the Oregon portion outpacing Washington at 1.58% versus 1.15%.

## Chapter 4: Supply Side Resources

Chapter 4 provides an in-depth description of the supply side options the Company considered in this Plan.

Cascade's gas supply portfolio is sourced from three areas of North America: British Columbia, Alberta, and the Rockies. The Company secures its gas through firm gas supply contracts and open market purchases.

Firm supply contracts commit both the seller and the buyer to deliver and take gas on a firm basis, except during *force majeure* conditions. Supply contract terms for firm commodity supplies vary greatly. Some contracts specify fixed prices, while others are based on indices that float from month to month. Open market purchases are short-term and are subject to more volatile pricing.

The Company evaluates its demand curve and defines four categories of supply for meeting its demand. First, base load supply resources are used for the constant demand that occurs all year and does not fluctuate based on weather. Base load supplies are typically taken day in and day out, 365 days a year. Next, winter supplies meet demand occurring due to cooler weather. Winter gas supplies are firm gas supplies that are purchased for a short period during the winter months to cover increased loads, primarily for space heating. The contracts are typically three to five months in duration (primarily November through March). Next are peaking gas supplies which are used when colder weather spikes demand. Peaking gas supplies, similar to storage, are firm contracts purchased only as load actually materializes due to high winter demand. That is, the seller must deliver the gas when the Company requires it, but the Company is not required to take gas unless it is needed to meet customer load requirements. Lastly are needle peaking resources which are utilized during severe or arctic cold snaps when demand increases sharply for a few days. These resources are very expensive and are available for a very short period of time.

Cascade also utilizes natural gas storage to meet a portion of the requirements of its core market. Storing gas supplies, purchased and injected during periods of low demand, is a cost-effective way of meeting some of the peak requirements of Cascade's firm market. Cascade does not own any storage facilities and, therefore, must contract with storage owners to lease a portion of those owners' unused storage capacity.

Cascade has contracted for storage service directly from NWP since 1994. Storage is held in their Jackson Prairie and Plymouth facilities. Jackson Prairie is located in Lewis County, Washington, approximately ten miles south of Chehalis. Plymouth is located in Benton County, Washington approximately 30 miles south of Kennewick. Both Jackson Prairie facilities and the Plymouth facility are located directly on NWP's transmission system. In addition, Cascade has leased Mist storage from NW Natural. The Mist facility located in Columbia County, near Mist, OR. Mist has a direct connection to NWP for withdrawals and injections. Storage withdrawal rates

can be changed several times during an individual gas day to accommodate weather driven changes in core customer requirements.

Cascade uses interstate pipeline transportation resources to deliver the firm gas supplies it purchases from three different regions or basins. Cascade has over 30 long-term annual contracts with NWP, numerous long-term annual and winter-only transportation contracts with GTN (including the upstream capacity on TransCanada Pipeline's Foothills and Nova systems), a long-term, annual contract with Ruby Pipeline, and one long-term annual contract with Enbridge (Westcoast Transmission) in British Columbia, Canada. These contracts do not include storage or other peaking services that may provide additional delivery capability rights ranging from nine to 120 days.

In order to evaluate the price of resource options, the Company analyzed gas price forecasts from various sources. Cascade used Wood Mackenzie, the Energy Information Administration (EIA), the Northwest Power and Conservation Council (NWPPCC), and Cascade's trading partners to develop a blended long-range price forecast. With a monthly Henry Hub price from the above sources, the Company derived a weight for each source to develop the monthly Henry Hub price forecast for the 20-year planning horizon. These weights were calculated from the Symmetric Mean Absolute Percentage Error (SMAPE or Errors) of each source versus actual Henry Hub pricing since 2010. The inverse of these Errors was then used to determine the weight given to each source.

Thereafter, to determine the low case and high case, the Company utilized the EIA economic growth factors which are 1.5 for the Low Case, 2.0 for the Reference Case, and 2.6 for the High Case.<sup>1</sup>

Besides currently used resources, Cascade considered alternative resources. Other potential incremental capacity options evaluated included: NWP Proposed Bremerton-Shelton Realignment, the Cross-Cascades Trail-West pipeline, additional GTN capacity, NWP Eastern Oregon Expansion, NWP Express Project or the I-5 Sumas expansion project, NWP Wenatchee Expansion, NWP Zone 20 (Spokane) Expansion, Pacific Connector, and Southern Crossing. Other storage options considered were: AECO, Gill Ranch Storage, Mist, Spire Storage (formerly Ryckman Creek Storage), Wild Goose Storage.

Cascade also considered unconventional supplies such as satellite LNG, renewable natural gas, and the realignment of its Maximum Daily Delivery Obligations (MDDOs) on NWP.

Long-term planning is not an exact science. The Company has considered the various risks that may challenge the assumptions used in this analysis. Risk can stem from potential Federal Energy Regulatory Commission (FERC) or Canada's

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<sup>1</sup> EIA 2018 Annual Energy Outlook

Energy Regulator (CER) rulings that may impact the cost or availability of gas. The Company also considers the risk that firm supply may not be available when Cascade needs it or that pricing could vary due to any factor impacting the economy of supply and demand.

To mitigate risk, Cascade constantly seeks methods to ensure price stability for customers to the extent that it is reasonable. In addition to methods such as long-term physical fixed price gas supply contracts and storage, another means for creating stability is through the use of financial derivatives. Derivatives generally lock-in a forward natural gas price with a hedge, consequently eliminating exposure to significant swings in rising and falling prices. The Company's Annual Hedging Plan, approved by the Gas Supply Oversight Committee (GSOC), provides oversight and guidance for the Company's gas supply hedging strategy.

## **Chapter 5: Avoided Cost**

The avoided cost is the estimated cost to serve the next unit of demand with a supply side resource option at a point in time. Avoided cost forecasts are used to establish a cost-effective threshold for demand side resources. If demand side resources cost as much as or less than the avoided cost, then the demand side resource is cost-effective and should be the next resource added to the Company's stack of resources.

Cascade's avoided cost includes fixed transportation costs, variable transportation costs, storage costs, commodity costs, a carbon tax, a 10% adder, distribution system costs, and a risk premium. Essentially, the avoided cost is the cost of the Company's resource stack on a per therm basis plus three values for benefits specifically acquired with energy efficiency. The largest part of the avoided cost is the cost of gas.

A carbon compliance cost forecast was added in anticipation of carbon legislation. Currently, Cascade models the market driven costs to start at \$21.13/metric ton in 2020 and capping at \$61.50/metric ton from 2030 onward. Cascade's use of this forecast does not indicate a preference towards this carbon future in Oregon, but rather signifies what the Company believes is the most probable form of carbon legislation in the state.

Next, 10% was added to the commodity portion of the avoided cost to account for nonquantifiable, environmental benefits. This 10% adder was first recommended by the Northwest Power and Conservation Council (NWPPCC) based on Federal legislation.

New to the 2020 IRP, Cascade has included distribution system costs in its avoided cost calculation. Distribution system costs capture the costs of sending gas from the citygate to Cascade's customers. For this IRP cycle, Cascade calculated distribution



system costs as the Company's system weighted average of its authorized margins, as approved in UM-1893. These costs are inflated by the Consumer Price Index (CPI) escalator every year.

For the 2020 IRP, the nominal system avoided costs ranges between \$0.26/therm and \$1.11/therm over the 20-year planning horizon. The increase over time is largely driven by the escalating cost of carbon.

## **Chapter 6: Demand Side Management & Environmental Policy**

Demand Side Management (DSM) refers to the reduction of natural gas consumption through the installation of energy efficiency measures such as insulation, more efficient gas-fired appliances or through load management programs. Cascade targets savings of approximately 62 million therms system-wide over the 20-year planning horizon; 12.09 million therms in Oregon and 50 million therms in Washington.

Cascade acquires therm savings through its energy efficiency programs. In Oregon, the Energy Trust of Oregon (Energy Trust) administers the Company's programs and in Washington, Cascade administers its own programs. In both states the programs offer Cascade customers financial incentives to install specific cost-effective energy efficiency measures. These measures cover a broad range of applications including new homes, retrofit appliances, and commercial appliances. The programs are funded in Oregon through a public purpose charge, which applies a percentage charge to customers' bills, and in Washington through a per therm charge.

To determine the Company's savings targets in Oregon, Energy Trust performed a resource analysis of all available energy efficiency for the 20-year planning period. This was a multi-step process beginning with determining all available and potentially available conservation measures. A demographic study of the age of the houses and buildings in Cascade's Oregon service territory was then performed to estimate when new buildings and homes would be built, and when existing homes would need replacement appliances. The total amount of energy savings that can be installed in an area without consideration of economic barriers is called the technical potential.

Once Energy Trust determined the technical potential, the industry standard of decrementing this by 15% was used to get to the achievable potential. Energy Trust then created the cost-effective potential by screening all DSM measures using the total resource cost (TRC) test, which is a benefit-cost ratio (BCR) that measures the cost effectiveness of the investment being made in an efficiency measure. The cost-effective achievable potential is smaller than the achievable potential because the potential savings from non-cost-effective measures are removed.

Energy Trust then applied its knowledge of market uptake to the cost-effective achievable potential which further reduced this amount and resulted in the program savings projections which are included in Appendix D by customer class, program and year.

Each measure comprising the cost-effective achievable potential was given a levelized cost which is that measure's annualized cost over annual therm savings. The levelized cost is used to demonstrate the total potential therms that could be saved at various costs. The levelized costs per measures in the 2020 IRP's cost-effective achievable potential are slightly higher than they were in the 2018 IRP for two reasons: 1) The therm savings targets in this IRP include savings from non-cost-effective measures that the Commission is allowing the Energy Trust to incent; and 2) The price of gas has decreased over the last two years.

The program savings projections included in this IRP are also slightly higher than those presented in the Company's 2018 IRP for the following reasons: 1) New measures were considered in the analysis; 2) Measure assumptions were updated based on more current data; 3) Emerging technologies were included in the analysis; and 4) Updated measure saturation rates from third-party research and survey work were used.

Chapter 6 also considers environmental policies being both enacted and considered in Oregon, Washington, and nationally. A number of initiatives intended to reduce, eliminate, or mitigate the effects of greenhouse gases on the atmosphere are in play. Carbon legislation is a reality, as both Oregon and Washington have begun adopting carbon regulations.

The Company follows all carbon related initiatives closely as policy changes will impact the natural gas retail business in some way. A carbon tax will raise customers' prices: initiatives such as Portland's goal of being 100% renewable by 2050, or Ashland's and Eugene's plans to reduce carbon emissions, and may reduce natural gas usage. Carbon policies will also increase the Company's avoided costs thus increasing cost-effective energy savings potential. Policies addressing climate change are likely to impact all factors in integrated resource planning (e.g., demand forecasts, pricing, and DSM potential) and, therefore, must be closely monitored.

## **Chapter 7: Renewable Natural Gas**

Renewable Natural Gas (RNG) has been introduced as its own chapter for the first time in this 2020 IRP. With there being a strong desire to mitigate the carbon footprint of the natural gas industry, the amount of information covered on RNG warranted a separate chapter. Cascade has been involved and committed to developing programs that follow RNG guidelines and rules stated in SB 98 and HB-

1257.

The Company has met with several individuals and companies within the RNG industry such as producers, municipals, wastewater treatment plants, biodigesters, and landfills. Currently, none of the projects have a timeline to implement putting RNG on the system in the near future. The Company will file an update in the 2021 Annual IRP Update.

Cascade has developed a potential RNG cost effectiveness methodology. Cascade is also utilizing SENDOUT<sup>®</sup> as another model for analyzing RNG. Cascade will continue to monitor RNG guidelines and rules and incorporate any necessary changes to these models.

## **Chapter 8: Distribution System Planning**

Cascade uses computer modeling for network demand studies to ensure its distribution system is designed to deliver gas reliably to customers as the number of customers and their demand change.

Cascade's geographical information system (GIS) keeps an up-to-date record of pipe and facilities, complete with all system attributes such as date of install and operation pressure. Using the Company's GIS environment and other input data, Cascade is able to create system models through the use of Synergi<sup>®</sup> software. The software provides the means to theoretically model piping and facilities to represent current pressure and flow conditions while predicting future events and growth. Combining these models with historical weather data can provide a design day model that will predict a worst-case scenario. Design day models that experience less than ideal conditions can then be identified and remedied before a real problem is encountered.

When modeling demonstrates that a portion of the distribution system is unable to meet future demand, Cascade engineers consider many possible remedies including reinforcements or expansions. Enhancements include pipeline looping, upsizing, and uprating. Pipeline looping is the most common method of increasing capacity in an existing distribution system. Pipeline upsizing involves replacing existing pipe with a larger size pipe. Pipeline uprating increases the maximum allowable operating pressure of an existing pipeline.

Besides modifying the pipelines, regulators or regulator stations can be added to reduce pipeline pressure at various stages in the distribution system. If pressures are too low, compressor stations can be added to boost downstream pressures.

Another possible solution is targeted conservation. Area specific incentives for installed energy efficiency measures can reduce demand in a constrained area either eliminating or forestalling the need to add or reinforce infrastructure.

Once the optimal solution is determined, projects are ranked based on numerous criteria and are scheduled. Chapter 8, Distribution System Planning, presents three sample projects and Appendix I lists all known distribution projects.

## **Chapter 9: Resource Integration**

Cascade utilizes SENDOUT® for resource optimization. This software permits the Company to develop and analyze a variety of resource portfolios to help determine the type, size, and timing of resources best matched to forecast requirements. The model knows the exact load and price for every day of the planning period based on input and can therefore minimize costs in a way that would not be possible in the real world. It is important to acknowledge that SENDOUT® provides helpful but not perfect information to guide decisions.

One of the purposes of integrated resource planning is to identify an illustrative resource portfolio to help guide specific resource acquisitions. In this planning cycle, the Company considered a host of resource alternatives that could potentially be added to its resource portfolio, including additional conservation programs, incremental off-system storage alternatives at AECO Hub, Mist, Spire, Wild Goose, and Gill Ranch. Additionally, incremental transportation capacity on NWP, Ruby, Nova Gas Transmission Ltd. (NGTL), Foothills and GTN pipeline systems was considered, along with on-system satellite LNG facilities, RNG, and imported LNG. Typically, utility infrastructure projects are “lumpy,” since demand grows annually at a small percentage rate, while capacity is typically added on a project-by-project basis. Utilities often have surplus capacity and must “grow into” their new pipeline capacity, because it is more cost effective for pipelines to build for several years of load growth at one time than to make small additions each year. However, the Company can minimize the impacts through the acquisition of citygate peaking resources which include both the supplies and the associated pipeline delivery for a certain number of days or through the purchase of other’s excess capacity through short- or medium-term capacity releases.

Even after the savings from energy efficiency programs are realized, Cascade will need to acquire additional capacity resources or enter into other supply arrangements to meet anticipated peak day requirements, primarily due to continued growth in the Company’s residential and commercial customer base. Utilizing the SENDOUT® resource optimization model, several portfolios were run to test the viability of acquiring incremental storage and transportation resources based on existing recourse rates and discounted rates, and via capacity release through a third party. Basin prices in the model over the 20-year planning horizon

have AECO trading at a discount to Rockies, Malin, and Sumas. The acquisition of additional traditional pipeline capacity is the most reasonable resource to address most capacity shortfalls on a peak day.

Using input from these alternative resources, SENDOUT<sup>®</sup> derives a portfolio of existing and incremental resources that Cascade defines as the Preferred Portfolio. This provides guidance as to what resources should be considered to reduce unserved demand with a reasonable least cost and least risk mix of demand and supply side resources under expected pricing, weather, and growth environments.

Twenty-year portfolio costs under a multitude of scenarios/sensitivities are expected to range between \$4,067,388,000 to \$4,627,197,000 for the planning period, with an average cost per therm ranging between \$0.5232 and \$0.5478.

A more detailed discussion regarding the Company's resource integration and the results can be found in Chapter 9, Resource Integration.

## **Chapter 10: Stakeholder Engagement**

Input and feedback from Cascade's Technical Advisory Group (TAG) is an important resource for ensuring the IRP includes perspectives beyond the Company's and is responsive to stakeholders' concerns. Cascade held five public TAG meetings with internal and external stakeholders. One meeting was held in Bend. Participants invited to these public meetings include interested customers, regional upstream pipelines, Pacific Northwest Local Distribution Companies, Commission Staff, stakeholder representatives such as the Northwest Gas Association, Public Counsel, Citizens' Utility Board, Oregon Department of Ecology, and the Alliance of Western Energy Consumers. Cascade has a dedicated internet webpage where customers and parties can view the IRP timeline, TAG presentations and minutes, as well as current and past IRPs. This information can be found at <https://www.cngc.com/rates-services/rates-tariffs/oregon-integrated-resource-plan>.

## **Chapter 11: Four-Year Action Plan**

Figure 1-1 on the following page shows Cascade's Four-Year Action Plan. Further descriptions can be found in Chapter 11, Four-Year Action Plan.

Cascade Natural Gas Corporation  
2020 Integrated Resource Plan

Figure 1-1: Highlights of 2020 Action Plan

| Functional Area              | Anticipated Action   | Timing                              |
|------------------------------|--|-------------------------------------|
| Resource Planning            | <p>Cascade will:</p> <ul style="list-style-type: none"> <li>attend other regional LDC IRP meetings;</li> <li>work with NWP on realigning MDDOs;</li> <li>determine if the temporary Jackson Prairie contract should be made permanent;</li> <li>develop modeling scenarios that represent Pipeline OFOs;</li> <li>improve the alignment of resource/costs between the PGA and the IRP;</li> <li>develop more scenarios that address changing Canadian Markets;</li> <li>add RNG as a candidate portfolio; and</li> <li>work with Staff and Stakeholders to develop a more effective presentation for the severity of negative outcomes. Cascade will report on the status of this action item when filing the 2021 OR IRP Update.</li> </ul>   | Ongoing, for inclusion in 2022 IRP. |
| Demand                       | <p>Cascade will look into making adjustments to a few methodologies on the demand forecast and scenarios. Those adjustments include:</p> <ul style="list-style-type: none"> <li>Adding wind in the stochastic weather analysis; and</li> <li>A new methodology for peak day.</li> </ul>  | Ongoing, for inclusion in 2022 IRP. |
| Environmental Policy         | <p>Cascade will either begin or continue to participate/monitor the following items:</p> <ul style="list-style-type: none"> <li>Continue to support the City of Bend's Climate Action Plan;</li> <li>Participate in City of Bellingham Climate Action Plan discussions;</li> <li>Monitor service areas for potential GHG reduction goal development relating to energy delivery and supply;</li> <li>Monitor carbon pricing and policy developments nationally and statewide;</li> <li>Monitor federal and state GHG regulation development for energy industry; and</li> <li>Continuation of current emission reduction and monitoring endeavors.</li> </ul>  | Ongoing, for inclusion in 2022 IRP. |
| DSM (Energy Efficiency)      | The Company will execute the Demand Side Management action items as described on page 11-3 and 11-4.   | Ongoing, for inclusion in 2022 IRP. |
| Renewable Natural Gas        | Cascade will continue to develop and update the cost-effective evaluation tool.  | Ongoing, for inclusion in 2022 IRP. |
| Distribution System Planning | <p>These projects are budgeted over the next five years:</p> <ul style="list-style-type: none"> <li>FP-306990 - PENDLETON 4" IP REINFORCEMENT</li> <li>FP-306991 - PENDLETON 4" HP REINFORCEMENT</li> <li>FP-306992 - PENDLETON KORVOLA ROAD 4"</li> <li>FP-316851 - South Hermiston to Feedville</li> <li>FP-316854 - BEND GATE REBUILD</li> <li>FP-316863 - Prineville Gate Rebuild</li> <li>FP-317586 - RF-REDM-6"S-4,750'-VETERANS WY</li> <li>FP-318466 - RF-Baker-GT-NW Baker Gate</li> <li>FP-318468 - RF-Baker-GT-NW Baker Regulation</li> <li>FP-318469 - RF-Baker-GT-NW Baker Gate Odorizer</li> <li>FP-318475 - RF-Baker-GT-NW Baker GT Line</li> <li>FP-318682 - RF-BEND-6"S-1100'-SHEVLIN PK</li> <li>FP-318733 - RF-BEND-6"S-2MI-SHEVLIN PK</li> <li>FP-318737 - RF-BEND-R-SHEVLIN PK RD 2"</li> <li>FP-318741 - RF-BEND-6"PE-1200'-PONDEROSA ST</li> <li>FP-318744 - RP-PRINEVILLE-GT-TRANSCANADA</li> <li>FP-318745 - RP-BEND-GT-TRANSCANADA</li> <li>FP-318770 - RF-REDM-R-VETERANS WAY-2" STD</li> </ul> | Ongoing over the next five years.   |

## **Chapter 2**

### **COMPANY OVERVIEW**

## Company Overview

Cascade Natural Gas Corporation (CNGC or Cascade or Company) has a rich history that began 67 years ago when business leaders and public officials in the Pacific Northwest initiated a campaign to bring natural gas to the region to replace other more expensive fuels. In 1953, five small utilities serving fifteen communities merged to form Cascade. Over the years, Cascade continued to grow, merging with and purchasing other utility providers. The Company stock first traded on the New York Stock Exchange in 1973. In 2007, Cascade merged with Montana Dakota Utilities (MDU) Resources Group Inc. which is headquartered in Bismarck, North Dakota. Cascade's headquarters moved from Seattle, Washington to Kennewick, Washington in 2010.

### Key Points

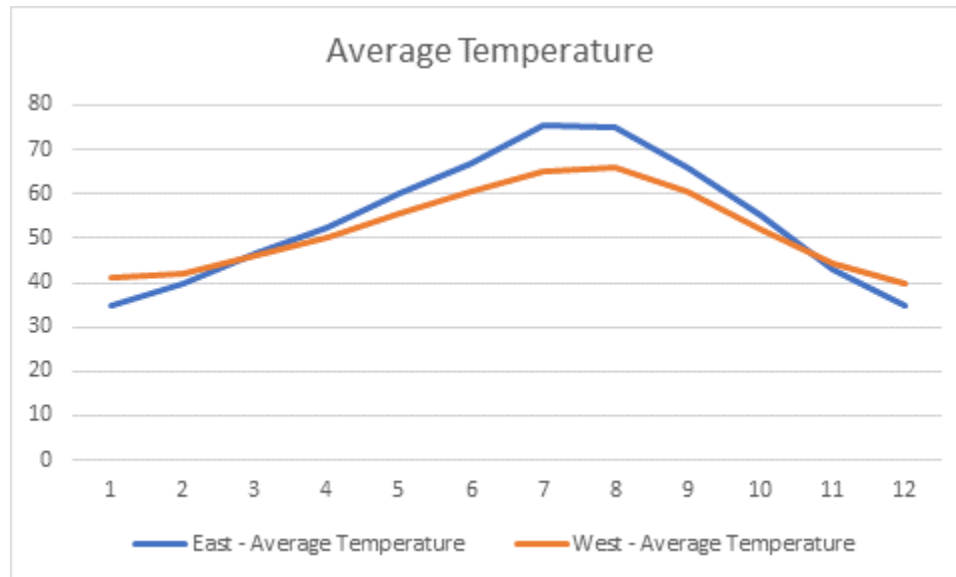
- Cascade serves diverse geographical territories across Washington and Oregon.
- Cascade's primary pipelines are NWP, GTN, and Enbridge, also known as WCT, with access to three other pipelines.
- Core customers represent 25% of total throughput, while non-core customers represent 75% of total throughput.
- Cascade is a subsidiary of MDU Resources Inc., based in Bismarck, North Dakota.

Today, Cascade's service territory covers about 32,000 square miles and extends over 700 highway miles from end to end, encompassing a diverse economic base as well as varying climatological areas. Cascade delivers natural gas service to more than 299,000 customers with approximately 77,000 customers in Oregon and 222,000 customers in Washington. The Company's customers reside in 96 communities--28 in Oregon and 68 in Washington. Cascade's service area consists of smaller, rural communities in central and eastern Oregon, as well as communities across Washington.

The climate of the service territory is almost as diverse as its geographical extension. Oregon's service territory is in rural areas throughout northern central and central Oregon as well as eastern Oregon. All regions of Oregon have semi-arid climates with periods of arctic cold in the winter and heat waves in the summer. The western Washington portion of the service territory, nicknamed the I-5 corridor, has a marine climate with occasionally significant snow events. In general, the climate in the western part of the service territory is mild with frequent cloud cover, winter rain, and warm summers. Cascade's eastern Washington service territory has a semi-arid climate with periods of arctic cold in the winter and heat waves in the summer. Figure 2-1 compares the average temperatures by month of the two regions.



Figure 2-1: Average Temperature by Region

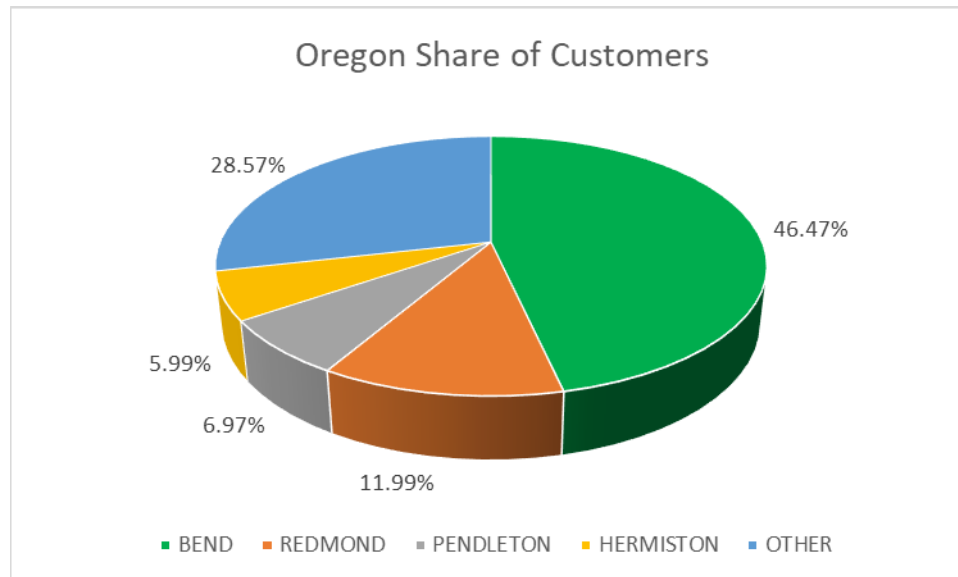


Below are some of the more populated towns within the regions Cascade provides distribution service:

- **Northwest** – Bellingham, Mt. Vernon, Oak Harbor/Anacortes, the Kitsap Peninsula, the Grays Harbor area and Kelso/Longview;
- **Central** – Sunnyside, Wenatchee/Moses Lake, Tri-Cities, Walla Walla and Yakima areas; and
- **Southern** – Bend and surrounding communities, Ontario, Baker City and the Pendleton/Hermiston areas.

Figure 2-2 shows a breakdown of Cascade’s Oregon customer density by town. A map of Cascade’s certificated service territory is provided as Figure 12-13 in Chapter 12, Glossary and Maps.

Figure 2-2: Customer Density by Town



### Pipeline and Basin Locations

Cascade purchases natural gas from a variety of suppliers and transports gas supplies to its distribution system using three natural gas pipeline companies. Northwest Pipeline LLC (NWP) provides access to British Columbia and domestic Rocky Mountain gas, Gas Transmission Northwest (GTN) provides access to Alberta and Malin gas, and Enbridge (WCT) provides British Columbia gas directly into the Company's distribution system. Cascade also holds upstream transportation contracts on TransCanada Pipeline's Foothills Pipeline (FHBC), NOVA Gas Transmission Ltd. (also known as NGTL), and Ruby Pipeline. More information about the pipelines and the supply basins is provided in Chapter 4, Supply Side Resources. Maps of select pipelines are found in Chapter 12.

### Core vs Non-Core Service

Cascade offers core service, which is the procurement of gas supply from an upstream basin, such as Sumas or AECO, that is then transported to Cascade's citygates. From the citygate, Cascade then delivers gas on its distribution system to the end-use customer. Although Cascade offers core service to all its customers, not all of them take advantage of this type of firm service.

In 1989, concurrent with the passage of the Natural Gas Wellhead Decontrol Act, Cascade began allowing its large volume customers to purchase their own gas

supplies and gas transportation services upstream of Cascade's distribution system.<sup>1</sup> These customers, referred to as large volume transportation or non-core customers, procure the distribution of their gas supply from Cascade from citygate to the point of delivery at the customer's site. The Company currently has approximately 245 large volume customers who have elected this type of non-core service.

Since the Company does not provide gas supply and upstream pipeline transportation capacity resources to non-core customers, the Company does not plan for non-core customers in the upstream resource analysis of its Integrated Resource Plan (IRP). Non-core demand is a consideration in distribution planning. While it is not the core substance of the IRP, it is included in Chapter 8, Distribution System Planning.

As of fourth quarter 2019, Cascade's residential customers represent approximately 13% of the total natural gas delivered on Cascade's system, while commercial customers represent roughly 10%, and the approximately 500 core industrial customers consumed around 2% of total gas throughput. The remaining non-core industrial customers represent the balance of the 75% of total throughput.

## **Company Organization**

In 2007, Cascade became a subsidiary of MDU Resources Group, Inc., a multidimensional regulated energy delivery and construction materials and services business, operating in 43 states and traded on the New York Stock Exchange under the symbol MDU. Cascade, with headquarters in Kennewick, Washington, is part of its utility group of subsidiaries. MDU Resources Group's utility companies serve more than one million customers. Cascade distributes natural gas in Oregon and Washington. Great Plains Natural Gas Co. distributes natural gas in western Minnesota and southeastern North Dakota. Intermountain Gas Company distributes natural gas in southern Idaho. Montana-Dakota Utilities Co. generates, transmits and distributes electricity and distributes natural gas in Montana, North Dakota, South Dakota and Wyoming. Figure 2-3 provides a geographical representation of the various services/territories served by MDU Resources. Figure 2-4 shows the MDU Resources Electric and Natural Gas Services and Territory.

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<sup>1</sup>Natural Gas Wellhead Decontrol Act of 1989 amends the Natural Gas Policy Act of 1978 to declare that the price guidelines for the first sale of natural gas do not apply to: (1) expired, terminated, or post-enactment contracts executed after the date of enactment of this Act; and (2) certain renegotiated contracts. Decontrols as of May 15, 1991, natural gas produced from newly spudded wells. Repeals permanently wellhead price controls beginning on January 1, 1993.

Figure 2-3: MDU Resources Services and Territory

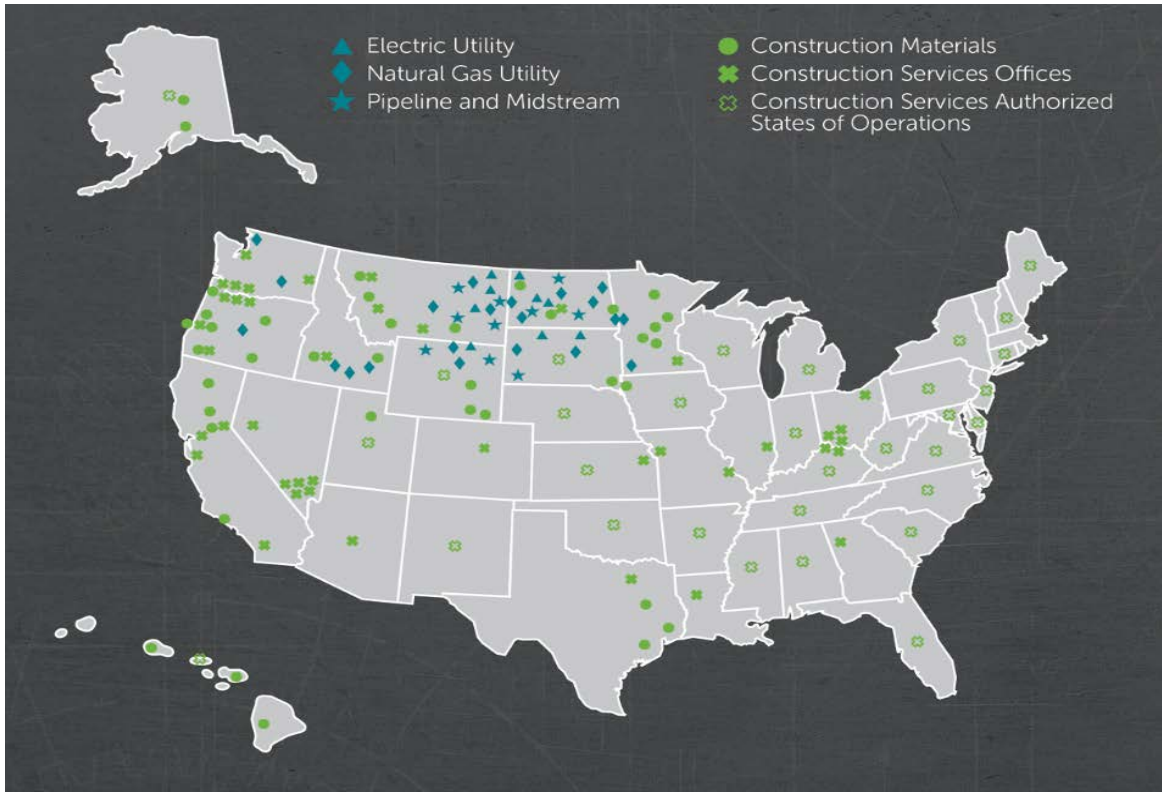
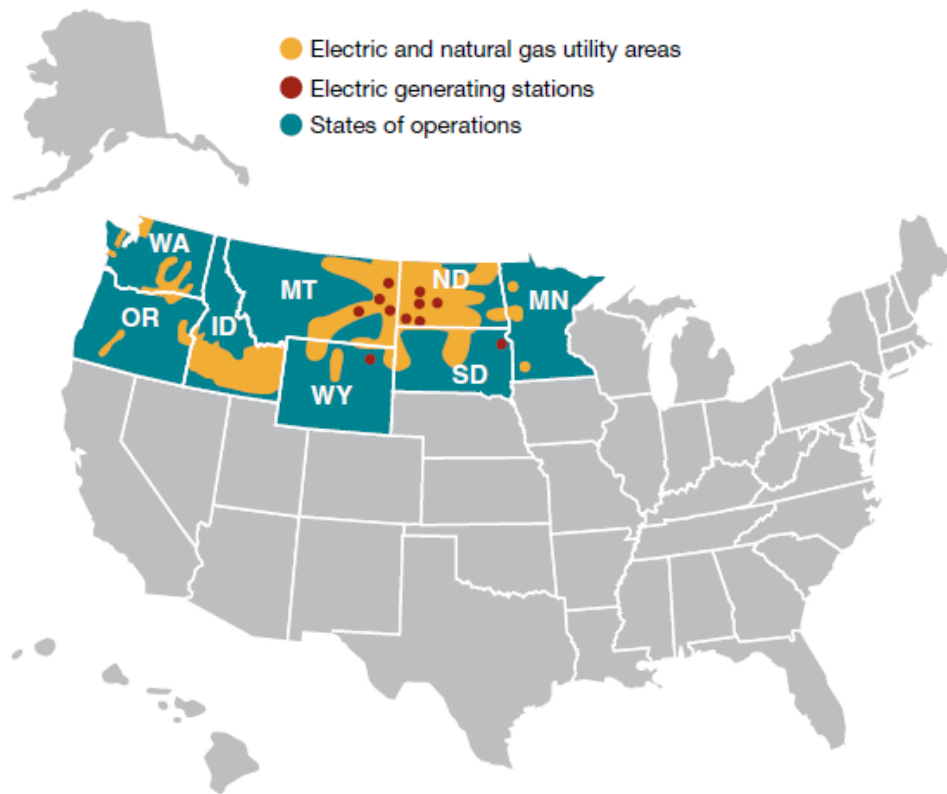


Figure 2-4: MDU Resources Electric and Natural Gas Services and Territory





## **CHAPTER 3**

### **DEMAND FORECAST**

## Overview

Each year Cascade develops a 20-year forecast of customers, therm sales, and peak requirements for use in short-term (annual budgeting) and long-term (distribution and integrated resource planning) planning processes. Sources of this forecast include historic data, market intelligence, and regional economic data from Woods & Poole. This forecast is a robust portfolio of estimates created by expanding a single best-estimate forecast, which includes various potential economic, demographic, and marketplace eventualities, into scenarios such as low, expected, and high growth. The scenarios are used for distribution system enhancement planning and as inputs in optimization models to determine the reasonable least cost, least risk mix of supply and Demand Side Management (DSM) resources, revenue budgeting, and load forecasts associated with the purchased gas cost process.

### Key Points

- Cascade initiates its forecast with analyses of demand area, weather, and HDDs.
- Peak day is analyzed deterministically with coldest day in 30 years, and stochastically using 10,000 Monte Carlo simulated draws.
- Cascade uses a 60 °F reference temperature to calculate HDDs.
- The Company utilizes dynamic regression modeling techniques for customer and annual demand forecasts.
- High and low scenarios are included and alternative forecasting assumptions were considered.
- Cascade expects system load growth to average 1.26% per year over the 20-year planning horizon.
- Uncertainties in the future may cause differences from the Company's forecast.

## Demand Areas

For the 2020-2039 planning horizon, Cascade forecasted at both the citygate and rate class levels. This is a change of methodology from previous years when certain models were built from the district or zonal level. Cascade has a total of 76 citygates of which nine citygates feed only non-core customers and the remaining 67 serve at least one core customer. Of the 67 citygates that serve core customers, twenty are grouped into eight different citygate loops. Therefore, Cascade forecasts a total of 55 areas. Each of these areas contain multiple rate classes, resulting in approximately 200 individual dynamic regression models. Each citygate is assigned to a weather location. For this IRP, the Company assigned the citygates to the closest weather location by distance. The citygate results are rolled up into zones and districts which segregate Cascade's system based on pipelines and weather, as shown in Appendix B. Figure 3-1 provides a cross reference for the demand areas.



Cascade Natural Gas Corporation  
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Figure 3-1: Demand Areas

| Citygate                    | Loop                 | State | Weather Location | Zone  |
|-----------------------------|----------------------|-------|------------------|-------|
| 7TH DAY SCHOOL              |                      | WA    | Yakima           | 10    |
| A/M RENDERING               | Sumas SPE Loop       | WA    | Bellingham       | 30-W  |
| ACME                        |                      | WA    | Bellingham       | 30-W  |
| ARLINGTON                   |                      | WA    | Bellingham       | 30-W  |
| ATHENA                      |                      | OR    | Pendleton        | ME-OR |
| BAKER                       |                      | OR    | Baker City       | 24    |
| BELLINGHAM 1 (FERNDALE)     | Sumas SPE Loop       | WA    | Bellingham       | 30-W  |
| BEND                        | Bend Loop            | OR    | Redmond          | GTN   |
| BREMERTON (SHELTON)         |                      | WA    | Bremerton        | 30-S  |
| BURBANK HEIGHTS             | Burbank Heights Loop | WA    | Walla Walla      | 20    |
| CASTLE ROCK                 |                      | WA    | Bremerton        | 26    |
| CHEMULT                     |                      | OR    | Redmond          | GTN   |
| DEHAWN DAIRY                |                      | WA    | Yakima           | 10    |
| DEMING                      |                      | WA    | Bellingham       | 30-W  |
| EAST STANWOOD               | East Stanwood Loop   | WA    | Bellingham       | 30-W  |
| FINLEY                      |                      | WA    | Walla Walla      | 20    |
| GILCHRIST                   |                      | OR    | Redmond          | GTN   |
| GRANDVIEW                   |                      | WA    | Yakima           | 10    |
| HERMISTON                   |                      | OR    | Pendleton        | ME-OR |
| HUNTINGTON                  |                      | OR    | Baker City       | 24    |
| KALAMA #1                   |                      | WA    | Bremerton        | 26    |
| KALAMA #2                   |                      | WA    | Bremerton        | 26    |
| KENNEWICK                   | Kennewick Loop       | WA    | Walla Walla      | 20    |
| LA PINE                     |                      | OR    | Redmond          | GTN   |
| LAWRENCE                    |                      | WA    | Bellingham       | 30-W  |
| LDS CHURCH                  |                      | WA    | Bellingham       | 30-W  |
| LONGVIEW-KELSO              | Longview South Loop  | WA    | Bremerton        | 26    |
| LYNDEN                      | Sumas SPE Loop       | WA    | Bellingham       | 30-W  |
| MADRAS                      |                      | OR    | Redmond          | GTN   |
| MCCLEARY (ABERDEEN/HOQUIAM) |                      | WA    | Bremerton        | 30-S  |
| MILTON-FREEWATER            |                      | OR    | Walla Walla      | ME-OR |
| MISSION TAP                 |                      | OR    | Pendleton        | ME-OR |
| MOSES LAKE                  |                      | WA    | Yakima           | 20    |
| MOUNT VERNON                | Sedro-Woolley Loop   | WA    | Bellingham       | 30-W  |
| MOXEE (BEAUCHENE)           |                      | WA    | Yakima           | 11    |
| NORTH BEND                  |                      | OR    | Redmond          | GTN   |
| NORTH PASCO                 | Burbank Heights Loop | WA    | Walla Walla      | 20    |
| NYSSA-ONTARIO               |                      | OR    | Baker City       | 24    |
| OAK HARBOR/STANWOOD         | East Stanwood Loop   | WA    | Bellingham       | 30-W  |

*Cascade Natural Gas Corporation  
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| Citygate               | Loop                 | State   | Weather Location | Zone  |
|------------------------|----------------------|---------|------------------|-------|
| OTHELLO                |                      | WA      | Walla Walla      | 20    |
| PASCO                  | Burbank Heights Loop | WA      | Walla Walla      | 20    |
| PATTERSON              |                      | WA      | Yakima           | 26    |
| PENDLETON              |                      | OR      | Pendleton        | ME-OR |
| PRINEVILLE             |                      | OR      | Redmond          | GTN   |
| PRONGHORN              |                      | Redmond | Redmond          | GTN   |
| PROSSER                |                      | WA      | Yakima           | 10    |
| QUINCY                 |                      | WA      | Yakima           | 11    |
| REDMOND                |                      | OR      | Redmond          | GTN   |
| RICHLAND (Richland Y)  | Kennewick Loop       | WA      | Walla Walla      | 20    |
| SEDRO/WOOLLEY          | Sedro-Woolley Loop   | WA      | Bellingham       | 30-W  |
| SELAH                  | Yakima Loop          | WA      | Yakima           | 11    |
| SOUTHRIDGE             | Kennewick Loop       | WA      | Walla Walla      | 20    |
| SOUTH BEND             | Bend Loop            | OR      | Redmond          | GTN   |
| SOUTH LONGVIEW         | Longview South Loop  | WA      | Bremerton        | 26    |
| STANFIELD              |                      | OR      | Pendleton        | GTN   |
| STEARNS (SUNRIVER)     |                      | OR      | Redmond          | GTN   |
| SUNNYSIDE              |                      | WA      | Yakima           | 10    |
| UMATILLA               |                      | OR      | Pendleton        | ME-OR |
| WALLA WALLA            |                      | WA      | Walla Walla      | ME-WA |
| WALLULA                |                      | WA      | Walla Walla      | ME-WA |
| WCT-CNG INTERCONNECT   | Sumas SPE Loop       | WA      | Bellingham       | 30-W  |
| WENATCHEE              |                      | WA      | Yakima           | 11    |
| WOODLAND               |                      | WA      | Bremerton        | 26    |
| YAKIMA CHIEF RANCH     |                      | WA      | Yakima           | 10    |
| YAKIMA TRAINING CENTER |                      | WA      | Yakima           | 11    |
| YAKIMA/UNION GAP       | Yakima Loop          | WA      | Yakima           | 11    |
| ZILLAH (TOPPENISH)     |                      | WA      | Yakima           | 10    |

## **Weather**

Historical weather data is provided by a contractor, Schneider Electric. Historically, Cascade has accessed data from NOAA (National Oceanic and Atmospheric Administration), but found many months/locations with missing data. The current forecast uses 30 years of recent history as the normal or expected weather. The forecast model takes the 30 previous years, converts the data to heating degree days (HDDs), then averages the HDDs into average days to create a normal or expected year. Cascade has seven weather locations with four located in Washington and three in Oregon. The three locations in Oregon are Baker City, Pendleton, and Redmond.

## Heating Degree Days

HDD values are calculated with the daily average temperature, which is the simple average of the high and low temperatures for a given day. The daily average is then subtracted from an HDD degree threshold (for example 60 °F) to create the HDD for a given day. Should this calculation produce a negative number, a value of zero is assigned as the HDD. Therefore, HDDs can never be negative. The HDD threshold number is designed to reflect a temperature below which heating demand begins to significantly rise. The historical threshold for calculating HDD has been 65 °F. However, when modeling gas demand based on weather, Cascade has determined that lowering the threshold to 60 °F produces more accurate results for the Company's service area. Figures 3-2 and 3-3 illustrate why the lower threshold is preferable. These figures show that heating demand does not begin to increase significantly until an HDD of five (65 °F minus 60 °F) is reached, if the traditional HDD threshold of 65 °F is utilized. Lowering the HDD threshold improves the R<sup>2</sup> statistic, thus giving a better measure of the relation between HDD and therms (measurement of heat usage). Cascade ran a cross-validation analysis to compare the forecast with actual weather and customer counts in the regressions (e.g. 2011 customers, with 2011 weather, to cross-validate 2011). When comparing, using a 65 °F reference temperature, the cross-validation analysis had a mean absolute percentage error (MAPE) of 14.9%. When using a 60 °F reference temperature, the MAPE improved to 7.62%.

Figure 3-2: Acme Therm/HDD with 65°F Reference Temperature

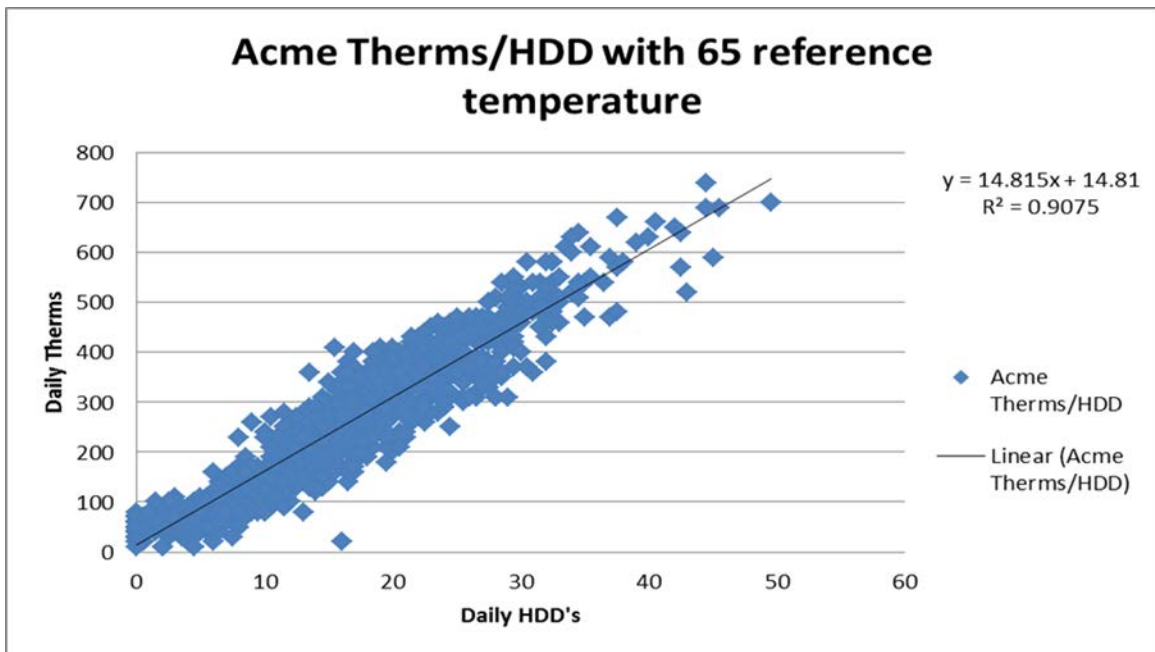
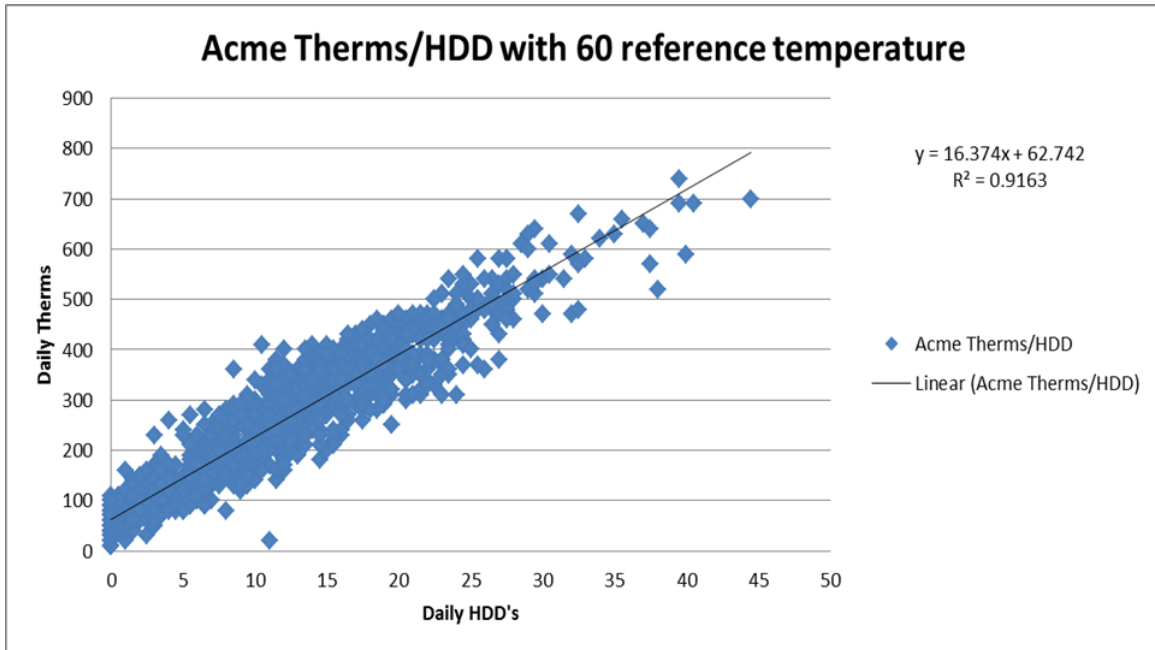


Figure 3-3: Acme Therm/HDD with 60°F Reference Temperature



### Peak Day HDDs

In order to ensure satisfaction of core customer demand on the coldest days, Cascade develops a deterministic and a stochastic peak day usage forecast in conjunction with annual base load forecasts. Peak day forecasts enable Cascade to make prudent distribution system and peak upstream pipeline capacity planning decisions to fulfill its responsibility to provide heating under all but *force majeure* conditions, particularly as most space-heating customers will have no alternative heating source during the coldest days in the event gas does not flow.

The deterministic peak day that was analyzed in the forecast model is a system-wide weighted HDD coldest in 30 years value.

This peak day will give Cascade the deterministic outcome with varying amounts of demand. The deterministic peak HDD methodology allows Gas Supply to plan for the highest peak event during a heating season.

System-wide maximum peak HDDs are determined by first selecting the system-wide single coldest day recorded in the past 30 years. To determine the system-wide single coldest day, HDDs from all seven weather stations are considered, giving appropriate weight to the weather stations. The weights are determined by the increase in demand experienced with an increase in one HDD. Cascade has found December 21, 1990, to have the highest, system-weighted HDD, at 56 HDDs for this period.

For SENDOUT®, Cascade uses the system-wide maximum peak HDDs method. Cascade applies the HDDs experienced on December 21, 1990, to each of the regressions in the forecast model. For example, all citygates associated with the Yakima weather station use the HDD for Yakima on December 21, 1990, and similarly for all the other weather stations and citygates. This provides a highest demand scenario for peak demand load based on 30 years of weather history for each citygate. Applying December 21, 1990, weather temperatures to today's forecast methodology gives Cascade an accurate representation of the demand the Company could expect to experience if this weather happened during the planning horizon.

Cascade is actively expanding its peak day methodology to include stochastic elements such as Monte Carlo analysis. More on this peak day analysis can be found on page 3-11. Cascade will also continue to investigate how various peak day standards affects the core demand load areas which are short of capacity. This investigation will include (but not be limited to) analysis of how other regional utilities look at peak day, discussions with the various weather services, and continued dialogue with Commission Staff and other interested parties.

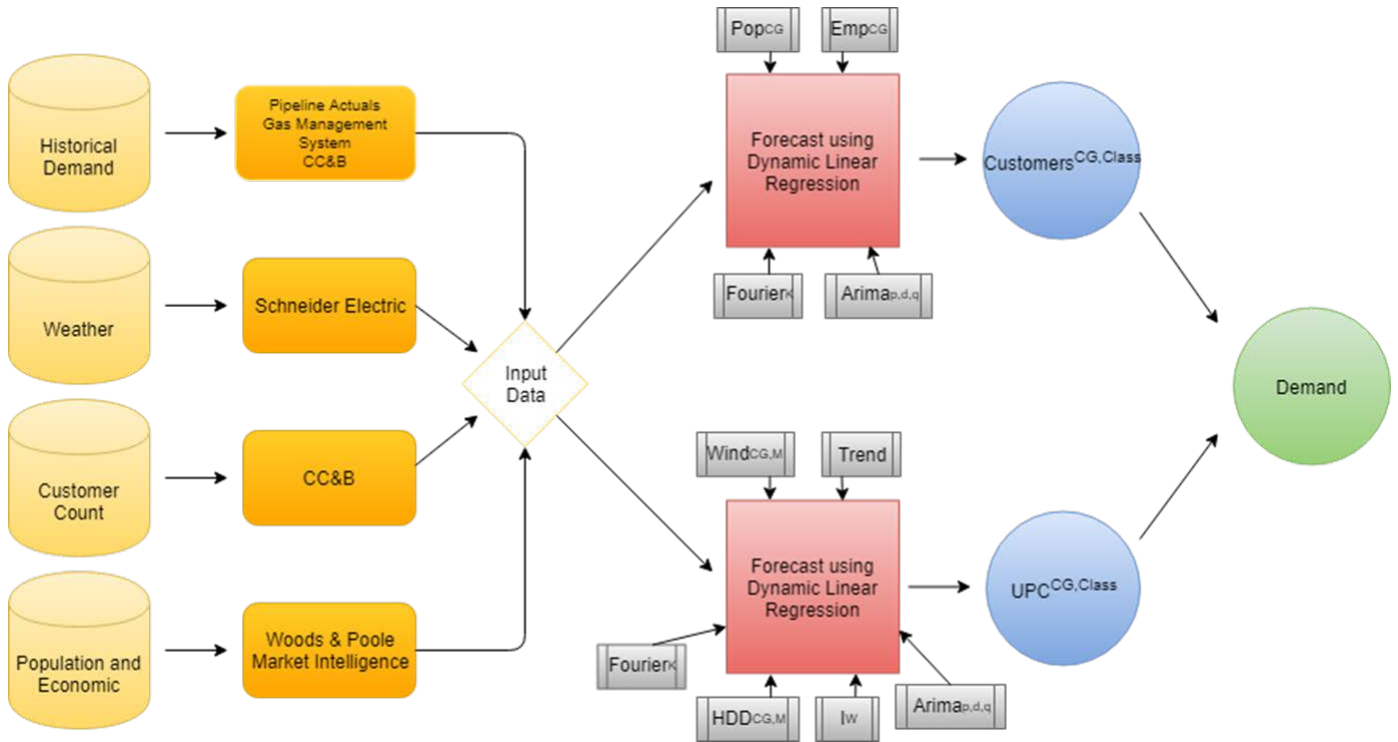
## **Wind**

Wind values are calculated with the daily average wind speed, which is the simple average of the high and low wind speeds for a given day. Wind speeds are also weather location specific, similar to HDDs.

## **Demand Overview**

Figure 3-4 provides a roadmap for Cascade's demand forecast. The inputs are displayed along with their sources in yellow and gold. The customer forecast and use-per-customer (UPC) forecast are shown in red along with their respective inputs into the model. Finally, the customer forecast is multiplied by the use-per-customer forecast to create the final demand forecast.

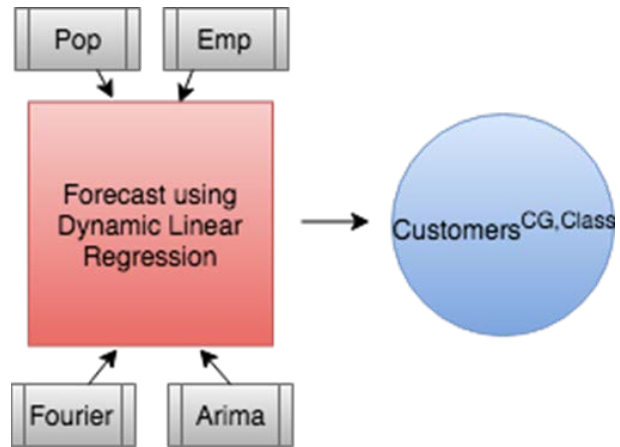
Figure 3-4: Demand Forecasting Process Overview



### Customer Forecast Methodology

Customer count forecasts are designed to reflect both demographic trends and economic conditions both in the short- and long-term. Cascade uses population and employment growth data from Woods & Poole (W&P). W&P growth forecasts are provided at the county level. It should be noted that W&P forecasts are adjusted when the internal intelligence about a demand area indicates a significant difference from W&P regarding observed economic trends.

Cascade utilizes dynamic regression models for the customer forecast as well as regression models for the UPC forecast, which will be discussed in the next subchapter. Below is the formula the Company used to run the regressions:



$$C_{Class}^{CG} = \alpha_0 + \alpha_1 Pop^{CG} + \alpha_2 Emp^{CG} + Fourier(k) + ARIMA\epsilon(p, d, q)$$

Model Notes:

- $C_{Class}^{CG}$  = Customers by Citygate by Class
- $Pop^{CG}$  = Population by Citygate
- $Emp^{CG}$  = Employment by Citygate
- *Fourier* = Terms used to capture seasonal patterns
- $k$  = Number of Fourier terms used in model
- $ARIMA\epsilon(p, d, q)$  =  
*Indicates that the model has  $p$  autoregressive terms,  $d$  difference terms, and  $q$  moving average terms.*

Cascade runs this model approximately 200 times to account for each customer class by citygate. The Company begins by testing seven different combinations of the regressors in both dynamic regression models and one Autoregressive Integrated Moving Average (ARIMA) model. The dynamic regression models test: Fourier, Population, Employment, Population + Fourier, Employment + Fourier, and Employment + Population + Fourier. The last model is called an ARIMA model, which uses ARIMA terms and no regressors. Unlike the dynamic regression models, the 'ARIMA Only' model's ARIMA term is not strictly modeling the errors, but is used as a model for the entire data set. The method used to compare and select a model is called the AIC, or the Akaike Information Criterion. This is a measure of the relative quality of statistical models, relative to each of the other models. In each of the models, except for the 'ARIMA Only' model, an ARIMA term is used to capture any structure in the errors (or residuals) of the model. In other words, there could be predictability in the errors, so they could be modeled as well. If the data is non-stationary, the ARIMA function will difference the data. Most times, the data does not require differencing, or only needs to be differenced once. Once the best model is selected for each customer class by citygate, a forecast is performed using the selected model.

Customer count and therm forecasts are augmented by revisions to the base data and output to create a portfolio of potential scenarios. Low and high growth scenarios are created from the confidence intervals from the forecast model. These scenarios, along with the original, best-estimate, expected scenario encapsulate a range of most-likely possibilities given known data. The most recent W&P data indicates an average annual population growth of 0.85% between 2020 and 2039 for Cascade's service territory. The projected customer growth is provided in Appendix B. Based on historical experience and given expected weather, Cascade expects system load will likely remain within a range bound by the low and high growth scenarios.

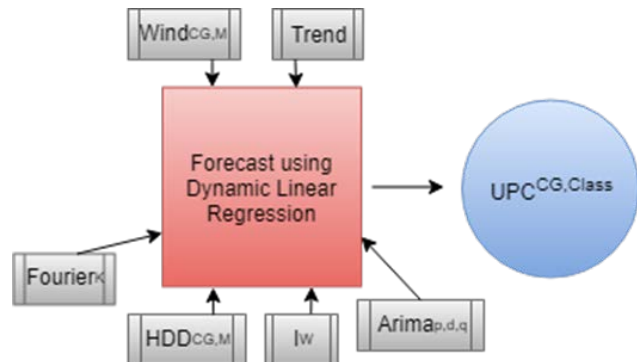
Among other reasons, the Company believes that growth in the following regions will be a major factor in any forecasted system-wide deficiency:

- Bend, Oregon – According to Portland State University’s (PSU) Population Research Center, the city of Bend is estimated to have an average annual growth rate of 10.22%. This is credited to factors such as job growth, increases in ratios of full-time to part-time jobs, poverty rates decreasing, and others. A study by a personal finance website called WalletHub found Bend to be the 3<sup>rd</sup> fastest growing city in the U.S. <sup>1</sup>
- Redmond, Oregon - The city of Redmond seems to be absorbing much of Bend’s rapid growth. With a lower cost of living and a strong job market, Redmond is boasting an annual average growth rate of 10.14%, according to PSU’s Population Research Center. <sup>2</sup>
- Tri-Cities, Washington – According to Washington’s Office of Financial Management’s data released in June 2019, Benton and Franklin counties were the fastest growing counties in the state between 2018 and 2019. These counties are growing at an impressive 2.2% and 2.3%, respectively, between 2018 and 2019. This rapid growth is credited primarily to net migration (people moving in versus people moving out). <sup>3</sup>

### Use-Per-Customer (UPC) Forecast Methodology

As previously mentioned, Cascade utilizes regression models for the UPC part of the demand forecast as well. Sources for the inputs into this model are pipeline actuals, Cascade’s gas management system, and Cascade’s Customer Care and Billing System (CC&B). Cascade developed the UPC coefficient by gathering historical pipeline demand data by day.

The pipeline demand data includes core and non-core usage. The non-core data is backed out using Cascade’s measurement data stored in the Company’s Aligned energy transaction system which leaves daily core usage data. The daily data is then allocated to a rate schedule for each citygate by using CC&B. This data is then divided by number of customers to come up with a UPC number for each day and for each rate schedule at each citygate.



Below is the model used for the UPC forecast:

$$\frac{Therms}{C_{Class}^{CG}} = \alpha_0 + \alpha_1 HDD^{CG,M} + \alpha_2 I_w + \alpha_3 T + \alpha_4 WIND^{CG,M} + Fourier(k) + ARIMA(p, d, q)$$

<sup>1</sup> <https://wallethub.com/edu/fastest-growing-cities/7010/>

<sup>2</sup> [https://www.oregonlive.com/news/erry-2018/05/3772ef0a5e1889/how\\_fast\\_is\\_each\\_oregon\\_city\\_g.html](https://www.oregonlive.com/news/erry-2018/05/3772ef0a5e1889/how_fast_is_each_oregon_city_g.html)

<sup>3</sup> <https://www.tricitiesbusinessnews.com/2019/06/2019-population-growth/>



Model Notes:

- $C_{Class}^{CG}$  = Customers by Citygate by Class.
- $HDD^{CG}$  = Heating Degree Days from Weather Location
- $m$  = month
- $w$  = weekend
- $T$  = Trend
- $I$  = Indicator variable, 1 if weekend, and 0 if weekday.
- $WIND^{CG}$  = Daily average wind speed from Weather Location
- $Fourier(k)$  = Captures seasonality of  $k$  number of seasons.
- $ARIMA(p, d, q)$  = Indicates model has  $p$  autoregressive terms,  $d$  difference terms, and  $q$  moving average terms.

Cascade runs this model for each of the 55 citygates and citygate loops by customer class where applicable, resulting in approximately 200 models. Cascade starts with the above model for Residential, Commercial, and Industrial customer classes. A change in methodology from previous IRPs involves keeping variables in the model that may appear non-significant on a statistical level but relevant on an economic level. This could be a shoulder month, i.e. September, showing insignificance in a model but economically known to affect the annual load shape of residential customers. Also, Cascade now runs the UPC forecast with Fourier and ARIMA terms.

### Peak Day Forecast Methodology

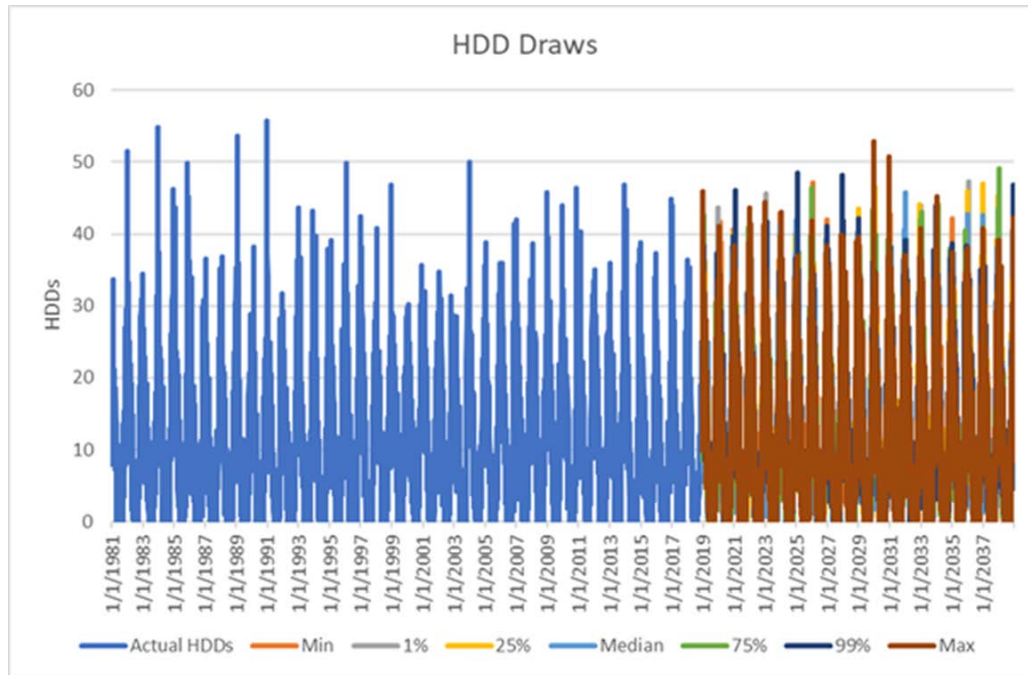
Cascade's methodology for peak day forecasting is similar to its forecast of demand. For a deterministic forecast, Cascade utilizes the same dynamic regressions as before but with a peak day HDD inserted. This peak day HDD comes from the coldest on record in the last 30 years. Once this peak day is inserted for every year of the forecast, Cascade deterministically derives a peak day usage forecast.

The Company also utilizes Monte Carlo simulation to stochastically analyze the peak day behavior. Through the statistical program R, Cascade runs 10,000 Monte Carlo draws in each weather zone, making sure to correlate the draws based on historical correlations between each weather zone. This results in 10,000 draws of various weather behavior based on historical averages, standard deviations, and correlations between weather zones. Further discussion regarding the Monte Carlo methodology can be found in Chapter 9, Resource Integration.

In this stochastic analysis, Cascade analyzed many attributes, including the minimum, the maximum, and percentiles such as the 1<sup>st</sup>, 25<sup>th</sup>, 75<sup>th</sup>, and the 99<sup>th</sup>. The 99<sup>th</sup> percentile is then used to calculate the Value-at-Risk (VaR) metric to compare with the VaR limits discussed in Chapter 9.

Figure 3-5 displays the historical weather data along with the Monte Carlo simulated weather forecast. The historical weather data represents actual HDDs. The 10,000-draw simulation includes the following draws: Minimum, 1%, 25%, median, 75%, 99%, and maximum.

Figure 3-5: Historical vs. Monte Carlo Simulated Weather



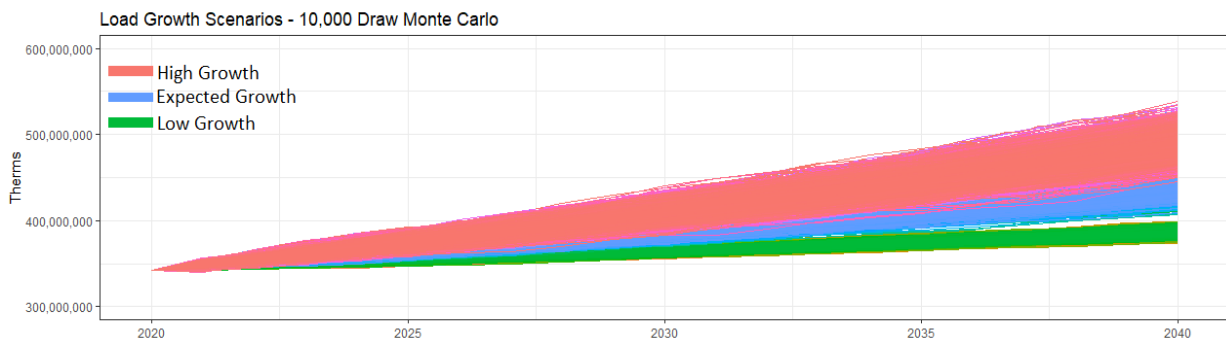
## Scenario Analysis

Cascade stress tests the load forecast in SENDOUT<sup>®</sup> by using alternative forecasting assumptions. These alternative forecasting assumptions refer to changing factors that influence demand. Alternative assumptions include high and low customer growth, and a stochastic study of weather using Monte Carlo simulations. These altered assumptions provide an effective tool for analyzing and stress testing the forecasts. Figure 3-6 identifies the list of scenarios. Figure 3-7 displays the scenario analysis over the planning horizon.

Figure 3-6: Growth and Weather Scenarios

| Scenario               | Weather             | Growth   | UPC      |
|------------------------|---------------------|----------|----------|
| Base Case              | Expected            | Expected | Expected |
| Low Growth             | Expected            | Low      | Expected |
| Low Growth Stochastic  | Monte Carlo Weather | Low      | Expected |
| High Growth            | Expected            | High     | Expected |
| High Growth Stochastic | Monte Carlo Weather | High     | Expected |

Figure 3-7: Scenario Analysis Demand Forecast (Volumes in Therms)



The base case contains expected weather, customer growth, and use per customer. The base case also has one max peak day event for each weather zone. Expected weather is the average weather over the past 30 years. High and low growth scenarios, discussed more on page 3-17, explain that Cascade uses modifiers to represent higher than expected growth and lower than expected growth. The high and low growth stochastic scenarios are represented by the 10,000 red and green lines above in Figure 3-7. This provides a stochastic stress test of Cascade’s growth scenarios. Stochastic tests such as these on demand are only to show how weather and/or growth can impact demand over the 20-year planning horizon. Cascade also performs a deep sensitivity analysis utilizing Monte Carlo runs for other variables such as price. Monte Carlo analysis is discussed further in Chapter 9.

### Forecast Results

Load across Cascade’s two-state service territory is expected to increase at an average annual rate of 1.26% over the planning horizon, with the Oregon portion outpacing Washington, 1.58% versus 1.15%. Figure 3-8 shows the expected core load volumes by state.

Figure 3-8: Expected Core Load by State (Volumes in Therms)

| Year                         | Washington   | Oregon       | System       |
|------------------------------|--------------|--------------|--------------|
| 2020                         | 256,632,337  | 86,191,685   | 342,824,022  |
| 2025                         | 272,364,811  | 93,774,368   | 366,139,180  |
| 2030                         | 289,075,933  | 101,716,374  | 390,792,307  |
| 2035                         | 305,787,078  | 109,658,358  | 415,445,436  |
| 2039                         | 319,102,685  | 115,997,548  | 435,100,233  |
| <b>Average Annual Growth</b> | <b>1.15%</b> | <b>1.58%</b> | <b>1.26%</b> |

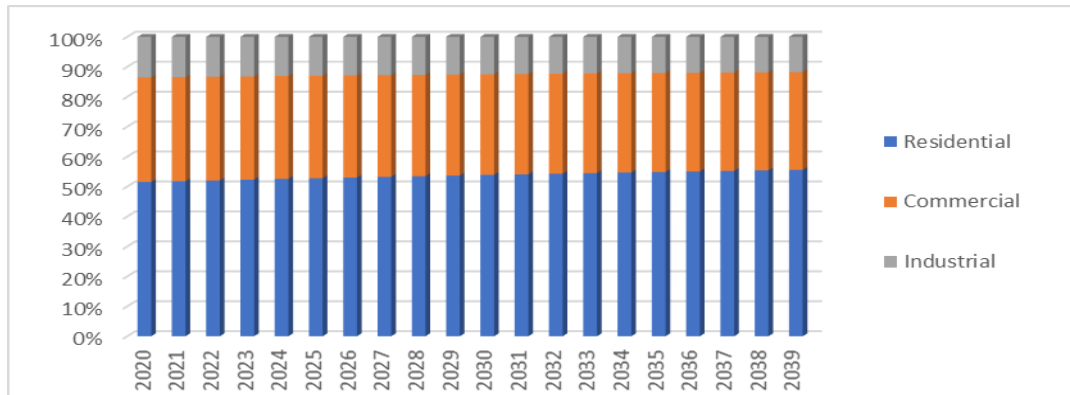
Load growth across Cascade’s system through 2039 is expected to fluctuate between 0.78% and 1.80% annually, accounting for leap years. Load growth is split between residential, commercial, and industrial customers. Residential and commercial customer classes are expected to grow annually at an average rate of 1.66% and 0.91%, while industrial expects a growth rate of approximately 0.51%. Figure 3-9 shows the percentage of core growth by class over the planning horizon.

Figure 3-9: Expected Core Load Growth by Class

| Average Growth               | Residential  | Commercial   | Industrial   | System       |
|------------------------------|--------------|--------------|--------------|--------------|
| 2020-2024                    | 1.91%        | 1.00%        | 0.55%        | 1.41%        |
| 2025-2029                    | 1.68%        | 0.88%        | 0.47%        | 1.25%        |
| 2030-2034                    | 1.62%        | 0.91%        | 0.52%        | 1.24%        |
| 2035-2039                    | 1.50%        | 0.87%        | 0.51%        | 1.17%        |
| <b>Average Annual Change</b> | <b>1.66%</b> | <b>0.91%</b> | <b>0.51%</b> | <b>1.26%</b> |

In absolute numbers, system load under normal weather conditions is expected to grow annually at an average of 4.9 million therms. A majority of core load today is residential. Cascade projects the ratio between residential, commercial, and industrial to increase in favor of residential customers. Residential customers are expected to grow from 54.5% of the total core load to 57% of the total core load by 2039. Figure 3-10 displays the relative percentage relationship of expected loads by class.

Figure 3-10: Expected Load Stack by Class



Cascade expects residential customers to increase load at an annual average growth of approximately 3.4 million therms and commercial core customers to increase load at an annual average growth of approximately 1.2 million therms over the 20-year planning horizon. Industrial customers are expected to increase load at an annual average growth of approximately 247,000 therms over the same period. Figure 3-11 displays the expected core load volumes by class.

Figure 3-11: Expected Load Growth by Class (Volumes in Therms)

| Year                         | Residential  | Commercial   | Industrial   |
|------------------------------|--------------|--------------|--------------|
| 2020                         | 176,668,996  | 119,706,359  | 46,448,668   |
| 2025                         | 193,278,462  | 125,290,909  | 47,569,808   |
| 2030                         | 210,595,205  | 131,345,978  | 48,851,124   |
| 2035                         | 227,911,914  | 137,401,072  | 50,132,450   |
| 2039                         | 241,732,639  | 142,220,037  | 51,147,557   |
| <b>Average Annual Change</b> | <b>1.65%</b> | <b>0.91%</b> | <b>0.51%</b> |

Load growth is primarily a result of increased customer counts. The number of commercial and industrial customers is expected to increase at a slightly faster rate than therm usage, whereas residential customer growth is similar to the residential load growth. Figure 3-12 displays the expected customer counts by class.

Figure 3-12: Expected Customer Counts by Class

| Year                         | Residential  | Commercial   | Industrial   |
|------------------------------|--------------|--------------|--------------|
| 2020                         | 3,152,556    | 445,063      | 9,047        |
| 2025                         | 3,464,692    | 467,980      | 9,687        |
| 2030                         | 3,776,826    | 490,896      | 10,326       |
| 2035                         | 4,088,960    | 513,812      | 10,966       |
| 2039                         | 4,338,669    | 532,146      | 11,477       |
| <b>Average Annual Change</b> | <b>1.65%</b> | <b>0.93%</b> | <b>1.22%</b> |

## Geography

Bend, Oregon is a major driver in the growth rate. The central part of the state is expected to see a large increase in growth. Figure 3-13 shows the percentage growth of load by each of Cascade's weather locations. Figure 3-14 shows the percentage growth of load by each pipeline zone over the planning horizon. Lastly, Figure 3-15 displays a range of core peak day growth over the planning horizon along with a sampling of peak day therms. Peak day average annual growth is expected to be approximately 1.38%.

Figure 3-13: Oregon 20-Year Load Growth by Weather Location (Volumes in Therms)

| Weather       | Average Annual Growth | 2020 Load         | 2039 Load          |
|---------------|-----------------------|-------------------|--------------------|
| Baker City    | 0.70%                 | 9,984,100         | 11,380,900         |
| Pendleton     | 0.90%                 | 14,607,900        | 17,306,000         |
| Redmond       | 1.83%                 | 61,166,000        | 86,878,800         |
| <b>Oregon</b> | <b>1.56%</b>          | <b>85,758,000</b> | <b>115,565,700</b> |

Figure 3-14: System 20-Year Load Growth by Pipeline Zone

| Zone       | Load Growth |
|------------|-------------|
| Zone 10    | -0.51%      |
| Zone 11    | 23.74%      |
| Zone 20    | 51.36%      |
| Zone 24    | 15.04%      |
| Zone 26    | 10.60%      |
| Zone 30-S  | 18.58%      |
| Zone 30-W  | 24.77%      |
| Zone GTN   | 43.72%      |
| Zone ME-OR | 18.96%      |
| Zone ME-WA | 19.56%      |

Figure 3-15: Expected Peak Day Growth (Volumes in Therms)

| Period                       | Peak Day Growth | Year | Peak Day Therms |
|------------------------------|-----------------|------|-----------------|
| 2020 – 2024                  | 1.56%           | 2021 | 3,612,900       |
| 2025 – 2029                  | 3.04%           | 2026 | 3,890,000       |
| 2030 – 2034                  | 2.90%           | 2032 | 4,222,500       |
| 2035 – 2039                  | 2.80%           | 2037 | 4,499,600       |
| <b>Average Annual Growth</b> | <b>1.38%</b>    |      |                 |

## High and Low Growth Scenarios

High and low growth scenarios were created by examining the confidence intervals resulting from the customer forecast model. Cascade derived from these intervals a high growth modifier of 1.5 times the expected growth, and a low growth modifier of 0.5 times the expected growth. Cascade projects an average annual growth rate of 1.26% in load growth on the expected case, 0.63% on the low band and 1.88% on the high band. Figure 3-16 displays the expected total system load growth across various scenarios.

Figure 3-16: Expected Total System Load Growth (By Percentage) Across Scenarios

| Range                 | Low           | Expected      | High          |
|-----------------------|---------------|---------------|---------------|
| 2020-2024             | 0.71%         | 1.41%         | 2.12%         |
| 2025-2029             | 0.63%         | 1.25%         | 1.88%         |
| 2030-2034             | 0.62%         | 1.24%         | 1.87%         |
| 2035-2039             | 0.59%         | 1.17%         | 1.76%         |
| 2020-2039             | <b>12.70%</b> | <b>26.92%</b> | <b>42.81%</b> |
| Average Annual Change | <b>0.63%</b>  | <b>1.26%</b>  | <b>1.88%</b>  |

Load growth under poor economic conditions is expected to average 0.63% annually over the forecast period, while load growth under good economic conditions is expected to average 1.88% annually. The cumulative effect of high growth over 20 years could result in an additional load of 54 million therms, while low growth could result in a load of 48 million therms less than the expected scenario predicts. Figure 3-17 shows the expected total system load across these scenarios.

Figure 3-17: Expected Total System Load Growth Across Scenarios (Volumes in Therms)

| Year                         | Low               | Expected          | High               |
|------------------------------|-------------------|-------------------|--------------------|
| 2020                         | 342,824,000       | 342,824,000       | 342,824,000        |
| 2025                         | 354,330,108       | 366,139,200       | 378,257,147        |
| 2030                         | 366,104,897       | 390,792,300       | 416,960,879        |
| 2035                         | 377,513,053       | 415,445,400       | 456,899,827        |
| 2039                         | 386,367,323       | 435,100,200       | 489,601,247        |
| 2020-2039                    | <b>43,543,323</b> | <b>92,276,200</b> | <b>146,777,247</b> |
| Average Annual Load Increase | <b>2,291,754</b>  | <b>4,856,642</b>  | <b>7,725,118</b>   |

## Alternative Forecasting Methodologies

Cascade has expanded its forecasting methodologies used in the customer forecast into the use-per-customer (UPC) forecast. Cascade now uses Fourier terms and ARIMA terms in its UPC forecasting methods. Cascade utilizes R as its primary statistical analysis software and uses models that follow a dynamic

regression methodology. The Company plans to continue improving the customer and demand forecast model through R.

The Company is responsive to several regulatory principles in forecasting. These include:

- A desire for precision and a high degree of accuracy;
- A universal understanding that forecasts should mirror future realities but may have unanticipated swings in either direction;
- A disconnect between planning and operational functions, in that natural gas purchasing and dispatch will be based on immediate needs which, in actuality, are guaranteed to vary from the plan (per the previous bullet);
- An understanding that an increased cost of improved precision sometimes has decreasing customer benefits;
- A need to meet Regulators' expectation that the Company show continual improvement because new tools are available. For example, the concept of "adaptive management" can be applied;
- The major differences in accounting treatment between the states regarding test years for ratemaking purposes (that is, for general rate case filings) and not necessarily for planning. At this time, Oregon uses future test year accounting while Washington employs a historic test year;
- The fuzziness of historic data that includes effects of energy efficiency, retail price (from annual PGA—purchased gas adjustment—changes and other rate changes), sometimes abnormal weather, new technology, and then-unique economic conditions (e.g., recession, interest rates, etc.). Cascade uses actual historic data. The term fuzziness is used in the context of basing forecasts on past-period data that includes many variables, any one of which may have increased or decreased in the intervening time between historical occurrence and forecasted periods. This causes difficulty for utilities trying to isolate primary factors for greater precision of long-term calculations.
- Unknown and uncertain future changes such as the assumptions around carbon policy and other environmental externalities; and
- A need to demonstrate support for assumptions such as growth in customers, use per customer and changes from previous forecasts, type of use (i.e., heating, manufacturing, etc.), to name a few.

The preceding subchapter illustrates the complexity of forecasting and highlights areas of stakeholder attention. Best efforts at appropriate reasonable cost distill these factors into a generally accepted forecast with recognition of inherent uncertainties.



## **Uncertainties**

This forecast represents Cascade's best estimate about future events. At this time, several important factors make predicting future demand particularly difficult – continued economic growth, carbon legislation, building code changes, direct use campaigns, conservation, and long-term weather patterns. The range of scenarios presented here and in Chapter 9 encompass the full range of possibilities through econometric analysis. These forecasts were created after running through a matrix of different functional forms and economic indicators. The chosen indicators were selected because of their consistency in returning statistically valid results. While they may be the best results mathematically, they are not the sole and only determinants of demand. As a result, while Cascade believes that the numbers presented here are accurate and that the scenarios presented represent the full range of possibilities, there are and always will be uncertainties in forecasting future periods.



## **CHAPTER 4**

### **SUPPLY SIDE RESOURCES**

## Overview

Cascade's core market residential and small volume commercial and industrial customers expect and require the highest reliability of energy service. Because of the Company's obligation to provide gas service to these customers, the Company must determine and achieve the needed degree of service reliability and attain it at the most reasonable lowest cost and least risk possible while maintaining infrastructure that is sufficient for customer growth. Assuming such infrastructure is operating effectively, the most important functions necessary for reliable natural gas service are planning for, providing, and administering the gas supply, interstate pipeline transportation capacity, and distribution service purchased by core market customers.

This chapter describes the various gas supply resources, storage delivery services from Jackson Prairie, Mist and Plymouth liquified natural gas (LNG) service, and transportation resource options available to the Company.

## Key Points

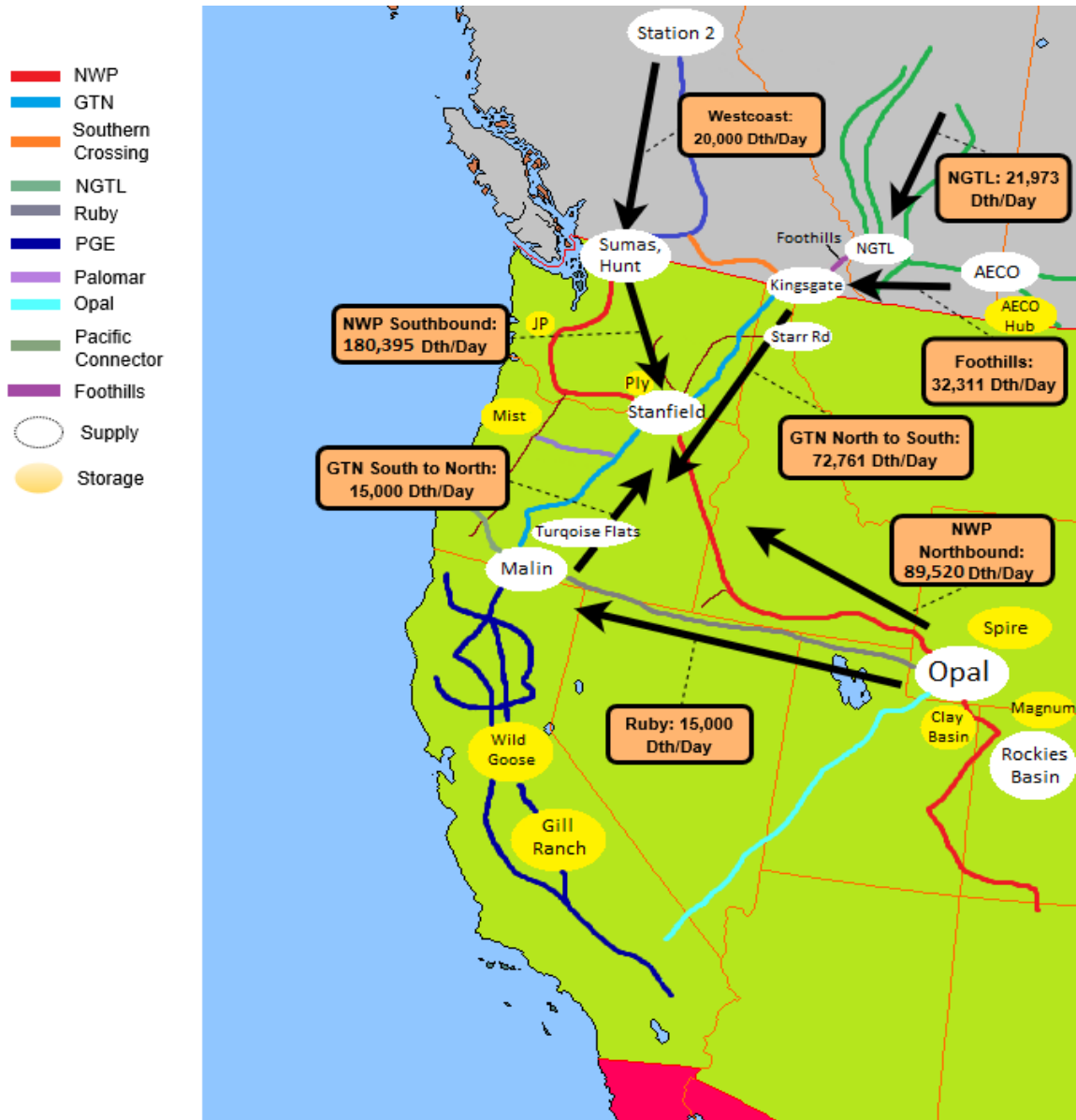
- To meet the Company's core market demand, Cascade accesses firm gas supplies and short-term gas supplies purchased on the open market, in addition to utilizing storage.
- Cascade purchases gas from the Rockies, British Columbia (Sumas), and Alberta (AECO). Gas is transported to the Company's system via pipelines by either bundled or unbundled contracts.
- The long-term planning price forecast is based on a blend of futures market pricing along with long-term fundamental price forecasts from multiple sources.
- The Company identifies potential incremental supply resources for the 2020 IRP.
- Risk management policies are implemented to promote price stability.
- Cascade's GSOC oversees the Company's gas supply purchasing strategy.
- Modeling of Cascade's available resources results in the lowest reasonably priced optimum portfolio.

## Gas Supply Resources

Gas supply options available to Cascade to meet the core market demand requirements generally fall into two groups: 1) Firm gas supplies on a short- or long-term basis, and 2) Short-term gas supplies purchased on the open market as needed for a particular month for one or more days. A separate and important source of gas supply is natural gas storage service, which is used to load balance, provide pricing arbitrage, and assist in needle peak events during the heating season.

Cascade's gas supply portfolio is sourced from three basic areas of North America: British Columbia, Alberta, and the Rockies. Figure 4-1 provides a general overview of regional gas flows to Cascade's distribution system.

Figure 4-1: Regional Map Showing General Flow Paths for System Gas Supplies



## Firm Supply Contracts

Firm supply contracts commit both the seller and the buyer to deliver and take gas on a firm basis, except during *force majeure* conditions. From Cascade's perspective, the most important consideration is the seller's contractual commitment to make gas available day in and day out regardless of market conditions. Firm supplies are a necessary component of Cascade's core market portfolio given its obligation to serve and the lack of easily obtainable alternatives for customers during periods of peak demand. Firm supply contracts can provide base load services,

seasonal load increases during winter months, or they can be used to meet daily needle peaking requirements. Quantities vary depending on the need and length of the contract. Operational considerations regarding available upstream pipeline transportation capacity and any known constraints must also be considered. Base load contracts can range from as small as 500 dths/day to quantities in excess of 10,000 dths/day. Blocks of 1,000, 2,500, 5,000 and 10,000 dths/day are standard as these are the most operationally and financially viable blocks for suppliers.

Base load supply resources are those that are typically taken day in and day out, usually 365 days a year. As a result, base load gas tends to be the least expensive of the firm supply contracts because it matches the production of gas and guarantees the producer that the volumes will be taken. The Company's ability to contract for base load supplies is limited because of the relatively low summer demand on Cascade's system. Base load resources are used to meet the non-weather sensitive portion of the core market requirements or may be used to refill storage reservoirs during periods of lower demand.

Winter gas supplies are firm gas supplies that are purchased for a short period during the winter months to cover increased loads, primarily for space heating. The contracts are typically three to five months in duration (primarily November through March). This enables the Company to ensure firm winter supplies without incurring obligations for high levels of supply contracts during periods of low demand in the summer months. Winter supplies combined with base load supplies are adequate to cover the moderately cold days in winter.

Peaking gas supplies, similar to storage, are firm contracts purchased only as load actually materializes due to high winter demand. That is, the seller must deliver the gas when the Company requests it, but the Company is not required to take gas unless it is needed to meet customer load demand. Peaking resources typically allow the Company to take between fifteen and twenty days of service during the winter period. These resources are usually more expensive than base load or winter supplies and typically include fixed charges to cover the costs for the sellers to stand by to deliver the supplies.

Needle peaking resources are utilized during severe or arctic cold experiences when demand can increase sharply. These resources are very expensive and are available for a very short period. One source of needle peaking gas supply is a form of demand side management that may be obtained from Cascade's core interruptible customer base. These customers are required to maintain standby or alternate fuel capability so that Cascade can request the customer switch to its alternate fuel source so Cascade can utilize (divert) the gas supply and transportation capacity to meet the Company's core firm market requirements. The benefits associated with this type of resource include lowering the demand of the industrial facility and providing a like amount of additional gas supply with pipeline capacity to meet core demand. Needle peaking requirements can also be met using on-site LNG facilities.

Currently, Cascade does not own or operate any LNG facilities along the distribution system.

Supply contract terms for firm commodity supplies vary greatly. Some contracts specify fixed prices, while others are based on indices that float from month to month. Most contain penalty provisions for failure to take the minimum supply according to the North American Energy Standards Board (NAESB) contract terms. Contract details will also vary for each individual supplier's needs and the NAESB contract special addendums.

Gas that is purchased for a short period of time (1 to 30 days) when neither the seller nor the buyer has a longer-term firm commitment to deliver or take the gas is referred to as a spot market purchase. Spot market supplies differ from firm resources in that they are more volatile, both in terms of availability and price, and are largely influenced by the laws of supply and demand.

In general, spot market supplies (also called day gas) are provided from gas supplies not under any long-term firm contract. Therefore, as firm market demand decreases, more gas becomes available for the spot market. Prices for spot market supplies are market driven and may be either lower or higher than prices under firm supply contracts. In warmer weather, as firm market demand requirements decrease, usually more gas becomes available for the spot market, resulting in lower prices. In colder weather, as firm markets demand their gas supplies, the remaining spot market supplies can carry higher prices.

Due to the potential for interruption of the spot market, these supplies are not considered a reliable source of gas supply for the winter peaking requirements of Cascade's core market. As identified earlier, part of the reason these supplies are considered less reliable is that these volumes are made available after longer-term firm commitments have been contracted for delivery by upstream suppliers. The available volumes are likely to vary daily, depending on production or the suppliers' ability to store un-marketed supply. Under a NAESB contract, parties can identify firm, variable, or interruptible quantities for these supplies. Buyers and sellers use this standard contract when entering into short-term supply transactions. Therefore, these spot volumes are more susceptible to daily operational constraints on the upstream pipelines. This is particularly true in the case of Northwest Pipeline (NWP), which is a displacement pipeline with bi-directional flow. Depending on how gas is scheduled versus how it physically flows between compressor stations, constraints can possibly occur. These constraints are identified in the timely cycle and must be adjusted according to a propriety model run by NWP. This can be done by NWP through an Operational Flow Order in which NWP directs Cascade to deliver to specific zones or move supply from one zone to another to assist with the constraint.

The role for spot market gas supply in the core market portfolio is based on economics. Spot market supplies may be used to supplement firm contracts during

periods of high demand or to displace other volumes when it is cost effective to do so. Depending upon availability and price, spot market volumes may be used in place of storage withdrawal volumes to meet firm requirements on a given day or for mid-heating season refills of storage inventory during periods of moderate weather.

### **Storage Resources**

Cascade also utilizes natural gas storage to meet a portion of the requirements of its core market. Storing gas supplies, purchased and injected during periods of low demand, is a cost-effective way of meeting some of the peak requirements of Cascade's firm market. Natural gas can be stored in naturally occurring reservoirs, such as depleted oil or gas fields, salt caverns or other geological formations with an impermeable cap over a porous reservoir. Gas can also be stored in vessels or tanks cooled to a liquid state, known as LNG.

Natural gas storage service is not only an excellent supply source for meeting peak winter demand, but it can also be an important gas supply management tool. Storing excess or unused supply during periods of low demand increases the annual utilization rate of a supply contract, thereby improving the annual load factor for the Company's gas supplies. Improving the annual load factor of a supply contract improves the Company's ability to purchase gas supplies on a more economical basis. Purchasing natural gas for storage during periods of low demand generally yields prices at the low point on the seasonal price curve.

Depending upon the location of the storage facility, pipeline transportation may also be required to move the gas from the facility to the distribution system. Storage facilities located within the Company's distribution system or on the interstate pipeline are preferable to those located off-system. Off-system storage requires additional upstream pipeline transportation and may limit the flexibility of the resource. Cascade does not own any storage facilities and, therefore, must contract with storage owners to lease a portion of those owners' unused storage capacity. Figure 4-1 on page 4-3 displays the location of some of the storage facilities in the region.

Cascade has contracted for storage service directly from NWP since 1994. Jackson Prairie is in Lewis County, Washington, approximately ten miles south of Chehalis. The following extract explaining the Jackson Prairie facility is found on Puget Sound Energy's website. Puget is a one-third owner of the Jackson Prairie facility.

Jackson Prairie is a series of deep underground reservoirs-basically thick porous sandstone deposits. The sand layers lie approximately 1,000 to 3,000 feet below the ground surface. Large compressors and pipelines are employed at JP to both inject and withdraw natural gas at 45 wells spread across the 3,200-acre facility. Currently it is estimated that Jackson Prairie can store nearly 25 BCF of working gas. The facility also includes "cushion" gas which provides pressure in the reservoir of



approximately 48 BCF. In terms of withdrawal capability, the facility is capable of delivering 1.15 BCF of natural gas per day.

The Company also has contracted for service from NWP's Plymouth, Washington LNG facility. Plymouth is in Benton County, Washington approximately 30 miles south of Kennewick. According to NWP's website, the total facility has storage capacity of 2.4 BCF. Cascade has leased approximately 28% of this storage capacity.

In addition to the above, the Company has also added storage capacity at the storage facility. This facility is located near Mist, Oregon and is adjacent to Northwest Natural Gas' distribution system and has a direct connection to NWP for withdrawals and injections. The Mist facility is owned and operated by Northwest Natural Gas.

All of the above facilities are located directly on NWP's transmission system. Therefore, storage withdrawal rates can be changed several times during an individual gas day to accommodate weather-driven changes in core customer requirements. Withdrawal capabilities should also be accompanied by firm capacity on the transporting pipeline(s) to be of value as a reliable source of gas supply. Cascade's Jackson Prairie storage and Plymouth LNG service require TF-2 firm transportation service for storage withdrawals; Cascade has sufficient firm TF-2 service to meet its storage daily deliverability levels. The Company's contracted storage services are summarized in Figure 4-2.

Figure 4-2: Cascade Leased Storage Services

| (Volumes in Therms)Facility | Storage Capacity        | Withdrawal Rights        |
|-----------------------------|-------------------------|--------------------------|
| Jackson Prairie (Principle) | 6,043,510               | 167,890                  |
| Jackson Prairie (Expansion) | 3,500,000               | 300,000                  |
| Jackson Prairie (2012)      | 2,812,420               | 95,770                   |
| <b>Facility</b>             | <b>Storage Capacity</b> | <b>Withdrawal Rights</b> |
| Plymouth LNG (Principle)    | 5,622,000               | 600,000                  |
| Plymouth LNG (2016)         | 1,000,000               | 181,250                  |
| Mist                        | 6,000,000               | 300,000                  |

## **Capacity Resources**

Capacity options are either interstate pipeline transportation resources or capacity on Cascade's local distribution system. Cascade's local distribution system is built to serve the connected load in its various distribution service areas on a coincidental demand basis, dependent upon the type of service the customer has contracted to receive.

Pipeline transportation resources are utilized to transport the gas supplies from the producer/supply sources to Cascade's system. Cascade currently purchases supplies from three different regions or basins: U.S. Rockies, British Columbia, and Alberta, Canada. Unless the supplier has bundled its sale of gas supplies with capacity (i.e. a citygate delivery), these resources require pipeline transportation to deliver them to Cascade's local distribution system. Transportation resources historically have been purchased from the pipeline at the time of an expansion under long-term (20 to 30 year) contracts.

Cascade has over 30 long-term annual contracts with NWP, numerous long-term annual and winter-only transportation contracts with GTN (including the upstream capacity on TransCanada Pipeline's Foothills and Alberta systems), a long-term, winter-only contract with Ruby Pipeline, and one long-term annual contract with Enbridge (Westcoast Transmission) in British Columbia, Canada. These contracts do not include storage or other peaking services that may provide additional delivery capability rights. Figure 4-1 on page 4-3 provides a general flow of Cascade's combined contracted pipeline transportation rights.

A complete listing of Cascade's current transportation agreements is provided in Appendix E.

At a minimum, in order to ensure a diversified physical portfolio, the basic design of Cascade's transportation portfolio considers incorporating these general physical products or elements:

- Annual supply package;
- November through March (the whole heating season);
- December through February (peak of the heating season);
- Spring Seasonal (Apr-Jun);
- Spring/Summer Seasonal (April through October);
- Day Gas; and
- No more than 25% of the overall portfolio can be supplied by a single party.

## **Natural Gas Price Forecast**

For IRP purposes, the Company develops a baseline, high, and low natural gas price forecast. Demand, oil price volatility, the global economy, electric generation, opportunities to take advantage of new extraction technologies, hurricanes and other weather activity will continue to impact natural gas prices for the foreseeable future. Cascade considers price forecasts from several sources, such as Wood Mackenzie, Energy Information Administration (EIA), S&P Global, NYMEX Henry Hub, Northwest Power and Conservation Council (NWPPCC), as well as Cascade's own observations of the market to develop the low, base, and high price forecasts. For confidentiality purposes, the Company refers to the selected sources as Sources 1-4 when discussing how these sources are weighted in Cascade's Henry Hub forecast. The following discussion provides an overview of the development of the baseline forecasts.

Cascade's long-term planning price forecast is based on a blend of futures market pricing along with long-term fundamental price forecasts from multiple sources. Since pricing on the market is heavily influenced by Henry Hub prices, the Company closely monitors this market trend. While not a guarantee of where the market will ultimately finish, the futures market (NYMEX) is the most current information available that provides some direction as to future market prices. On a daily basis, Cascade can see where Henry Hub is trading and how the future basis differential in the Company's physical supply receiving areas (Sumas, AECO, Rockies) is trading.

Cascade believes that relying on a single source for developing the Company's 20-year price forecast is not the most reasonable approach. Some sources such as EIA and Wood Mackenzie produce Henry Hub pricing over the long-term; whereas other sources like the NYMEX basis (e.g., Sumas) provide price indicators over a shorter period of time. Additionally, price forecast sources produce their forecasts or indicators at varying points in time throughout the year. Finally, most forecasts are at an annual level vs a monthly level. In order to capture the potential seasonality as well as the variances of monthly price within the producing basins, the Company blended the pricing data from these various forecast sources.

The fundamental forecasts of Wood Mackenzie, the EIA, NWPPCC, Platts, S&P Global, Bentek, and Cascade's trading partners are resources for the development of a blended long-range price forecast. Wood Mackenzie publishes a long-term price forecast twice a year to subscribing customers. This forecast was broken down by month through the planning horizon and includes Henry Hub as well as basis differentials for the Company's receiving areas. Cascade also considers the EIA forecast; however, it has its limitations since it is not always as current as the most recent market activity. Further, the EIA forecast provides monthly breakdowns in the short-term, but longer-term forecasts are only by year. Many of the other sources mentioned only provide price forecasts by year. Given Cascade's load profile and

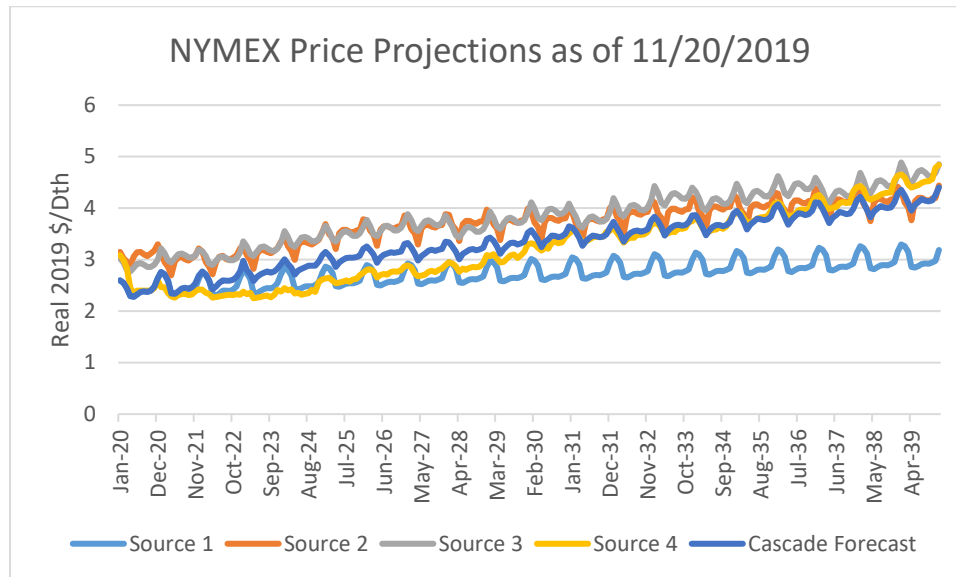
the need for more winter gas than summer, the Company developed a pattern based on the market monthly forward prices to create a long-term, monthly Henry Hub price.

With a monthly Henry Hub price determined from the above sources, the Company assigned a weight to each source to develop the monthly Henry Hub price forecast for the 20-year planning horizon. These weights were derived by calculating the Symmetric Mean Absolute Percentage Error (SMAPE) of each source versus actual Henry Hub pricing since 2010. The inverse of these error terms was then used to determine the weight given to each source. A sample of the forecast weighting factors are shown in Figure 4-3. A comparison of the sources Cascade uses in its forecast and the actual blended forecast is provided in Figure 4-4.

Figure 4-3: Sample of Cascade's Henry Hub Price Forecast Weights

| Date | Source 1 | Source 2 | Source 3 | Source 4 |
|------|----------|----------|----------|----------|
| T+1  | 9.115%   | 47.371%  | 29.499%  | 14.015%  |
| T+2  | 10.772%  | 44.692%  | 29.580%  | 14.955%  |
| T+3  | 9.570%   | 49.212%  | 28.405%  | 12.812%  |
| T+4  | 12.002%  | 43.537%  | 30.386%  | 14.075%  |
| T+5  | 11.523%  | 43.476%  | 32.206%  | 12.796%  |
| T+6  | 14.850%  | 32.243%  | 37.449%  | 15.458%  |
| T+7  | 13.972%  | 35.110%  | 36.448%  | 14.470%  |
| T+8  | 15.837%  | 31.029%  | 37.275%  | 15.859%  |
| T+9  | 15.074%  | 35.022%  | 34.192%  | 15.712%  |
| T+10 | 16.913%  | 31.090%  | 34.166%  | 17.831%  |
| T+11 | 16.168%  | 34.193%  | 31.641%  | 17.999%  |
| T+12 | 17.183%  | 29.466%  | 32.449%  | 20.902%  |

Figure 4-4: Henry Hub Price Forecast by Source (\$US/Dth)



### Age-Dampening Mechanism

To ensure that the forecast is accounting for the most current information in the market, Cascade has introduced an age dampening mechanism to its price forecast. Every month, if there is a source that is over one year old, all sources' weights are reduced by their share of the total number of months that all sources are outdated by. For example, if Source 1's forecast was fifteen months old, Source 2's was seven months old, and Source 3's was two months old, then each of these sources would be reduced by  $15/24$ ,  $7/24$ , and  $2/24$  respectively. The detracted weights are then added back into the weight of the forwards market, since that will always be the most current source (as it is updated daily). The one-year threshold was chosen qualitatively, as this methodology could be too punishing if all sources were not that old. For example, if one source was two months old, another was one month old, and another brand new, the first source would lose 66% of its weight to the forward curve, even though it still contains relatively current information regarding the market.

Also new to the 2020 OR IRP, Cascade has decided to weight the futures market at 100% for the first fifteen months of the forecasting period. The weights are then linearly interpolated over the next two years in order to align them with the calculated weights as described above.

The Company recognizes the importance of verifying forecast accuracy periodically and as such, will perform routine cross-validation to evaluate the impact of any modifications to the price forecast.

## **Development of the Basis Differential for Sumas, AECO and Rockies**

Cascade utilizes the basis differential from Wood Mackenzie's most recently available update and compares that to the future markets' basis trading as reported in the public market because the Company's physical supply receiving areas (Sumas, AECO, and Rockies) are typically traded somewhat independently from Henry Hub. Correspondingly, the Company applied a weighted average to determine the individual basis differential in the price forecast.

In order to determine the low case and high case, the Company utilized the EIA economic growth factors which are 1.5 for the Low Case, 2.0 for the Reference Case, and 2.6 for the High Case.<sup>1</sup>

## **Pros and Cons of New Methodology**

The changes made to the 2018 price forecast represent a significant methodological improvement over the forecasts in previous IRPs. Using the daily NYMEX forwards for short term forecasting allow the Company's forecast to incorporate current market data, such as weather and *force majeure* events, into its projections. Additionally, the age dampening mechanism favors sources that have been updated more recently, which better captures a paradigm shift in the markets on a long-term basis versus a forecast that may be a few months or even years old. Finally, the use of SMAPE to assign weights to the sources creates a more scientific rationale for the blending of forecasts.

While Cascade is pleased with this forecast, there are always areas of potential improvement. Since the forecast is a blending of other forecasts, the Company relies on the accuracy of its sources. While the SMAPE calculation helps to reward the more accurate forecasts, if all sources failed to capture a major market movement, Cascade's forecast would ultimately end up inaccurate as well. Additionally, some sources produce fairly infrequent forecasts, creating a small sample size for them to be evaluated in the SMAPE calculation. The Company is monitoring these problems to ensure they do not skew the forecast and does have mechanisms in place to allow for a manual adjustment if market intelligence deems such a modification to be appropriate.

## **Incremental Supply Side Resource Options**

As is more thoroughly described in Chapter 9, some of the load growth over the planning horizon will require Cascade to secure incremental supply side resources.

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<sup>1</sup> EIA 2018 Annual Energy Outlook

The purpose of this chapter is to identify the potential incremental supply resources the Company considered for the 2020 IRP.

Cascade models its incremental resources simultaneously through SENDOUT®. This allows the Company to evaluate each resource as a potential solution relative to all other resources, without any bias towards any particular option. Cascade utilizes functionality within SENDOUT® to allow the program to deterministically select the optimum timing and quantity of incremental supply resources. Any of the following resources that do not appear in Cascade's final preferred portfolio were deemed by SENDOUT® to be either not cost effective or not optimal in comparison with other resource options.

### **Pipeline Capacity**

- **Bremerton-Shelton Realignment:** During the 2018 IRP, NWP presented Cascade with a proposal to realign a portion of its capacity that runs from Sumas to Plymouth. This capacity gave the Company lateral rights along the Shelton lateral. Additionally, Cascade took the option to acquire a storage redelivery contract from Jackson Prairie to Stanfield Delivery. Cascade will continue to monitor the Bremerton-Shelton lateral during the resource integration analyses to ensure there are no constraints.
- **Cross-Cascades, Trail West (Palomar, NMax, Sunstone, Blue Bridge, et al):** Trail West is a proposed pipeline starting at GTN's system near Madras, Oregon, and connecting NWP's Grants Pass Lateral near Molalla, Oregon. Since portions of the Company's distribution system are not connected to Molalla, incremental pipeline capacity would be needed to transport gas northbound to certain load centers. NWP has proposed a transport service that would bundle Trail West capacity with NW Natural's northbound Grants Pass Lateral capacity. From Cascade's perspective, this might present an alternative means to move Rockies' gas to the I-5 corridor.
- **GTN/NGTL Capacity Acquisition:** Cascade recently acquired 20,000 dth of GTN, 20,000 of NGTL, and 10,000 of Foothills capacity that will begin in 2023. Cascade will continue to monitor GTN capacity through the resource integration analyses. If a constraint is determined, Cascade would acquire currently unsubscribed capacity on GTN in order to secure its gas supplies at liquid trading points to serve Central Oregon.
- **NWP Eastern Oregon Expansion:** This alternative resource would be incremental NWP capacity from a Washington State receipt point that is designed to serve load growth needs in Zone 24 and Zone ME-OR. Examples of the Cascade service areas that would benefit from this project

are Pendleton and Baker City. Similar to a proposed NWP Wenatchee expansion, it would be relatively small scale and could be expected to have a relatively high unit cost.

- **NWP Express Project/I-5 Sumas Expansion Project (Regional or Cascade Specific Project):** Cascade envisions this project as expanding capacity from Sumas on a potential NWP project that is the successor to the Western Expansion project. It would potentially combine Cascade's infrastructure expansion needs with other regional requests from parties such as local distribution companies (LDCs), power generators, and large petrochemical projects. The scale of this project is larger, potentially resulting in a more favorable unit cost; although with scale and multiple parties involved, timing for in-service dates may vary by the various participants. Examples of the Cascade service areas that would benefit from this project are Bellingham, Mount Vernon, Bremerton and Longview. Cascade, through the Company's active membership in various industry task forces and associations, works with regional pipelines and LDCs to consider potential pipeline expansions.
- **NWP Wenatchee Expansion:** This alternative resource would be incremental NWP capacity from a Washington State receipt point (e.g. Sumas) that is designed to serve load growth needs in Zone 10 and Zone 11. Examples of the Cascade service areas that would benefit from this project are Yakima and Wenatchee. Accordingly, it would have a relatively small scale and so could be expected to have a relatively high unit cost.
- **NWP Zone 20 Expansion:** This alternative resource would be incremental NWP capacity from a Washington State receipt point that is designed to serve load growth needs in Zone 20. Examples of the Cascade service areas that would benefit from this project are Kennewick and Moses Lake. Similar to a proposed NWP Wenatchee expansion, it would have a relatively small scale and so could be expected to have a relatively high unit cost.
- **Pacific Connector:** The Pacific Connector Pipeline project is tied to the development of the Jordan Cove LNG export terminal in Coos Bay, Oregon. This pipeline starts near Malin, Oregon, and would cross NWP's Grants Pass Lateral (GPL) in the vicinity of Roseburg, Oregon. This project presents an opportunity as a potential supply resource for this IRP. Cascade would not be seeking to become a shipper on Pacific Connector. The Company views this project as bundled pipeline supply service from Malin to the Company's citygates. The project was initially denied due to lack of demand, which has since increased, but faces considerable opposition including but not limited to landowners and special interest advocates. Incremental transport involving GTN might be necessary to



ensure transport from Malin to Cascade's GTN receipt point at Turquoise Flats.

- **Southern Crossing Expansion:** FortisBC Southern Crossing is considering an addition of 300-400 MMcf/d of bidirectional capacity. FortisBC has proposed a reinforcement project for the Southern Crossing Pipeline that would permit more flow of Alberta gas to Sumas. This would also require an expansion of NWP from Sumas at the Canadian border which in the Company's view does not need to be modeled since it essentially is replicated by the current inclusion of the NWP I-5 expansion project. This is primarily a price arbitrage opportunity, but the Company does not see any significant advantage to the system at this point given limited availability to move the gas from Sumas. However, Cascade will continue to consider this resource to see if it might make sense as a potentially cost-effective dedicated resource for the Company's direct connect with Westcoast.

### Storage Opportunities

- **AECO Hub Storage:** This is Niska's commercial natural gas storage business in Alberta, Canada. The service is comprised of two gas storage facilities: Suffield (South-eastern Alberta) and Countess (South-central Alberta). Although the two AECO facilities are geographically separated across Alberta, the toll design of the Nova Gas Transmission Ltd. (NGTL) system means they are both at the same commercial point. Capacity at one of the facilities is possible as an alternative resource. Currently, no open season is planned. However, some services are available for limited periods of time but are subject to possible interruption. Incremental transport involving NGTL, Foothills, GTN, and possibly NWP would be necessary.
- **Gill Ranch Storage:** Gill Ranch Storage is an underground intra-state natural gas storage facility near Fresno, Calif. It includes a pipeline that links the facility to Pacific Gas & Electric Company's (PG&E) mainline transmission system, allowing it to serve customers throughout California. Storage from this facility would require California Gas Transmission (CGT) transport, which has a potentially cost-prohibitive demand charge of \$1.68/Dth. Incremental transport involving GTN would also be necessary.
- **Mist (North Mist II):** According to NW Natural's 2016 IRP (LC 64), Chapter 3, pages 3.34 and 3.35,

NW Natural is in the midst of developing a project called North Mist that would combine new underground storage at Mist and a new

transmission pipeline to serve Portland General Electric (PGE) at Port Westward called North Mist. The storage reservoirs currently in service at Mist and those that would be developed as North Mist for PGE do not collectively exhaust Mist's storage potential; other Mist production reservoirs that theoretically could be developed by NW Natural into additional storage resources. The primary impediment in doing so is not geological, but the challenges associated with developing new pipeline capacity to move the gas from Mist to the Company's load centers.

NW Natural identifies a prospective Mist expansion project for core customer use in this IRP as 'North Mist II.' North Mist II involves 100 MMcf/day of maximum delivery capacity coupled with a maximum storage capacity of 2.0 billion cubic feet (Bcf), and includes a new compressor station and associated appurtenances. These capabilities would be exclusively for utility use. Should a third party want to subscribe to a North Mist II expansion, total deliverability and storage capacity would increase to match those additional subscribed amounts.

New to the 2020 IRP, Cascade contacted the operators of Mist to gather updated data to properly model this storage facility in SENDOUT<sup>®</sup>. The results of this can be found in Chapter 9.

- **Spire (formerly Ryckman Creek) Storage:** As of December 2017, Ryckman Creek, LLC operates as a subsidiary of Spire Inc. Spire Gas Storage Facility is located near the town of Evanston, Wyoming and approximately twenty-five miles southwest of the Opal Hub. Spire Storage has converted a partially depleted oil and gas reservoir into a gas storage facility with 35 BCF of working gas and a maximum daily withdrawal rate of 480,000 Dths/d. Spire Storage currently has interconnects with Questar Gas Pipeline, Kern River Transmission, Questar Overthrust Pipeline, Ruby Pipeline, and NWP. Incremental transport involving Questar and possibly Ruby would be necessary. Cascade met with Spire in mid-2019 to discuss any potential storage opportunities between Spire and Cascade. Currently, Spire is expanding their contracts but won't have any availability until early-2021.
- **Wild Goose Storage:** Wild Goose is located north of Sacramento in northern California and was the first independent storage facility built in the state. The facility commenced full commercial operations in April 1999 and in April 2004 completed its first expansion. Storage from this facility would require California Gas Transmission (CGT) transport, which has a potentially cost-prohibitive demand charge of \$1.68/Dth. Incremental transport involving GTN would also be necessary.

- **Magnum Gas Storage:** Magnum is currently developing Magnum Gas Storage at the Western Energy Hub. Magnum Gas Storage will be the first high-deliverability storage facility in the Rocky Mountain Region. The facility will contain 4 solution mined storage caverns capable of storing 54 billion cubic feet (Bcf) of natural gas.<sup>2</sup> Magnum would be connected to the Kern River Gas Transmission and Questar Pipeline systems at Goshen, Utah. Incremental transport involving Questar and possibly Ruby would be necessary.
- **Clay Basin:** Clay Basin is located in Northeast Utah and is a 54 Bcf working gas storage facility. Clay Basin would be connected to Questar Pipeline system. Incremental transport involving Questar and possibly Ruby would be necessary.

### Other Alternative Gas Supply Resources

- **Satellite LNG:** Some gas utilities rely on satellite LNG tanks to meet a portion of their peaking requirements. The term satellite is commonly used because the facility is scaled-down and has no liquefaction capability. Instead, its usefulness revolves around the availability of another (no doubt larger) facility with the ability to supply the LNG to fill its tank(s). LNG facilities in this context are peaking resources because they provide only a few days of deliverability, and should not be confused with the much larger facilities contemplated as LNG export or import terminals. The concept is that a small tank serving a remote area would be filled with LNG as winter approaches, and the site operated during cold weather episodes when vaporization is required. Since Satellite LNG has no on-site liquefaction process, the facility is fairly simple in design and operation. While likely as expensive as some pipeline projects, Satellite LNG may be more practical in areas where pipeline capacity shortfalls for peak day are the highest and most immediate. The addition of satellite LNG could defer significant pipeline infrastructure investments for several years.
- **Renewable Natural Gas (RNG):** Cascade is committed to the acquisition of cost-effective RNG under the current regulatory guidance provided by the OPUC and WUTC. An in-depth discussion of Cascade's RNG philosophy and analysis techniques can be found in Chapter 7, Renewable Natural Gas.
- **Realignment of Maximum Daily Delivery Obligations (MDDO):** Cascade has long held more delivery rights than receipt rights on NWP under its principle 100002 agreement. This was a result of FERC Order

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<sup>2</sup> See: <https://www.wyopipeline.com/magnum-gas-storage-llc-western-energy-hub-project/>

636, when NWP was required to assign upstream capacity directly on GTN (formerly known as Pacific Gas Transmission) to the shippers that were using that capacity. NWP allowed the direct assignment as part of the conversion from their merchant role to an open access pipeline. However, NWP did not lower its capacity contract to reflect the direct assignment. In effect, this increased Cascade's system capacity by the amount GTN would directly be providing to Cascade. On the plus side, this gives Cascade great flexibility to utilize 315,994 Dths/day of delivery rights vs 205,123 Dths/day of receipt rights. Cascade has the right to deliver gas to any delivery point within Washington and Oregon so long as the total MDDOs are not exceeded. Cascade and NWP have worked continuously in recent years for ways to address Cascade's potential peak day capacity shortfalls through re-alignment of the Company's contractual rights where possible, which mitigates the need to acquire incremental NWP capacity through expansions.

Cascade considers Unconventional Gas Supply Resources such as supplies from an LNG Import Terminal, local bio-natural gas or other manufactured gas supply opportunities as speculative supply side resources at this point in time. Ultimately these unconventional gas supply resources are treated as alternative resources and have to compete with traditional gas supplies from the conventional gas fields in Canada or the Rockies for inclusion in the Company's portfolio planning.

### **Supply Side Uncertainties**

Several uncertainties exist in evaluating supply side resources. These include regulatory risks, deliverability risks, infrastructure risks, and price risks. Regulatory risks include the unknown impacts of future Federal Energy Regulatory Commission (FERC) or Canada's Energy Regulator (CER)<sup>3</sup> rulings that may impact the availability and cost of interstate pipeline transportation.

Deliverability risk is the risk that the firm supply will not be available for delivery to the Company's distribution system. Purchasing resources from larger producers or marketers who typically have gas reserves in multiple locations may minimize this risk. The risks associated with prices rising or falling during any winter period represent another supply side uncertainty. To the extent the Company purchases firm contracts that are tied to an index price, it may be at risk for paying more than was initially anticipated for the resource after the resource decision has been made.

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<sup>3</sup> The Canada Energy Regulator (CER) is the agency of the Government of Canada under its Natural Resources Canada portfolio, which licenses, supervises, regulates and enforces all applicable Canadian laws as regards to interprovincial and international oil, gas, and electric utilities. The agency came into being on August 28, 2019, under the provision of the Canada Energy Regulator Act of the Parliament of Canada superseding the National Energy Board from which it took over responsibilities.

Price risks associated with climbing prices can be minimized through the use of fixed price contracts or through the use of financial derivatives.

As the United States continues to search for environmentally friendly, economically viable options to displace gasoline, natural gas is seen as a fuel that could significantly contribute to lessening American dependency on foreign oil. It should be noted that several proposals being discussed or that are in process involve a number of Canadian upstream pipelines which could have a direct impact on the availability of supply or at least may pose potential risks to increases in the price of supplies sourced from British Columbia and Alberta. This new service may impact the amount of Alberta gas available for companies such as Cascade. The Company will continue to monitor and be actively involved in the various pipeline forums as these initiatives develop.

### **Financial Derivatives and Risk Management**

Cascade constantly seeks methods to ensure customers of price stability. In addition to methods such as long-term physical fixed price gas supply contracts and storage, another means for creating stability is through the use of financial derivatives. The general concept behind a derivative is to lock-in a forward natural gas price with a hedge, consequently eliminating exposure to significant swings in rising and falling prices. Financial derivatives include futures, swaps, and options on futures or some combination of these.

Natural gas futures contracts are actively traded on the NYMEX. The use of futures allows parties to lock-in a known price for extended periods of time (up to six years) in the future. Contracts are typically made in quantities of 10,000 Dths to be delivered to agreed-upon points (e.g., NWP Sumas, Westcoast Station 2, NGTL AECO, NWP Rockies, etc.).

In a swap, parties agree to exchange an index price for a fixed price over a defined period. In this scenario, Cascade would be able to provide its customers with a fixed price over the duration of the swap period. In theory, the price would be leveled over the long-term. Futures and swaps are typically called costless because they have no up-front cost.

Unlike futures and swaps, an option-only provides protection in one direction - either against rising or falling prices. For example, if Cascade wanted to protect customers against rising gas prices but keep the ability to take advantage of falling prices, Cascade would purchase a call option on a natural gas future contract. This arrangement would give the Company the right (but not the obligation) to buy the futures contract at a previously determined price (strike price). Similar to insurance, this transaction only protects the Company from volatile price spikes, via a premium. The premium is typically a function of the variance between the strike price compared

to the underlying futures price, the period of time before the option expires, and the volatility of the futures contract.

Cascade's Gas Supply Oversight Committee (GSOC) oversees the Company's gas supply hedging strategy. The Company's current gas hedging strategy is outlined below:

### **Hedged Fixed-Price Physical or Financial Swaps**

- Year one up to 60% of annual requirements
- Year two set at up to 40%
- Up to 20% hedged volumes for year three

Depending on market conditions, the strategy allows for the ratchets to increase to 75%, 50%, and 30%, respectively, provided current market information supports moving to a different level.

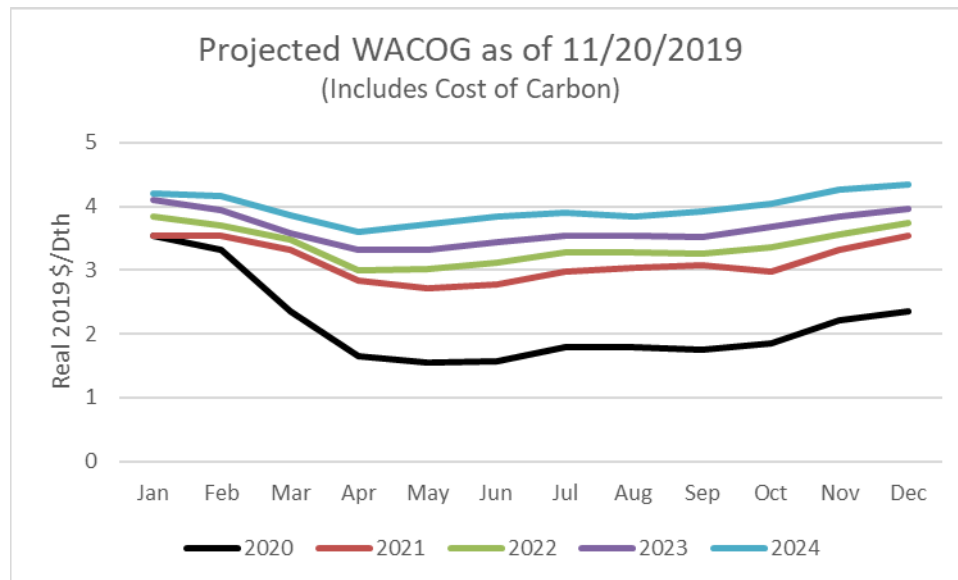
Cascade may employ prudent risk management strategies within designated parameters to minimize the risk of operating losses or assumption of liabilities from commodity price increases because the price the Company pays for gas is subject to market conditions. Risk is associated with business objectives and the external environment. The number of hedging strategies to deal with risk are almost infinite. The decision-making process to manage a risk categorizes whether the risk is one to be avoided, one to be accepted and controlled, or a risk left uncontrolled. When a risk is high impact with a high likelihood of occurrence, the risk is probably too high in relation to the reward and should be avoided. It is reasonable to accept business risks that can be managed and controlled. For some risk, the measurable impact is low, and the risk may not be worth controlling at all. These are risks where the Company can absorb a loss with little financial or operational effect. The Company's policy is directed toward those risks that are considered manageable, controllable, and worth the potential reward to customers. This manageable risk includes acceptable analysis of the possible side effects on the financial position of the Company as compared to the rewards.

The use of derivatives is permitted only after identified risks have been determined to exceed defined tolerance levels and are considered unavoidable. Cascade's GSOC makes these decisions. In recent years, GSOC has adjusted the percentage of the portfolio hedged based on volatility of the market. For example, in the early 2000s, the Company hedged up to 90% of the base gas supply portfolio. When MDU Resources acquired Cascade in 2007, this threshold was reduced to 75% to align with MDU Resources' Corporate Derivatives Policy. As the market began to fall dramatically in the 2008-2010 period, the Company continued to lower the percentage to approximately 30%. Current MDU Resources' corporate policy

encourages Cascade to keep the hedging percentage less than 50%. For the 2018 procurement design, GSOC felt that with Cascade’s unique load and wide geographical profile, the lack of price volatility would potentially expose the Company to unreasonable premiums on derivatives. Therefore, GSOC chose to hedge using fixed priced physicals. Currently, Cascade hedges approximately 40% of the portfolio using fixed priced physicals.

The Company entered into fixed price physical transactions and one financial swap for the current programmed buying period. Fixed prices consist of locked-in prices for physical supplies. As will be further described in this chapter, the Company utilizes a programmed buying approach for locking in or hedging gas supply prices. In light of the relative lack of volatility in current prices, abundant supply, concerns regarding the administrative impacts of the Dodd-Frank Wall Street Reform Act, and an evolving hedging policy in Washington, Cascade has only executed one new financial derivative for the 2020 IRP. The Company still monitors the outer years and stands ready to execute financial swaps when market and pricing conditions are more favorable. At the time the current procurement strategy was made, the forward price spread between the November 2019 through October 2020 period and the November 2022 through October 2023 period was less than 20%, which was deemed a reasonable and manageable spread given market intelligence available. Figure 4-5 provides a graph showing the Company’s projected weighted average cost of gas (WACOG), including the base case carbon adder, for the 2020 IRP.

Figure 4-5: Projected Cascade WACOG as of November, 2019



On March 13, 2017, the Washington Utilities and Transportation Commission (WUTC) issued its Policy and Interpretative Statement on Local Distribution Companies' (LDCs) Natural Gas Hedging Practices in Docket UG-132019.<sup>4</sup> This statement provided guidance on how LDCs should develop and implement more robust risk management strategies, analyses and reporting related to hedging activities. Many of the techniques employed as a result of the WUTC docket will benefit Oregon customers as well, so a discussion of these best practices is prudent for this IRP.

In Docket UG-132019, the WUTC reviewed hedging practices by utilities in the State of Washington and found that local LDCs experienced opportunity costs associated with price risk mitigation techniques upwards of \$1.1 billion over a ten-year period. The WUTC discovered that many of these costs were caused by adherence to programmatic “set-it-and-forget-it” price risk mitigation techniques (herein called hedging or hedging strategies) that did not respond well to the downward trending market which prevailed in recent years. The WUTC concluded that, while hedging is necessary to limit upside price risk, an effective program should also give flexibility that can mitigate downside hedge losses by adjusting to changing market conditions. To achieve this goal, the Commission identified a need for a risk-responsive hedge plan with a robust analytical framework.

GSOC oversees the Company's gas supply purchasing and hedging strategy. Members of GSOC include Company senior management from Gas Supply, Regulatory, Finance and Operations. In preparing the Company's hedge execution plan, Cascade has relied on the following points when interpreting the WUTC hedging policy statement:

- WUTC affirmed its preference that natural gas LDCs utilize risk responsive hedging practices.
- Hedging practices should not be speculative in nature. Hedging is an activity designed to reduce price uncertainty, not an attempt to realize profits based on predictions of anticipated market movements.
- The Commission believes that while there is no right mix of methods that may be applied unilaterally due to utility specific operations, LDCs must reasonably plan for market volatility and appropriately react to balance ratepayer exposure to hedging losses. This includes recognizing dual protection from upside price risk and downside hedging loss, along with annual validation of acceptable hedging outcomes.
- Based on the WUTC hedging policy statement the Company is aware that the WUTC views the Gettings White Paper as a resource in helping LDCs develop more robust risk management programs. While

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<sup>4</sup> <https://www.utc.wa.gov/docs/Pages/DocketLookup.aspx?FilingID=132019>



Cascade has considered portions of the White Paper to inform the Company's enhanced risk management strategies, analysis and reporting, Cascade has hired a consultant, Gelber & Associates, to assist the Company in developing the proper risk responsive process and analyses.

With the assistance of Gelber & Associates (G&A or Gelber), an energy consulting firm with 30 years of experience in utility hedging, CNGC has reexamined its hedging practices to develop a hedging plan that uses a data-driven approach, and provides the flexibility to manage both upside price risk and downside hedge loss risk.

Gelber & Associates has been working in close coordination with Cascade to design and implement processes and analytics to comply with the Washington Utility and Transportation Commission UG-132019 policy statement while simultaneously complying with Oregon Public Utility Commission UM-1286 PGA integrated hedging guidelines.

WUTC's Docket UG-132019 requires that hedging programs steer away from inflexible, programmatic practices employed previously to become more "risk responsive" and "data driven". WUTC requires an annual hedging plan submission that demonstrates risk responsive strategies in addition to retrospective hedge reporting. Gelber believes and Cascade concurs that the use of a diversified portfolio of hedging instruments including swaps, call options, and fixed-price physicals are the appropriate design criteria to satisfy Commission requirements.

An update of Cascade's work with Gelber on a more risk-responsive hedge design can be found in the Company's WUTC acknowledged 2019 Annual Hedge Plan in Appendix E.

## **Portfolio Purchasing Strategy**

As stated earlier, GSOC oversees the Company's gas supply purchasing strategy. Based on current stable prices and a robust supply picture, the Company considers contracting physical supplies for up to five years (based on a warmer-than-normal weather pattern). The Company's current gas procurement strategy is to secure physical gas supplies for approximately one-third of the core portfolio supply needs each year for the subsequent rolling three-year period. This method ensures some portion of the current market prices will affect a portion of the next three years of the portfolio.

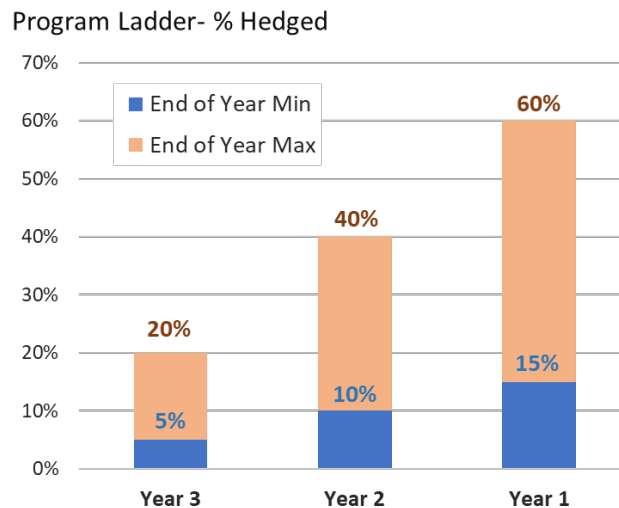
The current hedging plan for CNGC, approved by GSOC in the spring of 2019, is comprised of 99% physical purchases in a ladder design in which hedges are added

and accumulated every year prior to the final consumption of the gas. The natural gas is considered hedged when its price is locked-in and scheduled for delivery in the physical market using a fixed-price physical purchase. The program currently allows up to 20% of expected purchases to be hedged three years prior to delivery, up to 40% hedged two years prior, and up to 60% hedged the year prior to the final consumption of the gas. The portfolio percentage of fixed priced purchases is defined in the Cascade Natural Gas NOV19-OCT20 PGA.

The gas supply portfolio design is overseen by GSOC, which determines the framework for the portfolio design including the allowable percentage of fixed-priced purchases. The execution of the portfolio and the hedging plan is accomplished primarily by the Supervisor of Gas Supply, under the leadership of the Manager of Gas Control & Supply for the Western Region. Either the Supervisor or Manager can execute purchases under the current plan (under the proposed plan they will retain this function), additionally, they may designate a backup within Gas Supply with the responsibility to execute trades in the event of their absence. The Manager of Supply Resource Planning functions as compliance manager regarding the WUTC’s UG-132019 policy statement. This team is overseen by the Director, Gas Supply—Utility Group.

As depicted on Figure 4-6, the structure of the current plan is as follows: Year 1 is currently hedged at 25% (blue bars) which leaves 15% (orange bar) of additional hedges that can be added for Year 1. Year 2 is currently hedged at 20% which leaves 5% of additional hedges that can be added for Year 2. (For clarity, when Year 2 becomes Year 1, the hedge percentage will increase from a maximum of 25% to a maximum of 40% unless overridden by the GSOC portfolio design discussed previously). Year 3 is currently unhedged which leaves 20% of additional hedges that can be added for Year 3.

Figure 4-6: Current Hedge Ladder



Additional characteristics of the current strategy are described below:

- Stay the course. Portfolio procurement for 2020 should continue with same guidance as 2019's plan. This is the most reasonable action while the Company works with Gelber & Associates to identify modifications to future portfolio and hedging designs for GSOC to consider.
- Annual load expectation (Nov-Oct) is approximately 30,000,000 dekatherms, consistent with recent load history.
- Portfolio procurement design based on a declining percentage each year, accordingly: Year 1: approximately 80% of annual load expectation; Year 2: 40%, Year 3: 20%.
- Portfolio must contain a variety of parties, locations, contract volume and terms.
- Considerations of structured products, caps, floors, derivatives, etc. are not to exceed 5% of overall contract supply target. These items are principally used as a potential offset to fixed priced physicals being "out of the money".
- GSOC can always modify the plan to include additional years if a significant discount price materializes.
- GSOC may make further modifications to this portfolio plan based on the results of the Company's hedging initiative to be in compliance with WUTC docket UG-132019.

Under this procurement strategy, approximately 10% to 20% of the annual portfolio is to be met with spot purchases. Spot purchases consist of either first of the month transactions, executed during bid week for the upcoming month, or day purchases which are utilized to meet incremental daily needs.

Once GSOC has approved the portfolio procurement strategy and design, the Company employs a variety of methods for securing the best possible transactions under existing market conditions. Cascade employs a bidding process when procuring fixed priced physical, indexed spot physical, as well as financial swaps used to hedge the price of underlying index based physical supplies. In the bidding process, the Company alerts a minimum of three suppliers and/or financial counterparties of the specific gas supply transactions Cascade plans to fill. Cascade then collects bids from these parties over a period of time for the packages sought, comparing the indicative pricing to each party as well as comparing the information to market intelligence available at the time. Ideally, after monitoring these indicatives and the market, Cascade awards the specific packages to individual parties. Naturally, price is the principle factor; however, Cascade also considers reliability, financial health, past performance, and the party's share of the overall portfolio so that the Company ensures party diversity. It should be noted that the lowest market price may occur during a period when the Company is initially gathering the price indicatives; in that situation there is a risk that a sudden price run-up may lead to filling the transaction at the higher end of the bids over time, or delay the acquisition to another time. However, the reverse is also true—the initial price indicators may

start high and drop over time allowing Cascade to capture the transaction on the downward swing. In the end, timing is always a factor as the market cannot be predicted with any certainty.

Cascade follows a similar process when it submits a formal request for proposals (RFP) to the various suppliers. Parties are asked to provide offers on specific packages, but are also encouraged to propose other transactions or packages that they feel may be of interest in helping Cascade secure financially attractive and flexible transactions to meet the Company's needs. This process requires additional analysis regarding operational reasonableness, timing, and volumes. Price comparisons also become more complicated since pricing could be tiered; part of a structure deal may be tied to an index or contains floors, caps, etc. Cascade utilizes TruMarx's COMET transaction bulletin board system to assist in communicating, tracking, and analyzing these RFP activities.

## **Conclusion**

Cascade's 20-year supply side resource goal is to continue to meet the energy needs of its core market customers. This is accomplished through a package of services that combines adequate gas supplies and cost-effective winter peaking services with long-term pipeline transportation contracts and sufficient distribution system capacity at the lowest possible cost. The Company has identified several transport, storage, and other alternative resources which may be modeled to join the Company's existing demand and supply side resources to address the load demand needs over the planning horizon.

## **CHAPTER 5**

### **AVOIDED COSTS**

## Overview

The avoided cost is the estimated cost to serve the next unit of demand with a supply side resource option at a point in time. This incremental cost to serve represents the cost that could be avoided through energy conservation. The avoided cost forecast can be used as a guideline for comparing energy conservation with the cost of acquiring and transporting natural gas to meet demand.

This chapter presents Cascade's avoided cost forecast and explains how it was derived. While the IRP is only a 20-year plan, avoided costs are forecasted for 45 years to account for the full measure life of some conservation measures, such as insulation, which has a 30-year life. The avoided cost forecast is based on the performance of Cascade's portfolio under expected conditions.

## Key Points

- Avoided cost forecasting serves as a guideline for determining energy conservation targets.
- Cascade's avoided costs include fixed transportation costs, variable transportation costs, commodity costs, a carbon tax, distribution system costs, a risk premium, and a 10% adder.
- New to the 2020 IRP, the Company has included a value for avoided or delayed distribution investment, and a methodology to calculate risk premium.
- The total avoided cost ranges between \$0.26 and \$1.11/therm over the 20-year planning horizon.

## Costs Incorporated

The components that go into Cascade's avoided cost calculation are as follows:

$$AC_{nominal} = TC_f + TC_v + SC + ((CC + C_{tax}) * E_{adder}) + DSC + RP$$

Where:

- $AC_{nominal}$  = The nominal avoided cost for a given year. To put this into real dollars apply the following:  $\text{Avoided Cost} / (1 + \text{inflation rate})^{\text{Years from the reference year}}$ .
- $TC_f$  = Incremental Fixed Transportation Costs
- $TC_v$  = Variable Transportation Costs
- $SC$  = Storage Costs
- $CC$  = Commodity Costs
- $C_{tax}$  = Carbon Tax
- $E_{adder}$  = Environmental Adder, as recommended by the Northwest Power and Conservation Council
- $DSC$  = Distribution System Costs

- $RP$  = Risk Premium

The following parameters are also used in the calculation of the avoided cost:

- The most recent load forecast (9/27/2019);
- The inflation rate used is tied to the Consumer Price Index (CPI) from Woods & Poole's 2019 projections and
- The discount rate of 7.33% (Cascade's real after-tax weighted average cost of capital).

### Understanding Each Component

- **Incremental Fixed Transportation Costs**

For the 2020 IRP, prior to the acquisition of incremental demand-side management resources, Cascade identifies the year 2032 as the start of potential capacity shortfalls. To this end, fixed transportation costs after 2032 represent the average reservation rate of all incremental contracts that would be used to solve shortfalls. Importantly, in some cases, these costs are an estimate based on information from the pipeline companies, and furthermore, are treated as confidential as any incremental fixed transportation costs could ultimately be a negotiated rate.

- **Variable Transportation Costs**

Variable transportation costs are the cost per therm that Cascade pays only if the Company moves gas along a pipeline. This rate is set by the various pipeline companies and can be changed if one of the pipeline companies files a rate case. The final rates filed at the conclusion of a rate case (whether reached through a settlement or a hearing) must be approved by the Federal Energy Regulatory Commission (FERC). To model rate changes in its forecast, Cascade multiplies its transportation costs by the CPI escalator every four years. Four years is a proxy, since rate cases may not be filed each year.

For its 2020 IRP, Cascade projects shortfalls will begin in 2032. Once these shortfalls begin, the next therm saved would no longer apply to existing contracts, but rather to prevent the need to acquire additional transportation. To this end, variable transportation costs after 2032 represent the average demand charge of all incremental contracts that would be used to solve shortfalls. It is worth noting that these costs are estimated based on information from the pipelines and should be treated as confidential as any incremental variable transportation costs could ultimately be a negotiated

rate. These costs are inflated by the CPI escalator every four years to mimic the occurrence of potential rate cases.

- **Storage Costs**

Storage costs are the cost per therm that Cascade would pay for a storage contract that solved some or all of Cascade's peak day shortfalls. This would include an on-system storage facility, or a satellite LNG facility into Cascade's distribution system. Cascade does not forecast a need to acquire additional storage, so this value is zero for the 2020 IRP.

- **Commodity Costs**

Commodity costs are the costs of acquiring one therm of gas. Cascade first uses SENDOUT<sup>®</sup> to calculate the monthly percentage of gas that the optimizer would purchase from each of the three basins to serve that climate zone. These weights are then used to derive a single price for the acquisition of that therm. The source for the price that is used for each month's calculation is the monthly price from each year of Cascade's 20-year price forecast.

- **Carbon Tax**

Once the Company has calculated its average cost of gas, a price for expected carbon compliance costs must be added. Cascade converts the cost of carbon in dollars per metric ton to dollars per dekatherm. Accurate modeling of these costs can be challenging due to uncertainty surrounding how these costs will ultimately be quantified. When Cascade locked in its avoided cost for the 2020 Oregon IRP in late 2019, the Oregon legislature was attempting to pass a Cap and Trade bill that, if passed, would not contain explicit costs for carbon emissions, but rather emissions reduction targets. If utilities cannot meet these targets through emissions reductions efforts, they will presumably be required to purchase carbon offsets through a marketplace that does not yet exist in Oregon. Although this legislation ultimately did not pass, on March 10<sup>th</sup>, 2020, Governor Brown issued Executive Order No. 20-04. This order establishes emissions reductions targets for Oregon but no explicit costs tied to emissions in excess of the targets set. With some type of Cap and Trade system being the most probable carbon compliance future in Oregon, Cascade has elected to use market driven carbon compliance cost as its primary carbon forecast, with California's Energy Assessment Division's 2019 IEPR Preliminary GHG Allowance Price Projections being the closest analog available to a future Oregon carbon marketplace.



Currently, Cascade projects a scaling carbon tax, starting at \$21.13/metric ton in 2021 and capping at \$61.50/metric ton from 2030 onward. These prices are pulled directly from the real mid-price forecast of the IEPR price projections. The Company assumes that compliance costs begin in 2021 to provide a year of implementation time from the beginning of the planning horizon, and caps prices at \$61.50 based on guidance in the cover page of the IEPR projections. Cascade's use of this forecast does not indicate a preference towards this carbon future in Oregon, but rather signifies what the Company believes is the most probable form of carbon legislation in the state. That being said, Cascade recognizes the uncertainty surrounding the cost of carbon compliance as discussed earlier, so the Company performs significant analysis around the variance of carbon compliance costs and the impact of this variance on DSM potential. This is discussed further in Chapter 9, Resource Integration.

- **Environmental Adder**

Cascade includes a 10% adder for non-quantifiable environmental benefits as recommended by the Northwest Power and Conservation Council. The 10% adder is added after the cost of gas and taxes are applied.

- **Distribution System Costs**

Distribution system costs capture the costs of sending gas from the citygate to Cascade's customers. For this IRP cycle, Cascade calculates distribution system costs as its system weighted average of its authorized margins, as posted in the Company's tariffs. Distribution system projects that are not related to growth are then backed out of the weighed margin figure to capture only the costs that can be deemed avoidable. Cascade calculates distribution system costs for both peak day and peak hour, as distribution system analysis is most concerned about system capabilities during a peak hour scenario.

- **Risk Premium**

Cascade views a risk premium as a cost associated with uncertainty around the other avoided cost factors, versus relative certainty of the costs around energy efficiency programs. For the 2020 IRP, the Company worked closely with its stakeholders to create a methodology to quantify this premium. Cascade requested a hypothetical 20-year fixed price quote from its Asset Management Agreement (AMA) partner, Tenaska Marketing Ventures. The Company then compared the prices offered at each of its basins to its 20-year price forecast. Surprisingly, the 20-year fixed prices offered by

Tenaska were lower than projected floating market prices, which would lead to a negative risk premium. Cascade is following the regional best practice established during the UM1893 avoided cost docket and recording a value of zero for risk premium instead of the negative values that were calculated

### **Peak Hour Calculation Methodology**

As discussed earlier, to properly quantify the impact of distribution system enhancement costs, Cascade analyzes what the projected costs would be to increase flow by one therm on peak hour. To do this, Cascade analyzed a representative sample of the actual hourly flow through a few large citygates in its service territory on a particularly cold week in recent years. The Company then analyzed the ratio of peak hour demand to daily demand and applied this ratio to its projected peak day capacity costs. The result of this calculation can be found in Appendix H.

### **Application**

The 2020 IRP makes several enhancements in calculating and applying the avoided costs. This cost figure becomes the foundation for many prudency determinations both operationally and from a resource planning perspective. It may be helpful to think of the final avoided cost figure as something of a cutoff point. Any action that would save a therm of gas could be evaluated based on the cost per therm saved of that measure. If that number is lower than the avoided cost, it may make sense to implement that measure. If not, such a measure may not be optimal to engage in.

### **Results**

Figure 5-1 displays the total avoided cost by each conservation zone over the 20-year IRP horizon, while Figure 5-2 provides the net present value of avoided costs over the planning period. For the 2020 IRP, the system avoided costs range between \$0.26/therm and \$1.11/therm.

As mentioned earlier, the avoided cost is based on the performance of the portfolio under expected conditions for the entire 20-year planning horizon. Overall, avoided costs for the 2020 IRP are lower than in the 2018 IRP. The main driver of this is falling gas prices, and the continued low volatility of prices keeps Cascade's price forecast low throughout the planning horizon. This effect is mitigated somewhat by changes in methodology, including the addition of distribution system costs to the calculation. The 45-year avoided costs and other detailed tables of avoided costs, including various carbon scenarios, are found in the Excel version of Appendix H.

Figure 5-1: Total Oregon Avoided Costs by End Use (Cost per Therm)

| <b>TOTAL AVOIDED COSTS - Annual Values</b> |            |             |                    |                    |                      |
|--|------------|-------------|--------------------|--------------------|----------------------|
| <b>Lifetime</b>                            | <b>DHW</b> | <b>FLAT</b> | <b>Res Heating</b> | <b>Com Heating</b> | <b>Clotheswasher</b> |
| 2020                                       | \$0.26     | \$0.26      | \$0.28             | \$0.28             | \$0.26               |
| 2021                                       | \$0.39     | \$0.39      | \$0.40             | \$0.41             | \$0.39               |
| 2022                                       | \$0.43     | \$0.43      | \$0.45             | \$0.45             | \$0.43               |
| 2023                                       | \$0.45     | \$0.45      | \$0.46             | \$0.47             | \$0.45               |
| 2024                                       | \$0.50     | \$0.50      | \$0.52             | \$0.52             | \$0.50               |
| 2025                                       | \$0.54     | \$0.54      | \$0.56             | \$0.56             | \$0.54               |
| 2026                                       | \$0.58     | \$0.57      | \$0.60             | \$0.60             | \$0.57               |
| 2027                                       | \$0.61     | \$0.61      | \$0.63             | \$0.64             | \$0.61               |
| 2028                                       | \$0.67     | \$0.66      | \$0.68             | \$0.69             | \$0.66               |
| 2029                                       | \$0.73     | \$0.72      | \$0.75             | \$0.75             | \$0.72               |
| 2030                                       | \$0.78     | \$0.78      | \$0.80             | \$0.81             | \$0.78               |
| 2031                                       | \$0.79     | \$0.78      | \$0.81             | \$0.81             | \$0.78               |
| 2032                                       | \$0.83     | \$0.82      | \$1.02             | \$1.00             | \$0.81               |
| 2033                                       | \$0.83     | \$0.83      | \$1.02             | \$1.00             | \$0.81               |
| 2034                                       | \$0.84     | \$0.83      | \$1.03             | \$1.01             | \$0.82               |
| 2035                                       | \$0.84     | \$0.84      | \$1.03             | \$1.01             | \$0.82               |
| 2036                                       | \$0.85     | \$0.85      | \$1.04             | \$1.02             | \$0.83               |
| 2037                                       | \$0.89     | \$0.88      | \$1.08             | \$1.06             | \$0.87               |
| 2038                                       | \$0.90     | \$0.89      | \$1.09             | \$1.07             | \$0.88               |
| 2039                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |

Figure 5-2: Total Oregon Avoided Costs Net Present Value (Cost per Therm)

| <b>TOTAL AVOIDED COSTS - Net Present Value</b> |            |             |                    |                    |                      |
|--|------------|-------------|--------------------|--------------------|----------------------|
| <b>Lifetime</b>                                | <b>DHW</b> | <b>FLAT</b> | <b>Res Heating</b> | <b>Com Heating</b> | <b>Clotheswasher</b> |
| 2020   | \$0.25     | \$0.25      | \$0.26             | \$0.27             | \$0.25               |
| 2021   | \$0.61     | \$0.60      | \$0.63             | \$0.64             | \$0.60               |
| 2022   | \$0.99     | \$0.98      | \$1.03             | \$1.03             | \$0.98               |
| 2023   | \$1.36     | \$1.36      | \$1.42             | \$1.42             | \$1.35               |
| 2024   | \$1.76     | \$1.76      | \$1.83             | \$1.84             | \$1.75               |
| 2025   | \$2.18     | \$2.17      | \$2.26             | \$2.27             | \$2.16               |
| 2026   | \$2.60     | \$2.59      | \$2.70             | \$2.71             | \$2.58               |
| 2027   | \$3.03     | \$3.02      | \$3.14             | \$3.16             | \$3.01               |
| 2028   | \$3.48     | \$3.47      | \$3.60             | \$3.62             | \$3.46               |
| 2029   | \$3.95     | \$3.93      | \$4.08             | \$4.10             | \$3.92               |
| 2030   | \$4.43     | \$4.42      | \$4.58             | \$4.60             | \$4.40               |
| 2031   | \$4.90     | \$4.88      | \$5.06             | \$5.07             | \$4.86               |
| 2032   | \$5.36     | \$5.34      | \$5.63             | \$5.64             | \$5.32               |
| 2033   | \$5.81     | \$5.79      | \$6.18             | \$6.18             | \$5.76               |
| 2034   | \$6.25     | \$6.22      | \$6.71             | \$6.70             | \$6.18               |
| 2035   | \$6.66     | \$6.63      | \$7.22             | \$7.20             | \$6.59               |
| 2036   | \$7.07     | \$7.03      | \$7.71             | \$7.68             | \$6.98               |
| 2037   | \$7.47     | \$7.43      | \$8.20             | \$8.17             | \$7.37               |
| 2038   | \$7.86     | \$7.81      | \$8.68             | \$8.63             | \$7.75               |
| 2039   | \$8.24     | \$8.19      | \$9.14             | \$9.08             | \$8.13               |

## **CHAPTER 6**

# **DEMAND SIDE MANAGEMENT AND ENVIRONMENTAL POLICY**

## Overview

Demand Side Management (DSM) refers to the reduction of natural gas consumption through the installation of energy efficiency measures such as insulation or more efficient gas-fired appliances, or through other load management programs such as demand response efforts that shift gas consumption to off-peak periods. The Company's primary means for reducing load is through energy efficiency programs that provide customers with financial incentives to install energy efficiency measures or appliances. The Company's energy efficiency programs in Oregon and Washington offer rebates/incentives to homeowners, commercial customers, industrial customers, and builders to invest in energy efficiency measures. Because the customer must ultimately make the decision to invest in an energy efficiency measure, DSM is unlike other supply side resources which the Company can independently secure.

This chapter presents the methodology used to determine the Company's DSM supply curve for the 20-year planning period, the Company's annual savings targets, and a narrative about how DSM goals will be achieved.

This chapter also considers state and Federal policy initiatives addressing carbon mitigation that may increase the cost of natural gas service, thus increasing the amount of DSM that is cost-effective.

## Cascade's Oregon Energy Efficiency Program

The Energy Trust of Oregon (Energy Trust) administers the following energy efficiency programs in Oregon on behalf of Cascade:

- Residential (Existing and New Home Construction)
  - Single family, moderate income, manufactured homes
    - Weatherization, HVAC & water heating equipment

### Key Points

- Cascade targets saving approximately 62 million therms system-wide over the 20-year planning horizon; 12.09 million therms in Oregon and 50 million therms in Washington.
- Energy Trust of Oregon performed the technical potential analysis (the Resource Assessment Model) that informs the savings targets in Oregon for this Plan.
- Cascade has thoroughly integrated the elements of the Company's DSM programs into the full IRP planning process by forecasting the DSM potential at the climate zone level.
- Programs are designed to achieve DSM savings targets by offering customers incentives for installing energy

- Commercial (Existing, New and Multifamily)
  - Retail, offices, schools, groceries & other associated market segments
    - Weatherization, controls, HVAC & water heating equipment
- Industrial & Agriculture (Non Transport Sites)
  - Manufacturing facilities, greenhouses
    - Process improvements, HVAC & water heating equipment, operations and maintenance

The Energy Trust of Oregon is an independent, nonprofit organization initially established to provide energy efficiency services and renewable energy programs to customers of Oregon's investor-owned electric utilities. Over time, each independently owned local gas distribution company in Oregon has transferred control of its energy efficiency programs to Energy Trust as a condition for Commission approval of their independent decoupling mechanisms. As such, Energy Trust provides energy efficiency services to much of Oregon. The Energy Trust's program offerings can be found online at [www.energytrust.org](http://www.energytrust.org).

Cascade offers a comprehensive low-income weatherization program administered by Community Action Agencies (CAAs) who provide whole-home weatherization services to qualified customers at no direct cost to the customer. While the low-income programs are designed to meet the unique needs of qualifying customers, the therm savings acquired in these programs contribute to the total DSM savings target. The Company does not have income data for its customers and, therefore, cannot separately estimate the therm savings potential for just its low-income program. The program details are found in Schedule 33, Oregon Low-Income Energy Conservation Program of the Company's Oregon tariff. Further details on this program are provided later in this chapter.

### **Cascade's Washington Energy Efficiency Program<sup>1</sup>**

Cascade administers its energy efficiency programs in Washington. The methodology for establishing Cascade's long-term planning targets as well as the savings targets are included in the Company's 2018 IRP, filed in the Washington Utilities and Transportation Commission's (WUTC's) Docket UG-171186. A recapitulation of the Company's short-term goals and initiatives for achieving these goals is available in the Company's Conservation Plan filed in WUTC Docket UG-190957 and is included in Appendix D of the 2018 WA IRP.

The Company's program offerings are broad, including rebates to homeowners for furnaces and water heaters as well as rebates to commercial customers for gas

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<sup>1</sup> The Oregon IRP rule requires planning on a system basis, hence the inclusion of Washington energy efficiency descriptions herein.

fryers and gas convection ovens. The sectors covered through these programs include the following:

- Residential (Existing and New Home Construction)
  - Single Family & Manufactured
    - Built Green & Energy Star homes, weatherization, HVAC and water heating equipment, Energy Savings Kits, exterior doors, and programmable thermostats
- Commercial/Industrial (New and Existing)
  - HVAC and water heating equipment, weatherization, controls, energy savings kits, commercial kitchen, clothes washers, and custom

The Company's specific program offerings are detailed in the Company's Washington tariff found online at [www.cngconserve.com](http://www.cngconserve.com).<sup>2</sup>

As in Oregon, Cascade offers a comprehensive low-income weatherization program administered by CAAs. The specific details of the Company's offering can be found in Schedule 301, Low Income Weatherization Incentive Program in the Company's Washington tariff.

## **20-Year Forecast for Cascade Natural Gas Corporations' DSM Potential in Oregon**

Energy Trust analyzes energy savings on a consistent and comparable basis with other supply side resources. All cost-effective energy efficiency is identified and deployed via the long-term planning process and Energy Trust is tasked with acquiring this resource on behalf of Cascade. Cascade and Energy Trust work closely together to ensure that Energy Trust has access to the Company's most recent forecasting data and is able to effectively integrate this information into its assessment of the Company's DSM potential. Throughout the IRP process, both entities communicated and coordinated on an ongoing basis to maximize forecast accuracy and to provide adjustments to analysis where appropriate. For this planning cycle, consistent with the previous, the Company and Energy Trust spent nearly a year engaged in constructive dialogue, beginning with an exchange of load and customer growth forecasting and avoided costs, as well as discount and inflation rates. From there, a series of meetings and calls were launched to ensure that both parties were comfortable with the analysis as it proceeded.

As a result of this coordination, Energy Trust developed a 20-year DSM resource forecast for Cascade using Energy Trust's DSM resource assessment modeling tool (hereinafter 'RA Model') to identify the total 20-year cost-effective DSM

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<sup>2</sup> See Schedule 300, Residential Conservation Incentive Program; Schedule 301, Low Income Weatherization Incentive Program; Schedule 302, Commercial/Industrial Conservation Program. Tariffs are posted online at [www.cngc.com](http://www.cngc.com).



savings potential, which is then ‘deployed’ exogenously of the RA model to estimate the final deployed IRP savings projection.<sup>3</sup> There are four types of potential that are calculated to develop the final deployed IRP savings projection. The types of potential are shown in Figure 6-1 and are discussed in greater detail in the sections.

Figure 6-1: Types of Potential Calculated in 20-year Forecast Determination

|                                 |                            |   |  |  |                                   |
|---------------------------------|----------------------------|---|--|--|-----------------------------------|
| <i>Not Technically Feasible</i> | <b>Technical Potential</b> |   |  |  | <i>Calculated within RA Model</i> |
|                                 | <i>Market Barriers</i>     | <b>Achievable Potential</b><br>(85% of Technical Potential) |  |  |                                   |
|                                 |                            | <i>Not Cost-Effective</i>                                   | <b>Cost-Effective Achievable Potential</b>     |  |                                   |
|                                 |                            |   | <i>Program Design &amp; Market Penetration</i> | <b>Final Deployed IRP Savings Projection</b> |                                   |

The RA Model utilizes the modeling platform Analytica<sup>®4</sup>, an object-flow based modeling platform that is designed to visually show how different objects and parts of the RA model interrelate and flow throughout the modeling process. The RA Model utilizes multidimensional tables and arrays to compute large, complex datasets in a relatively simple user interface. Energy Trust then deploys this cost-effective potential exogenously to the RA Model into an annual savings projection based on past program experience, knowledge of current and developing markets, and future codes and standards. This final 20-year savings projection is provided to Cascade for inclusion in its SENDOUT<sup>®</sup> Model as a reduction to demand on the system.

## 20-Year Forecast Detailed Methodology

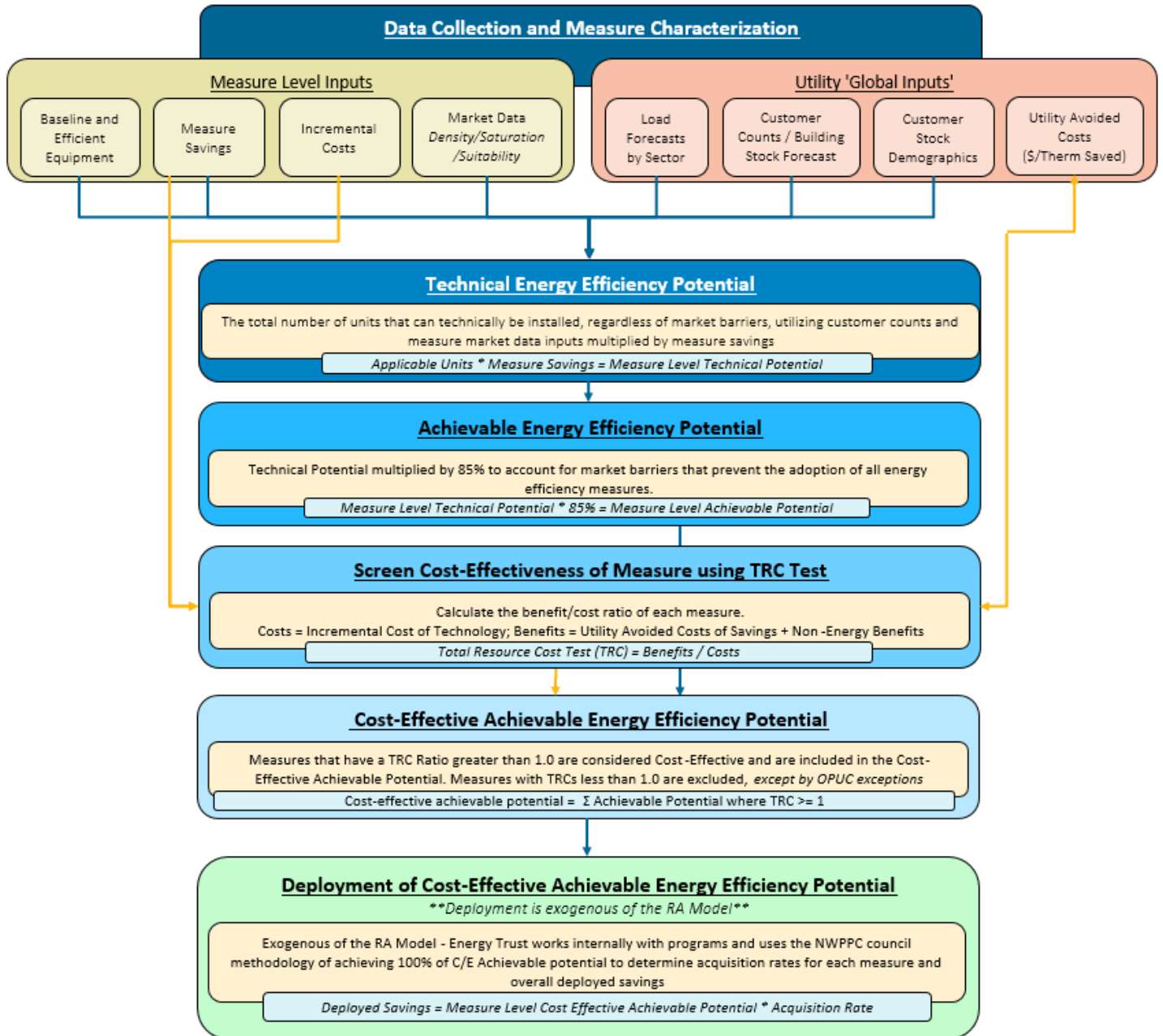
Energy Trust’s 20-year forecast for DSM savings follows six overarching steps from initial calculations to deployed savings, as shown in the flow chart in Figure 6-2. The first five steps in the varying shades of blue nodes (*Data Collection and Measure Characterization to Cost-Effective Achievable Energy Efficiency Potential*) are calculated within Energy Trust’s RA Model. This results in the total cost-effective potential that is achievable over the 20-year forecast. The actual

<sup>3</sup> The RA Model is similar to what is called a Conservation Potential Assessment (CPA) as is performed for Cascade’s Washington energy efficiency planning.

<sup>4</sup> <https://lumina.com/why-analytica/what-is-analytica/>

deployment of these savings (the acquisition percentage of the total cost-effective potential each year, represented in the green node of the flow chart) is done exogenously of the RA Model. The remainder of this section provides further detail in each of the steps shown in Figure 6-2.

Figure 6-2: Energy Trust's 20-Year DSM Forecast Determination Flow Chart



## Data Collection and Measure Characterization

The first step of the modeling process is to identify and characterize a list of measures to include in the RA Model, as well as receive and format utility ‘global’ inputs for use in the RA Model. Energy Trust compiled and analyzed a list of commercially available and emerging technology measures for residential, commercial, industrial and agricultural applications which can be installed in new or existing applications. The list of measures is meant to reflect the full suite of measures offered by Energy Trust, plus a spectrum of emerging technologies.<sup>5</sup> Simultaneous to this effort, Energy Trust collected necessary data from Cascade to run the RA Model and scale the measure level savings to a given service territory (known as ‘global inputs’). The measure level inputs and global inputs are described in more detail below.

### Measure Level Inputs

Once the measures have been identified for inclusion in the RA Model, they must be characterized to determine their savings potential and cost-effectiveness. The characterization inputs are determined through a combination of Energy Trust primary data analysis, regional secondary sources<sup>6</sup>, and engineering analysis. There are over 30 measure level inputs that feed into the RA Model, but on a high level, the inputs are put into the following categories:

- **Measure Definition and Equipment Identification:** This is the definition of the efficient equipment and the baseline equipment it is replacing (e.g. a 95% EF furnace replacing an 80% EF baseline furnace). A measure’s replacement type is also determined in this step – Retrofit (RET), Replace on Burnout (ROB), or New Construction (NEW).
- **Measure Savings:** the kWh or therms savings associated with an efficient measure calculated by comparing the consumption of the baseline and efficient measures.

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<sup>5</sup> An emerging technology is defined as technology that is not yet commercially available, but is in some stage of development with a reasonable chance of becoming commercially available within a 20-year timeframe. The Model is capable of quantifying costs, potential, and risks associated with uncertain, but high-saving emerging technology measures. The savings from emerging technology measures are reduced by a risk-adjustment factor based on what stage of development the technology is in. The working concept is that the incremental risk-adjusted savings from emerging technology measures will result in a reasonable amount of savings over standard measures for those few technologies that eventually come to market without having to try and pick winners and losers.

<sup>6</sup> Secondary Regional Data sources include: The Northwest Power and Conservation Council (NWPCC), the Regional Technical Forum (the technical arm of the NWPCC), and market reports such as the Northwest Energy Efficiency Alliance’s (NEEA) Residential and Commercial Building Stock Assessments (RBSA and CBSA)

- **Incremental Costs:** The incremental cost of an efficient measure over the baseline. The definition of incremental cost depends upon the type of the measure. If a measure is a RET measure, the incremental cost of a measure is the full cost of the equipment and installation. If the measure is a ROB or NEW measure, the incremental cost of the measure is the difference between the cost of the efficient measure and the cost of the baseline measure.
- **Market Data:** Market data of a measure includes the density, efficient saturation, and suitability of a measure. A density is the number of measure units that can be installed per scaling basis (e.g. the average number of showers per home for showerhead measures). The efficient saturation is the average saturation of the density that is already efficient (e.g. 50% of the showers already have a low flow showerhead). Suitability of a measure is a percentage input to represent the percent of the density where the efficient measure is actually suitable for installation. These data inputs are all generally derived from regional market data sources such as the Northwest Energy Efficiency Alliance's (NEEA) Residential and Commercial Building Stock Assessments (RBSA and CBSA).

### Utility Global Inputs:

The RA Model requires several utility level inputs to create the DSM forecast. These inputs include:

- **Customer and Load Forecasts:** These inputs are essential to scale the measure level savings to a utility service territory. For example, residential measures are characterized on a scaling basis 'per home', so the measure densities are calculated as the number of measures per home. The RA Model then takes the number of homes that Cascade serves currently and the forecasted number of homes to scale the measure level potential to the utility's entire service territory.
- **Customer Stock Demographics:** These data points are utility specific and identify the percentage of stock that utilize different heating fuels for both space heating and water heating. The RA Model uses these inputs to segment the total stocks to the stocks that are applicable to a measure (e.g. gas storage water heaters are only applicable to customers that have gas water heat).
- **Utility Avoided Costs:** Avoided costs are the net present value of avoided energy purchases and delivery costs associated with energy efficiency savings represented as \$'s per therm saved. These values are provided by Cascade and the components are discussed in Chapter 5,

Avoided Cost. Avoided costs are the primary ‘benefit’ of energy efficiency in the cost-effectiveness screen.

### Calculate Technical Energy Efficiency Potential

Once measures have been characterized and utility data is loaded into the RA Model, the next step is to determine the technical potential of energy that could be saved. Technical potential is defined as the total potential of a measure in the service territory that could be achieved regardless of market barriers or cost-constraints, representing the maximum potential energy savings available. The RA Model calculates technical potential by multiplying the number of applicable units for a measure in the service territory by the measure’s savings. The RA Model determines the total number of applicable units for a measure utilizing several of the measure level and utility inputs referenced above:

|                                 |   |
|---------------------------------|---|
| <i>Total applicable units =</i> | <i>Measure Density * Baseline Saturation * Suitability Factor * Heat Fuel Multipliers (if applicable) * Total Utility Stock (e.g. # of homes)</i> |
| <i>Technical Potential =</i>    | <i>Total Applicable Units * Measure Savings</i>   |

The measure level technical potential is then summed to show the total technical potential across all sectors. This savings potential does not take into account the various market and cost barriers that will limit a 100% adoption rate.

### Calculate Achievable Energy Efficiency Potential

Achievable potential is simply a reduction to the technical potential by 15%, to account for market barriers that prevent total adoption of all cost-effective measures. Defining the achievable potential as 85% of the technical potential is the generally accepted method employed by many industry experts, including the Northwest Power and Conservation Council (NWPCC) and National Renewable Energy Lab (NREL).

|                               |                                  |
|-------------------------------|----------------------------------|
| <i>Achievable Potential =</i> | <i>Technical Potential * 85%</i> |
|-------------------------------|----------------------------------|

### Determine Cost-effectiveness of Measure using TRC Screen

The RA Model screens all DSM measures in every year of the forecast horizon using the Total Resource Cost (TRC) test, a benefit-cost ratio (BCR) that measures the cost-effectiveness of the investment being made in an efficiency measure. This test evaluates the total present value of benefits attributable to the measure divided by the total present value of all costs. A TRC test value equal to or greater than 1.0 means the value of benefits is equal to or exceeds the costs of the measure, and is therefore cost-effective and contributes to the total amount of cost-effective potential. The TRC is expressed formulaically as follows:

$TRC = \text{Present Value of Benefits} / \text{Present Value of Costs}$

Where the *Present Value of Benefits* includes the sum of the following two components:

- **Avoided Costs:** The present value of natural gas energy saved over the life of the measure, as determined by the total therms saved multiplied by Cascade's avoided cost per therm. The net present-value of these benefits is calculated based on the measure's expected lifespan using the Company's discount rate.
- Non-energy benefits are also included when present and quantifiable by a reasonable and practical method (e.g. water savings from low-flow showerheads, operations and maintenance (O&M) cost reductions from advanced controls).

Where the *Present Value of Costs* includes the total incremental cost of an energy efficiency measure, which includes:

- Incentives paid to the participant; and
- The participant's remaining out-of-pocket costs for the installed cost of the measures after incentives, minus state and federal tax credits.
- Operations and maintenance costs over the life of the measure, if applicable.

The cost-effectiveness screen is a critical component for Energy Trust modeling and program planning because Energy Trust is only allowed to incentivize cost-effective measures, unless an exception has been granted by the OPUC. The RA Model allows for non-cost-effective measures that have been granted OPUC exceptions to be included in the cost-effective achievable savings using an override feature in the RA Model.

### **Quantify the Cost-Effective Achievable Energy Efficiency Potential**

The RA Model's final output of potential is the quantified cost-effective achievable potential. If a measure passes the TRC test described above, then *achievable savings* (85% of technical potential) from a measure is included in this potential. If the measure does not pass the TRC test above, the measure is not included in cost-effective achievable potential. However, the cost-effectiveness screen is overridden for some measures, detailed in Figure 6-3, under two specific conditions:

- The OPUC has granted an exception to offer non-cost-effective measures per conditions outlined in Oregon UM-551 or,

- When the measure isn't cost-effective using utility specific avoided costs but the measure is cost-effective when using blended gas avoided costs for all of the gas utilities Energy Trust serves and is therefore offered by Energy Trust programs.

Figure 6-3: Measures with Cost-Effective Override Applied and Rationale

| Measures that are Overridden             | Override Applied? | Rationale      |
|--|-------------------|----------------|
| Res - Attic/Ceiling insulation           | TRUE              | OPUC Exception |
| Res - Floor insulation                   | TRUE              | OPUC Exception |
| Res - Wall insulation                    | TRUE              | OPUC Exception |
| Res - 0.67/0.69 EF Gas Tank Water Heater | TRUE              | OPUC Exception |

### Deployment of Cost-Effective Achievable Energy Efficiency Potential

After determining the modeled 20-year cost-effective achievable potential, Energy Trust develops a savings projection based on past program experience, knowledge of current and developing markets, and future codes and standards. This is known as the deployment of savings and is a 20-year forecast of energy savings that will result in a reduction of load on Cascade's system. This savings forecast includes savings from program activity for existing measures and emerging technologies, expected savings from market transformation efforts that drive improvements in codes and standards, and a forecast of what Energy Trust is describing as a 'large project adder'. The 'large project adder' is characterized as savings that account for large unidentified projects that consistently appear in Energy Trust's historic savings record and have been a source of Energy Trust overachievement against IRP targets in prior years for other utilities that Energy Trust serves.

### Overview of Deploying Cost-Effective Achievable Potential

The cost-effective achievable potential output by the RA Model does not represent the forecast of savings that utilities will actually experience on their systems. Not all cost-effective achievable potential that results from the RA Model can actually be obtained by Energy Trust due to customer awareness, customer willingness to install, program maturity, codes and standards, and other market factors. To account for all of these factors, Energy Trust 'deploys' the cost-effective achievable results output by the RA Model to represent the amount of savings that are forecast to be obtained either through Energy Trust programs, codes and standards or other market transformation mechanisms. This results in the 4th level of potential called 'deployed potential' outline in Figure 6-1, using ramp rates.

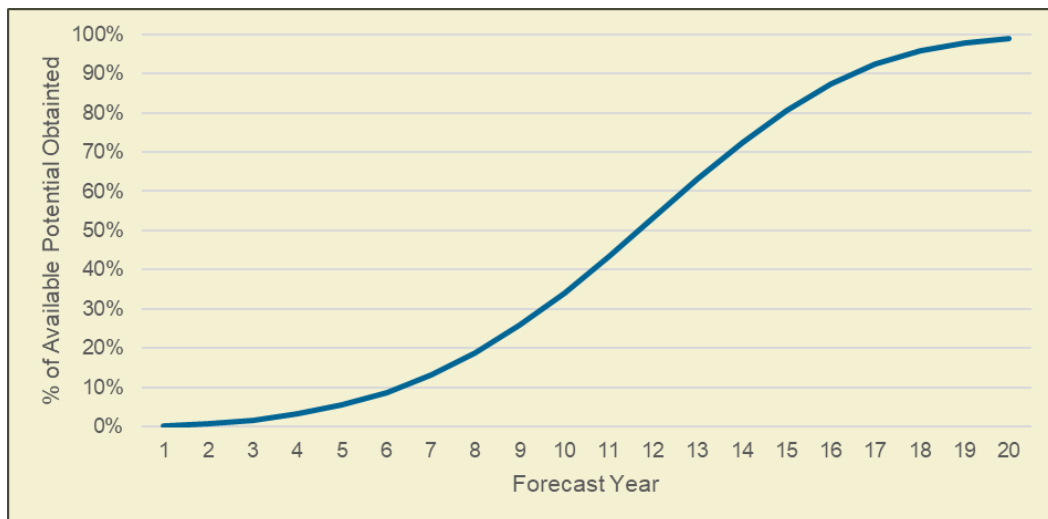
There is a suite of ramp rates that Energy Trust utilizes, and an individual measure's ramp rate depends on the replacement type of the measure, which is

either a Lost Opportunity or Retrofit. This reflects the difference in calculating potential between different measure replacement types (ROB vs. RET vs. NEW). This method generally aligns with the NWPCC methodology for deploying potential in the NWPCC Power Plans<sup>7</sup>, produced every five years although Energy Trust applies ramp rates that reflect assumptions about specific market conditions in Cascade’s Oregon territory. Below is further detail on each deployment type:

- **Lost Opportunity (LO) Measures** – LO measures are ROB and NEW measures in the RA Model. They are considered lost opportunity because the number of stocks available is limited by stock turnover for ROB measures and new construction rates for NEW measures. When a new construction project happens or a piece of equipment burns out, a one-time window of opportunity is opened to replace the old equipment with higher-efficiency equipment above code or to promote new construction equipment above code. If the opportunity is missed, it is lost until the inefficient equipment burns out again, hence the ‘lost opportunity’ name.

In the early years of a forecast, it is not plausible that Energy Trust is incenting every piece of equipment that turns over, but it is possible that in the later years those replacements will be captured through either programs, codes, or market transformation. Therefore, ETO uses a deployment ramp rate that ramps up to capturing 100% of the available LO savings by the end of the 20-year forecast. Figure 6-4 shows a representative LO Ramp Rate:

Figure 6-4: Example of NWPCC Lost Op. Ramp rate



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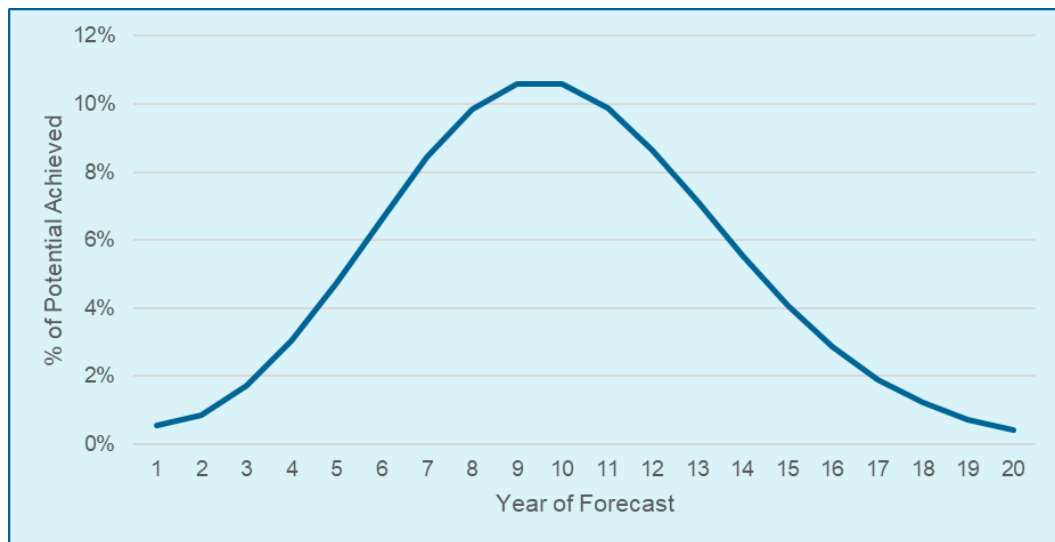
<sup>7</sup> A discussion of the ramp rate methodology applied by the Northwest Power and Conservation Council in the 7th Power Plan can be found in Chapter 12 of the 7th Power Plan:

[https://www.nwcouncil.org/sites/default/files/7thplanfinal\\_chap12\\_conservationres\\_2.pdf](https://www.nwcouncil.org/sites/default/files/7thplanfinal_chap12_conservationres_2.pdf)



- **RET Measures** – The RA Model results for retrofit measures represent the total amount of potential available over the 20-year forecast period. Retrofit measure potential must be deployed differently because it is assumed that the measures can be acquired at any point within the forecast period. For retrofit measure deployments Energy Trust typically uses a bell-shaped ramp rate that adds up to 100% and distributes the potential over the 20-year forecast. Figure 6-5 shows a representative RET Ramp Rate.

Figure 6-5: Example of NWPCCC Retrofit Ramp rate

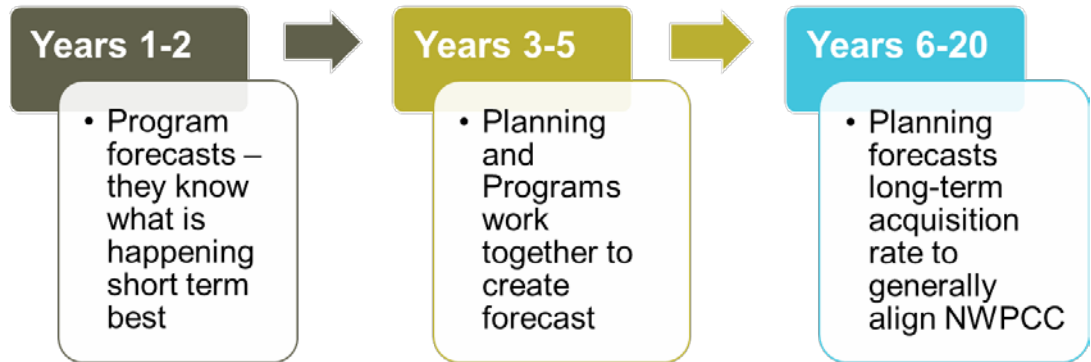


*Some RET measures can have ramp rates that do not add up to 100%, especially if they are hard to reach measures such as insulation or are emerging technologies*

### Ramp Rate Development and Calibration for Final Deployment

Energy Trust typically develops ramp rates at the program category level and the calibration process is divided into three time frames, as shown in Figure 6-6. The first two years of each ramp rate are calibrated to program budgeted goals to get a starting point for the curve. Years 3-5 of ramp rates are also calibrated based on collaboration between Energy Trust program intelligence and RA Model results. The remaining 15 years of the forecast are developed without program input and are based on the remaining potential available.

Figure 6-6: Energy Trust Ramp Rate Calibration Process



Some Energy Trust programs have more detailed data, and Energy Trust can develop more granular ramp rates at the end-use or measure level. Energy Trust follows the NWPC methodology of achieving 100% of the cost-effective achievable potential by the end of the forecast, unless there is a good rationale that it is not possible to realize 100% of potential. Some reasons may be that measures have had historically low uptake, installation is invasive, or it is an emerging technology. In terms of lost opportunity measures, achieving 100% means achieving 100% of the available stocks turning over in that year. For retrofit measures, this means spreading 100% of the potential across the 20 years, informed by calibration in the early years.

Figure 6-6 reflects the process for how Energy Trust develop ramp rates to finalize the “Final Deployed Program Savings Potential” from the “Cost-Effective Achievable Potential” shown in step 6 and Steps 4&5 respectively in Figure 6-7.

Figure 6-7: The Progression to Final IRP DSM Savings Projections

|   |                            |  |  |   |                        |
|---|----------------------------|--|--|---|------------------------|
| <b>Data Collection and Measure Characterization</b> |                            |  |  |   | <i>Step 1</i>          |
| <i>Not Technically Feasible</i>                     | <b>Technical Potential</b> |  |  |   | <i>Step 2</i>          |
|   | <i>Market Barriers</i>     | <b>Achievable Potential<br/>(85% of Technical Potential)</b> |  |   | <i>Step 3</i>          |
|   |                            | <i>Not Cost-Effective</i>                                    | <b>Cost-Effective Achiev. Potential</b>        |   | <i>Steps 4 &amp; 5</i> |
|   |                            |  | <i>Program Design &amp; Market Penetration</i> | <b>Final Deployed Program Savings Potential</b> | <i>Step 6</i>          |

## Modeling Changes and Sensitives in Oregon

Energy Trust's RA Model is a 'living' model and it is continually being updated and improved. There have been a number of changes to the RA Model, methodology and measures since the 2018 IRP, which are a result of a stakeholder workshop that Energy Trust held in 2017 and other more recent internal improvement updates.

The purpose of the stakeholder meeting in September 2017 was to solicit feedback on Energy Trust's forecast process. Attendees included utilities, OPUC Staff, and other regional stakeholders like the Northwest Energy Coalition. Some of the most significant themes that emerged from this process include:

- Energy Trust annual savings achievements have been consistently exceeding IRP targets.
- Utilities and stakeholders are interested in receiving a forecast based on more than just "firm" resources achieved through program activity.
- Utilities are interested in the best projection Energy Trust can provide. Achievements should fluctuate on both sides of the forecast over time.
- Forecast has been missing some estimation of future resources that Energy Trust cannot currently identify.
  - New large single loads that utilities have difficulty forecasting and associated large efficiency 'mega-projects'.
  - Emerging technology of the future that has not yet been developed to the point where Energy Trust includes it in its Model.
- Short-term forecasts are most important to utilities and the OPUC in the following order: 1-2 years, 3-5 years, 6-10 years, and 11-20 years.

As a result of this feedback, Energy Trust made several changes to improve its forecasting methodology which are reflected in Cascade's energy efficiency forecast:

- New Measures
  - Inclusion of additional behavioral savings and near net-zero homes and buildings
- Calibration of Measure Deployment Rates based on Program Forecasts and Trends
  - Increased coordination with program managers and a move to think about forecast in three time periods to calibrate savings potential.
    - 1-2 years (short term) - Rely on programs and align with savings goals from most recent budget
    - 3-5 years (midterm) - Programs and planning work together to extend program trends based on market intelligence
    - 6-20 years (long term) - Planning forecasts long-term acquisition rate

- Large Project Adder
  - Addition of forecast “large project adder” to account for large unidentified projects. These have previously not been forecast as loads or opportunities and have led to results that deviated from the forecasts. The addition is based on average savings from large projects completed in the past.
- Alignment with NWPCC
  - Adopted deployment methodologies that better align with the NWPCC acquisition assumptions and ramping the deployment of measures to 100% of total cost-effective achievable potential for each measure.
    - Exceptions: emerging technologies and hard to reach measures such as insulation

Other updates since the 2018 IRP include:

- Refreshed measure assumptions
  - Energy Trust has completely overhauled the measures in the RA Model to better reflect the savings and cost estimates utilized by Energy Trust programs. Additionally, market data has been updated significantly to include the most recent iterations of RBSA II and CBSA.
- Emerging Technologies
  - Several emerging technologies were added to the RA Model in the Fall of 2017 and these additions are described in detail in the results section below. These measures add to the total potential in the later years of the forecast but they do not show up in the earlier years because they are not yet commercially available.
- Load Forecast Alignment
  - Energy Trust worked with Cascade to better understand what is included in Cascade’s load forecast to better align modeling efforts.
- Scenario Runs
  - Energy Trust ran five scenario runs for Cascade’s 2020 IRP to show changes in potential based on different carbon prices and measure adoption ramp speed. These scenarios are discussed in more detail in the results section.

## **DSM Projections in Oregon: 2020-2039**

The Company foresees 12.09 million therms of its 20-year demand coming from Oregon demand side management measures delivered through Energy Trust. Figure 6-8 presents the technical, achievable, and cost-effective achievable potentials as well as Energy Trust’s therm savings target for the 20-year planning period.

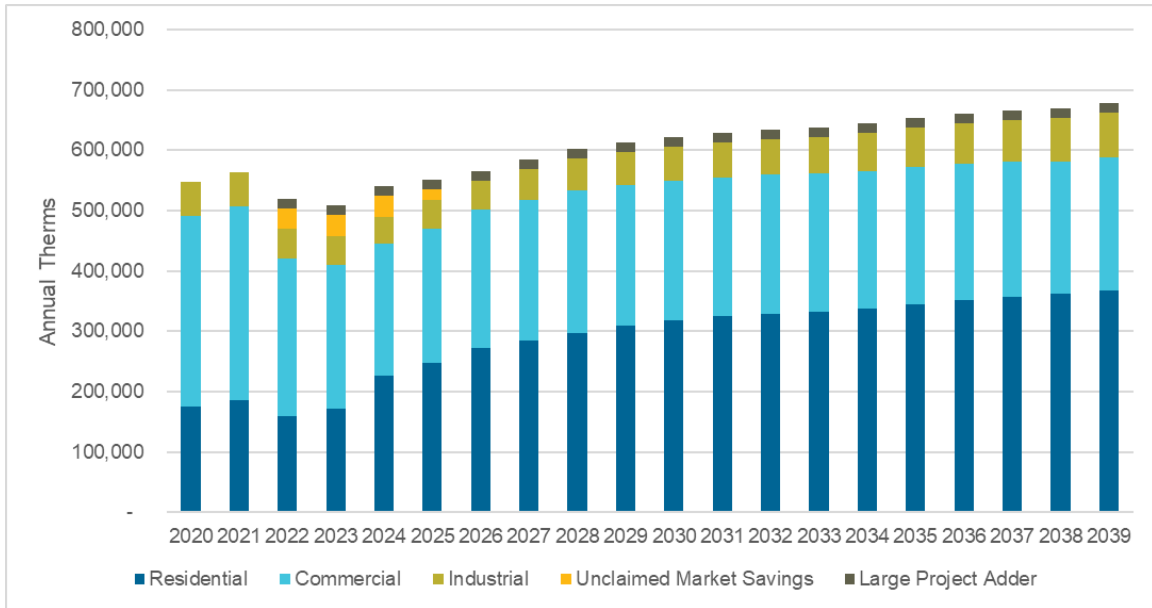
Figure 6-8: Savings Projections for Oregon

|                                  | Residential | Commercial | Industrial | All Sectors       |
|----------------------------------|-------------|------------|------------|-------------------|
| <b>Technical</b>                 | 15,330,968  | 10,907,894 | 1,495,547  | 27,734,409        |
| <b>Achievable</b>                | 13,031,322  | 9,271,710  | 1,271,215  | 23,574,247        |
| <b>Cost-effective achievable</b> | 10,567,961  | 6,259,466  | 1,229,985  | 18,057,412        |
| <b>IRP Projected Savings</b>     | 5,823,039   | 5,121,593  | 1,148,116  | <b>12,092,748</b> |

The final savings projection of 12.09 million therms by 2039 in Cascade’s service territory reflects the reduction to the full cost-effective achievable potential of 18.06 million therms due to additional market-related constraints on capturing savings from replacing equipment at end-of-life and measures from new homes and buildings. Such measures are known as *lost opportunity* measures. The opportunity to acquire these savings, if lost, does not reappear again until their useful life has passed. Energy Trust assumes a relatively sizable portion of these savings will be acquired over time, but Energy Trust does not expect it can leverage all these opportunities as they arise. Energy Trust’s savings projection also includes therms achieved through known changes to future residential and commercial building codes where Energy Trust played a role in advancing the adoption of these codes and standards. Since energy consumption is reduced when more stringent building codes are adopted, the OPUC has agreed to allow Energy Trust to claim some of the savings since its work in transforming the market influenced the changes in code. This was done for the New Homes and New Buildings programs.

Figure 6-9 depicts Energy Trust’s annual savings projection for Cascade’s service territory.

Figure 6-9: 20-Year Annual Projected Savings (2020-2039)



The decline in savings from 2021 to 2023 is due to the expiration of savings from the New Homes programs for past work that contributed to building code changes (otherwise known as market transformation savings) as discussed above<sup>8</sup>. Additionally, some of the forecasted decline in savings is due to changes to measure level savings assumptions due to the use of market baselines. Market baselines are used to develop savings estimates for replacement measures and the baseline assumption is a representation of what the market is currently purchasing, resulting in a weighted average baseline of non-efficient and efficient equipment. As the market matures over time, the market baseline tends to become more efficient, resulting in lower projected savings per measure. Cascade does not include anticipated future savings resulting from market baselines in their load forecast. Therefore, Energy Trust assumes fixed baselines for measures affected by evolving market baselines for the purpose of projecting future savings potential.

Energy Trust calibrates the first five years of the forecast to what programs believe they will be able to obtain and for the first time, programs began to forecast the decline of savings due to market baselines. As a result, for the 2020 IRP, Energy Trust estimated the amount of the program forecasts that are attributed to market baseline and code changes in the first five years of the forecast. Energy Trust included a forecast of these market changes impacts called 'Unclaimable Market

<sup>8</sup>Consistent with practices employed by Northwest Energy Efficiency Alliance, Energy Trust assumes that market transformation savings resulting from Oregon residential codes will persist for homes built for 10 years after the code cycle takes effect. In this case, Energy Trust began claiming savings from the 2011 code in 2012 and these savings will fall off significantly in 2022 and will no longer be claimed at all in 2023.

Savings' in order to forecast what will come off Cascade's system in total from energy efficiency, even if it will not be claimed and reported by Energy Trust.

This discussion highlights that there is a divergence between forecasted savings projections and what Energy Trust will actually claim beyond the first two years of the forecast, with the first two years of savings taken from the most recent Energy Trust two-year budget. For years three through twenty it isn't clear whether the savings that Cascade will experience on its system are savings that will be claimed by Energy Trust or savings that will result from market transformation effects such as codes and standards or future changes to market baselines.

Figure 6-10 provides a 20-year view of cumulative savings projections by savings type: technical, achievable, cost-effective achievable and the deployed IRP savings projection. The orange IRP savings projection line approaches the cost-effective achievable potential but does not meet it. This is due to the earlier discussion of lost opportunity measures. Additionally, some hard to reach measures such as insulation are not deployed to 100% of their Cost-Effective potential in recognition of the fact that these savings are much more difficult to achieve through programs.

Figure 6-10: 20-Year Cumulative Savings Projections by Savings Type

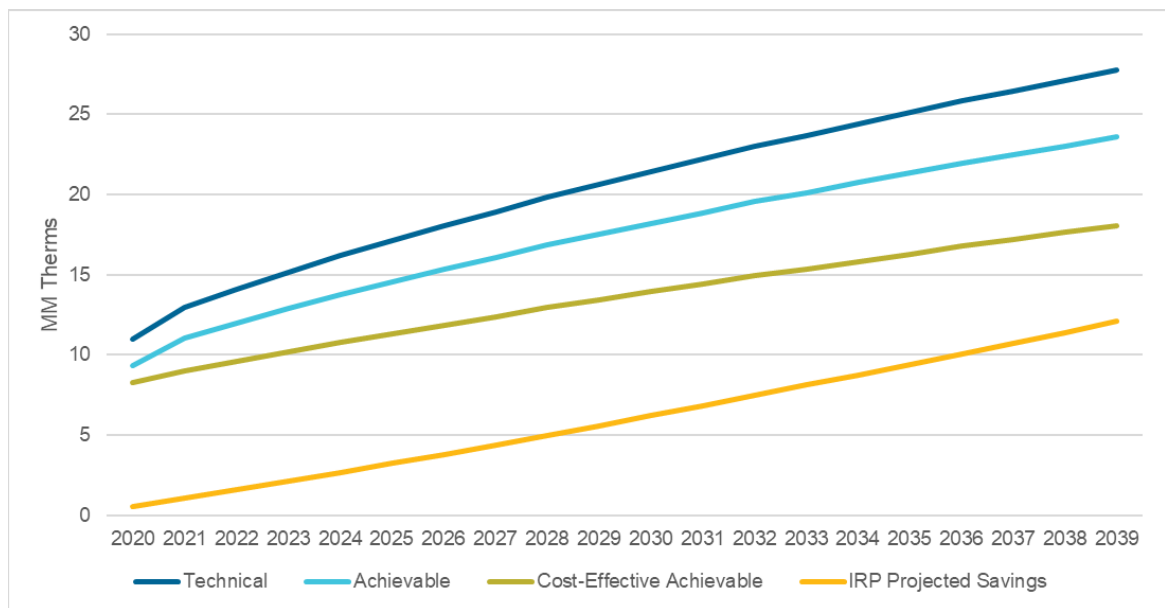


Figure 6-11 provides the cumulative savings projections by sector and savings type. The residential IRP projected savings are a smaller percentage of the total cost-effective achievable potential due to a significant amount of insulation and windows savings that are not fully deployed because they are hard to reach and have lost-opportunities with the new construction market in the early years.

Figure 6-11: Cumulative 20-year Savings Potential by Sector and Savings Type

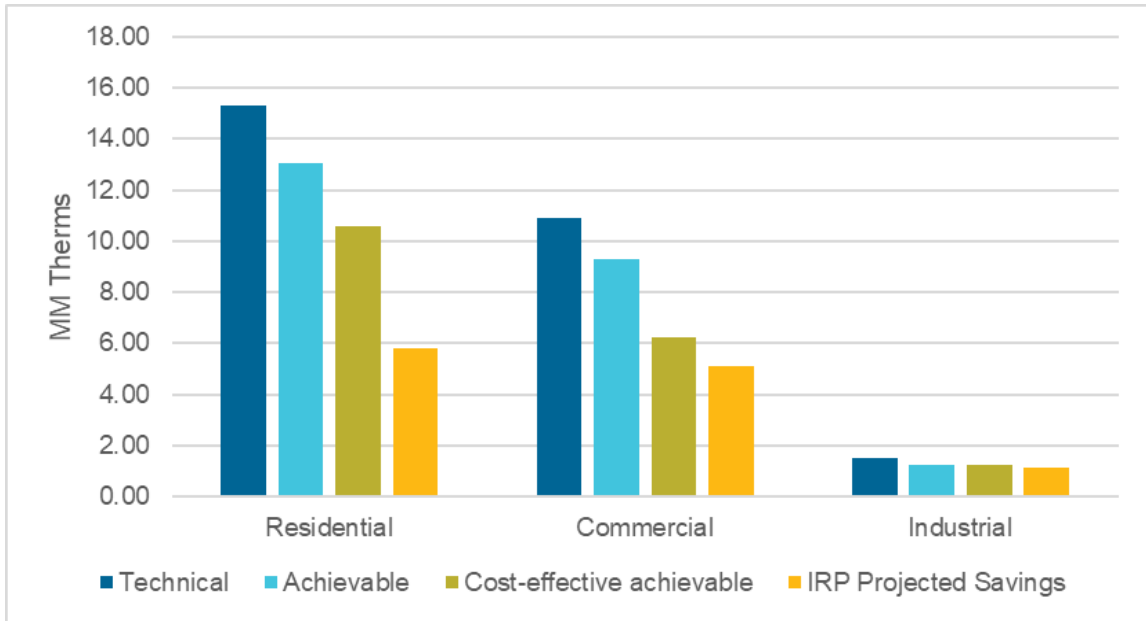


Figure 6-12 shows the potential therm savings per customer class, per measure type per previous discussion.

Figure 6-12: Savings by Customer Class and Measure Type

| Measure Type                                  | Residential Therms Saved | Commercial Therms Saved | Industrial Therms Saved |
|---|--------------------------|-------------------------|-------------------------|
| <b>New Construction</b>                       | 1,346,437                | 913,018                 | NA                      |
| <b>Retrofit</b>                               | 1,694,650                | 2,119,303               | 1,070,386               |
| <b>Replacement/Burn-out</b>                   | 1,050,276                | 936,046                 | 77,730                  |
| <b>Strategic Energy Management</b>            | NA                       | 811,875                 | NA                      |
| <b>New Construction Market Transformation</b> | 1,662,781                | NA                      | NA                      |
| <b>Unclaimed Market Savings</b>               | NA                       | 122,424                 | NA                      |
| <b>Large Project Adder</b>                    | NA                       | 287,823                 | NA                      |
| <b>Total</b>                                  | 5,754,144                | 5,190,488               | 1,148,116               |



Market Transformation savings are based on forecasts of units built to a code that would not have been in place had it not been for the program's efforts to accelerate both the change in code and builder's compliance with code.

Residential New Construction Market Transformation savings represent Energy Trust's best estimate of annual therm savings to be acquired for Cascade in Oregon. These savings targets include improvements in residential building codes adopted earlier due to Energy Trust's and NEEA's efforts and the estimated share of future savings that may come from codes.

Energy Trust's analysis of the market transformation savings that will result from energy system requirements written into the 2019 commercial code<sup>9</sup> was not complete by the time this forecast took place, therefore commercial market transformation savings are zero. However, the unclaimed savings adder includes a forecast of some of the commercial market transformation savings likely to come from the 2020 commercial code.

Figure 6-13 provides an overview of Cascade's 20-year projected annual savings acquisition by measure end-use category showing both the total cost-effective achievable potential and the deployed IRP savings projection. A significant amount of savings is available from the heating and weatherization end-uses, which occur during peak periods.

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<sup>9</sup> For information on the 2019 Oregon Structural Specialty Code visit the Oregon Building and Codes Division Website: <https://codes.iccsafe.org/content/OSSC2019P1>

Figure 6-13: 20-Year Annual Savings Projection by End Use Category

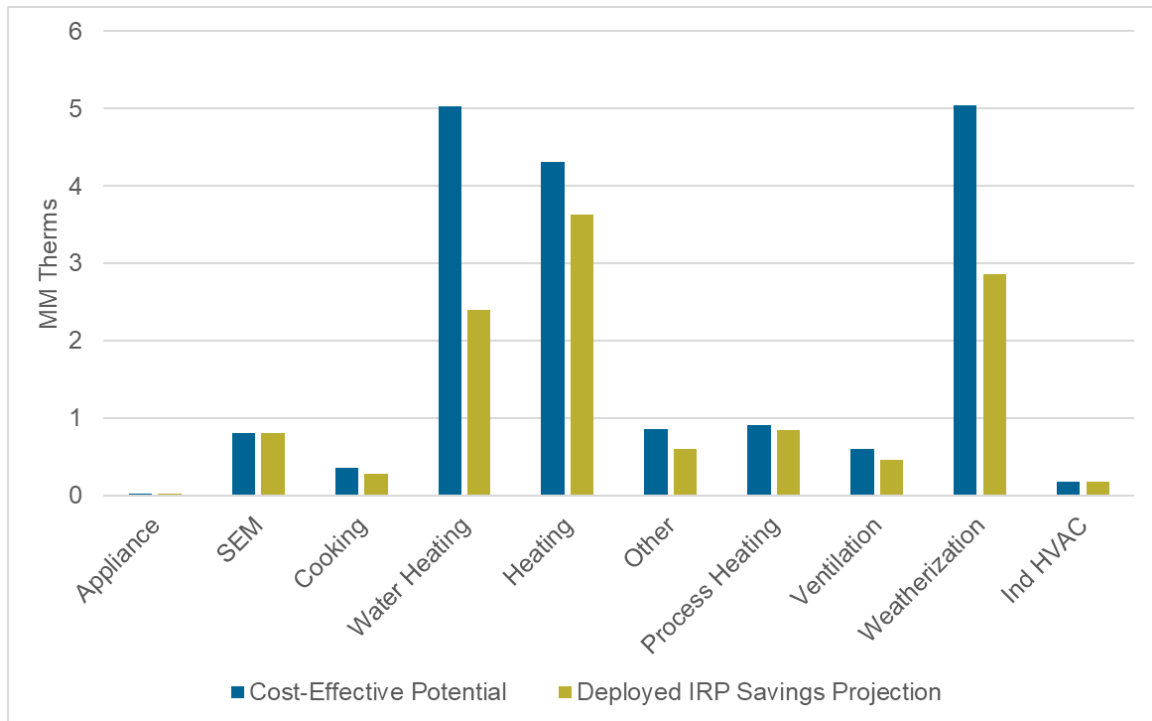
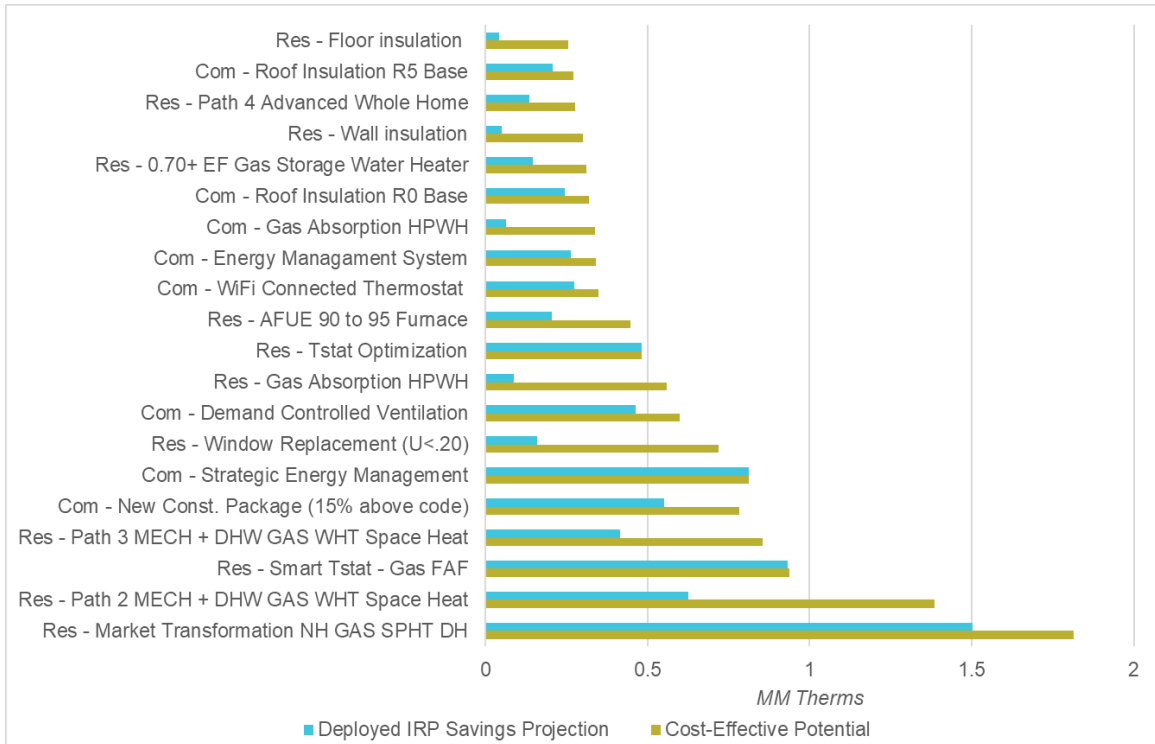


Figure 6-14 lists the top twenty measures from the Model based on their cost-effective potential. The chart also shows how much of that cost-effective potential was deployed and included in the final IRP savings projection. This illustrates the different factors that cause a measure to not achieve 100% of its cost-effective potential, for example:

- Residential – Floor Insulation & Res – Window Replacement:* These two measures are hard to reach measures that have historically shown low program performance. There are a lot of savings available from these measures, but Energy Trust did not deploy 100% of these savings because uptake of these measures has been slow. The forecast does include a small increase in savings from these measures over time but is more tied to historical performance than other measures.
- Residential – Gas Absorption Heat Pump Water Heater (HPWH):* This measure is an emerging technology and therefore is deployed at a lower rate than other measures and later in the forecast when the measure becomes cost-effective, which is why a small percentage of the cost-effective achievable potential is deployed.
- Residential New Homes Pathways:* The reason these measures do not achieve 100% of the cost-effective potential is because of the lost opportunities in the early years, as discussed earlier in this chapter.

Figure 6-14: Top 20 Measures - Cumulative Cost-Effective & Deployed IRP Savings Projections



### Impact of Emerging Technologies

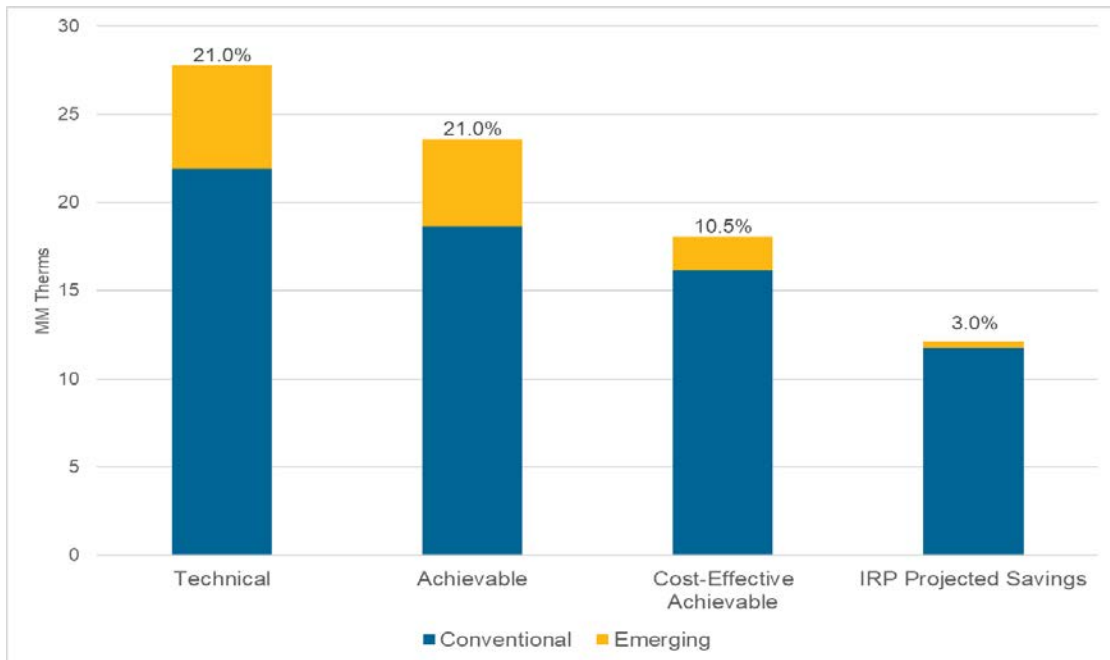
Energy Trust's forecast includes a suite of emerging technologies. These are technologies that are not yet commercially available and are generally high cost. The Model includes cost reduction curves for these technologies to simulate market effects as they become more mature, often resulting in the technology becoming cost effective later in the program. Figure 6-15 indicates the emerging technologies that were included in this forecast.

Figure 6-15: Emerging Technologies Included in the Energy Trust Forecast

| Residential                                | Commercial                    | Industrial                   |
|--|-------------------------------|------------------------------|
| Path 5 Emerging Super Efficient Whole Home | Advanced Ventilation Controls | Gas-fired HP Water Heater    |
| Window Replacement (U<.20), Gas SH         | DOAS/HRV - GAS Space Heat     | Wall Insulation- VIP, R0-R35 |
| Absorption Gas Heat Pump Water Heaters     | DHW Circulation Pump          |                              |
| Advanced Insulation                        | Gas-fired HP HW               |                              |
|  | Gas-fired HP, Heating         |                              |
|  | Zero Net Energy Path          |                              |

Figure 6-16 depicts the cumulative impact of emerging technologies on the overall savings potential for each type of potential. Overall, emerging technologies account for over 20% of the technical potential, but only about half of that potential becomes cost-effective over the forecast. The impact on deployed IRP projected savings potential is even smaller because Energy Trust applies a different ramp rate to these technologies than existing technologies. This ramp rate places emerging technologies at the beginning of an adoption curve when they become cost effective.

Figure 6-16: Impact of Emerging Technologies on Cumulative Savings by Savings Type



### Impact of Cost-Effective Override

As mentioned in the methodology discussion, Energy Trust includes some non-cost-effective measures in the forecast if they are being offered under an exception granted by the OPUC. These measures include residential insulation measures and gas water heaters. Figure 6-3 in the methodology section describes the measures in more detail. The impact of the cost-effective override is small in this IRP; only 5% of the cost-effective achievable of potential is overridden on 1.4% of the deployed potential results from these overridden measures, as detailed in Figure 6-17.

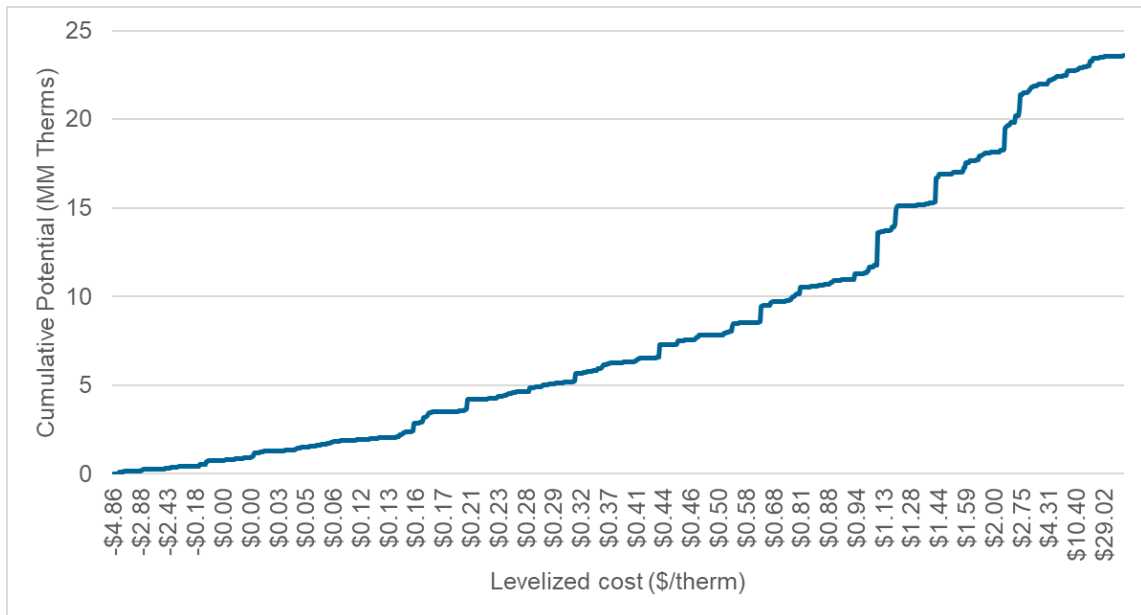
Figure 6-17: Impact of the Cost-Effective Override for Measures under OPUC Exception

| Total Cumulative Potential                | Cost-Effective Potential | Deployed IRP Savings Projection |
|---|--------------------------|---------------------------------|
| Savings with CE Override (MM Therms)      | 18.06                    | 12.09                           |
| Savings with NO CE Override (MM Therms)   | 17.08                    | 11.93                           |
| Variance (MM Therms)                      | 0.98                     | 0.17                            |
| <b>CE Overridden % of Total Potential</b> | <b>5.4%</b>              | <b>1.4%</b>                     |

### Levelized Cost Supply Curve

Figure 6-18 shows the levelized cost supply curve of energy efficiency potential. An energy efficiency supply curve plots the cumulative 20-year *achievable* potential on the y-axis against the associated levelized cost bin of the measure on the x-axis. The measure costs are levelized over the lifetime of the measure and can be negative if non-energy benefits exceed the cost of the measure. This provides a picture of how much potential can be obtained at different cost thresholds but should not be used to estimate the cost-effectiveness of a measure.

Figure 6-18: Energy Efficiency Supply Curve by Levelized Cost (20-Year Cumulative Achievable Potential)

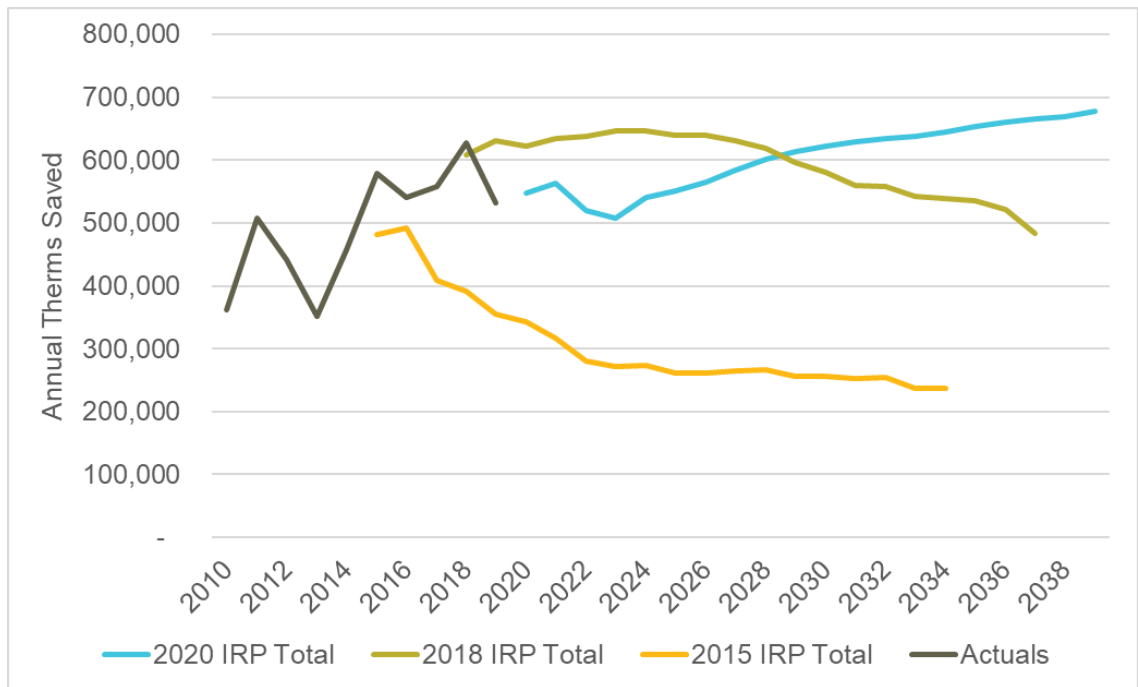


### Savings Projection Comparison to Previous IRPs

Figure 6-19 shows a comparison between the 2015 IRP, 2018 IRP, and 2020 IRP deployed savings potential, with actual savings performance shown in gray for

reference. The spikey nature of the actual savings line is reflective of several factors, including the small size of Cascade’s Oregon service territory and the potential of overachieving or underachieving due to the impact that large projects can have on overall annual savings achievements. Large projects can be difficult to forecast and often account for variances experienced in historical performance against goal and this is the rationale for why Energy Trust included a ‘large project adder’ in the 2020 IRP forecast.

Figure 6-19: Annual Actual Savings History and IRP Projection Comparison (Therms)



Savings for the 2020 IRP increase in the later years, which is a product of the methodology change to align with NWPCC deployment assumptions. Previous forecast vintages were more reflective of what Energy Trust will be able to claim, but the 2020 IRP deploys all the cost-effective savings over the forecast. The later years of the forecast are savings that could come through Energy Trust programs, codes and standards, or market transformation. In the 2020 IRP Energy Trust does not attempt to delineate what portion of the forecasted savings will come from Energy Trust programs after year five of the forecast. The current method should provide a better representation of the loads that will actually come off of Cascade’s system due to energy efficiency of all types.

### Scenario Runs

For the 2020 IRP, Energy Trust modeled five scenarios for Cascade. This was the first time that Energy Trust provided scenario runs for Cascade’s IRP work. The five scenarios were based upon two different levers: carbon prices embedded in

the avoided costs and increased/decreased deployment ramp rates. These scenarios are outlined in the bullets below and the methodologies for the scenarios are described in further detail following bullets:

- *Scenario 1: Base Case Ramp Rates / Social Cost of Carbon Avoided Costs (higher than Reference Case Avoided Costs)*
- *Scenario 2: Base Case Ramp Rates / Market Price of Carbon Avoided Costs (lower than Reference Case Avoided Costs)*
- *Scenario 3: Base Case Ramp Rates / NO Carbon Price included in Avoided Costs*
- *Scenario 4: Low (Slow) Ramp Rates / Reference Case Avoided Costs*
- *Scenario 5: High (Fast) Ramp Rates / Reference Case Avoided Costs*

The first three scenarios utilized different carbon price forecasts; carbon price was chosen as a lever because of the potential for carbon legislation in Oregon in the near term. Note that the base case avoided costs provided by Cascade already include a carbon price forecast that begins in 2021. This carbon price accounts for about 25%-40% of the avoided cost value of a measure, depending on the measure life and load profile. The purpose of these scenarios is to test the sensitivity of different carbon price scenarios, such as the social cost of carbon, or the impact of taking a carbon price out of the avoided costs completely. Energy Trust input these different carbon prices into the avoided cost calculations for each scenario and re-ran the Model to see what might become cost effective or not cost-effective based on these changes to avoided costs. Energy Trust utilized the same ramp rates developed for the base case deployed savings to get the final scenario savings projections.

The final two scenarios were based on speeding up or slowing down the ramp rates in terms of deploying savings potential. This depended on the measure replacement type and whether or not the measure is an emerging technology. For measures that are retrofit replacements, the spread of the savings over the 20-year horizon was either front loaded or only reached 85% of the total potential rather than 100% in the base case. For lost opportunity measures (replacement/new construction), the year in which 100% of the available stocks captured shifted up or down in time. The base case assumption was 100% of turned over stocks will be acquired by year 20. Both of these scenarios utilize the base case avoided costs, including base case carbon price forecasts. Assumptions for each scenario are detailed below:

- *Scenario 4: High (Fast) Ramp Methodology:*
  - *Lost Opportunity Measures (Replacement/New Construction):* Achieve 100% of available turned-over measures earlier in the forecast (about 5 years)
  - *Retrofit Measures:* Savings are front loaded for measures
  - *Emerging Technologies:* Applied a faster ramp rate than base case

- Scenario 5: Low Ramp Methodology:
  - *Lost Opportunity Measures (Replacement/New Construction):* Achieve only 85% of available turned-over measures in the forecast instead of 100% like the base case
  - *Retrofit Measures:* Achieve only 85% of available retrofit potential
  - *Emerging Technologies:* Applied a slower ramp rate than base case

Figure 6-20 provides a graphical view of the annual savings potential for each scenario. Each scenario is labeled with an S and a number representing the scenario number it is associated with from the descriptions above, with S0 as the base case. Figure 6-21 provides the cumulative savings potential of each scenario.

Figure 6-20: Annual Savings Comparison of Scenarios

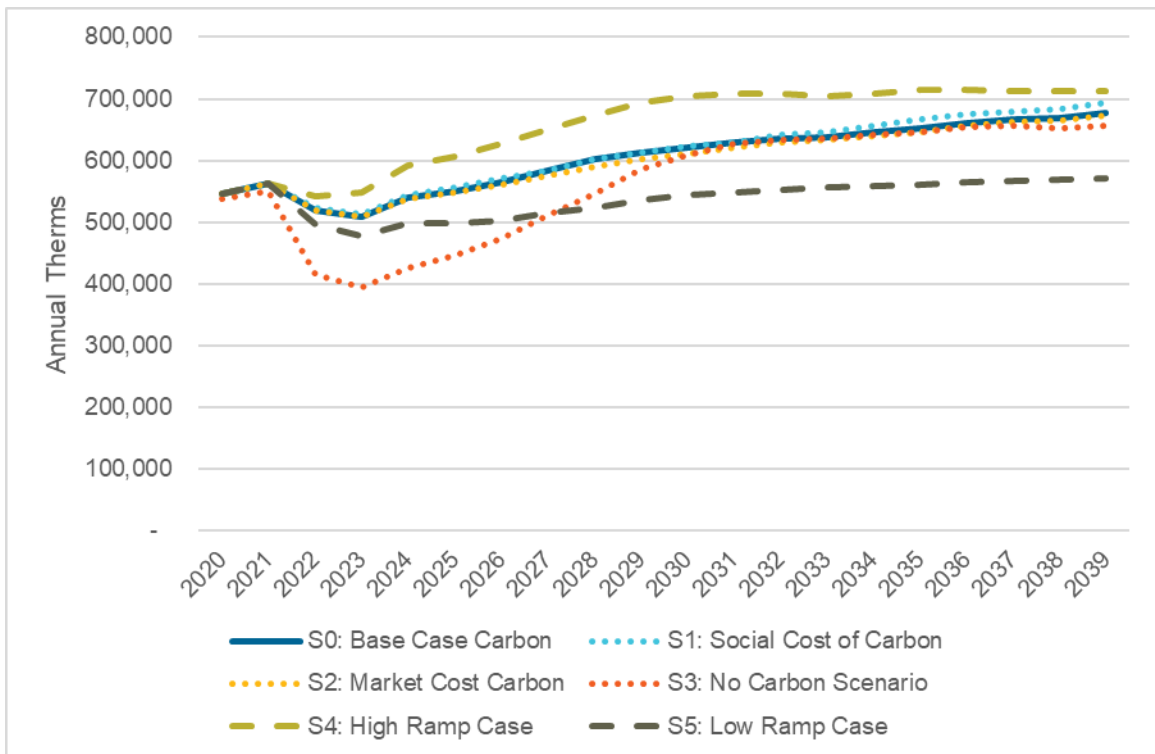


Figure 6-21: Cumulative 20-year Deployed Savings Potential by Scenario

| Scenario                  | 20 Year Cumulative Savings Potential (Therms) | % Difference from Base Case |
|---------------------------|---|-----------------------------|
| S0: Base Case Carbon      | 12,092,748                                    | NA                          |
| S1: Social Cost of Carbon | 12,213,602                                    | 1.0%                        |
| S2: Market Cost Carbon    | 11,988,015                                    | -0.9%                       |
| S3: No Carbon Scenario    | 11,299,643                                    | -6.6%                       |
| S4: High (Fast) Ramp Case | 13,145,690                                    | 8.7%                        |
| S5: Low (Slow) Ramp Case  | 10,752,512                                    | -11.1%                      |



The carbon scenarios have minimal impact on the overall potential (+ or – 1%) except for the no carbon scenario, which is about 6.6% lower cumulatively than the base case. This is because Cascade already includes a carbon price forecast in their base case scenario that makes more measures cost effective earlier in the forecast when compared with the no carbon scenario. Therefore, changes to that price forecast are relatively insensitive. Some additional key notes and takeaways from the three carbon scenarios:

- Carbon price has a minimal effect on overall deployed cost-effective potential, unless no carbon is considered at all.
- Measures are tested for cost-effectiveness each year in the Model, so the carbon scenarios most often shift the year when a measure becomes cost-effective, rather than moving measures fully in or out of the whole forecast period.
- The no carbon scenario catches up to the base case over the forecast in terms of annual savings for the same reason as outlined in the last bullet. Avoided costs increase over time, so many of the measures that were not cost effective without a carbon assumption still became cost-effective by the end of the forecast.
- There are relatively few measures that are on the margin (just below a TRC of 1.0).
- These scenarios do not account for customer adoption elasticity.

The high and low ramp scenarios have a much larger impact on overall deployed savings, with the high ramp scenario resulting in about 8.7% more cumulative savings potential than the base case and the low ramp scenario resulting in about 11% lower savings potential than the base case. These high and low ramp scenarios are meant to represent faster or slower savings acquisition that could be the result of one or a combination of factors, which may include circumstances outlined below. Energy Trust's influence on outcomes is subject to uncertainty associated with how customers will respond to Energy Trust offerings in the midst of other circumstances that are beyond Energy Trust control. Some of the potential reasons that one of the scenarios may occur are:

- Increased incentives from higher avoided costs due to carbon
- Economic booms or slowdowns
- Increased awareness of carbon and therefore increased interest in energy efficiency adoption (or the opposite)
- Increased or decreased funding of energy efficiency in Oregon
- Carbon legislation or other legislation.
- Customer behavior or interest in certain technologies

## Capacity Contributions of Energy Efficiency

Due to an increased focus on the refinement of targeted DSM efforts and the development of strategies for avoiding or delaying distribution system reinforcements, Cascade is assessing the capacity contribution of energy efficiency at the citygate level.

Under Cascade's current analysis, demand is reduced by the inputted level of energy efficiency before any optimization is calculated. However, consistent with Commission Order No. 16-054, the Company is re-examining its approach to DSM analysis and is reviewing NW Natural's capacity contribution analysis. Cascade is also monitoring the emerging conversation taking place at the regulatory level regarding avoided costs and will use the results of this deliberation to shape future resource planning, as appropriate.

For this planning cycle, the Company is working with Energy Trust to analyze peak day savings by load profile, with the goal of ultimately translating this into data that can be used to formulate a strategy for addressing peak day demand. A brief analysis of peak-day savings is provided in Figure 6-22:

Figure 6-22: Peak Day/Annual Usage Saving Factors and Forecasted Savings

| <b>Peak Day Factors and Forecasted Peak Day Savings (Cumulative 20-yr Therms)</b> |                        |   |  |
|---|------------------------|---|--|
| <b>Load Profile</b>   | <b>Peak Day Factor</b> | <b>Total Cost-Effective Potential Peak Day Therms</b> | <b>Final IRP Savings Targets Peak Day Therms</b> |
| <b>Cooking</b>  | 0.30%                  | 1,099   | 863  |
| <b>Com Heating</b>  | 1.80%                  | 89,959  | 73,216   |
| <b>Domestic Hot Water</b>   | 0.40%                  | 10,249  | 4,791  |
| <b>FLAT</b>   | 0.30%                  | 2,545   | 2,344  |
| <b>Res Heating</b>  | 2.10%                  | 192,531   | 110,512  |
| <b>Res Clothes Washer</b>   | 0.20%                  | 6   | 3  |
| <b>Total</b>  | <b>NA</b>              | <b>296,389</b>  | <b>191,728</b>                                   |

Peak day savings for each load profile are calculated by multiplying the Peak Day Factor shown in Figure 6-22 against the total cumulative amount of savings for these load profiles. Figure 6-22 also provides peak day savings estimates for both total Cost-Effective Potential and Deployed IRP Savings Targets. Heating measures, which have the highest amount of annual usage coincident with peak, have the most peak savings potential. The total deployed peak savings potential from this estimate is 191,728 therms.

While reductions in peak load from all customers reduce the need for supply side resources, a full adaptation of a specifically targeted peak-management strategy would require reductions in peak load from customers connected to the portion of the distribution system that requires reinforcement. This means that for a DSM

program to offer meaningful capacity contributions, the Company would need to consider a more geographically targeted, DSM strategy. Cascade will continue to coordinate both internally and with the Energy Trust to determine the optimal approach for avoiding additional capacity and the need for system reinforcements through energy efficiency.

### **Program Funding**

In Oregon, Cascade charges customers a public purpose charge (PPC), which is a percentage applied to customers' bills. The Company's Schedule 31 PPC was adopted in 2006 with the approval of Cascade's Conservation Alliance Plan (CAP) in OPUC Docket UG 167.<sup>10</sup> PPC collections are used to fund Energy Trust efforts on behalf of Cascade in Oregon, and on behalf of the two Oregon low-income programs, weatherization and bill payment assistance.

In Washington, Cascade defers program costs for later collection from customers through the Schedule 596, Conservation Program Adjustment charge. Dollars collected through Schedule 596 fund the Company's residential, commercial, and industrial energy efficiency programs and the Company's low-income, weatherization program.

### **Oregon Low-Income Energy Conservation Program**

Cascade partners with the five Community Action Agencies (CAA) that serve low-income households in Central and Eastern Oregon to administer and deliver the Oregon Low-Income Energy Conservation Program (OLIEC) and its associated Conservation Achievement Tariff (CAT) program, which was made permanent on December 1, 2016.

The OLIEC program was designed to increase energy efficiency in low-income households within Cascade's Oregon service area by providing rebates for the installation of certain weatherization and conservation measures following the completion of a home energy evaluation performed by a qualifying Low-Income, 501c3 organization or a CAA. The rebates are determined on the basis of the first-year dollar value of the conserved natural gas as reflected by the Company's most recently acknowledged avoided cost of natural gas.

The OLIEC program provides incentives for ceiling, floor, wall and duct insulation; duct sealing; infiltration system upgrades (weather stripping and caulking); high efficiency furnace installations; furnace tune-up and filter replacement; and high-efficiency water heaters. Rebates are also available for new low-income residential construction and custom energy efficiency measures on an individual basis with preference for measures that would qualify for rebate in similar projects

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<sup>10</sup> CAP is a decoupling mechanism.

offered through the Energy Trust.

In addition to the OLIEC rebates, agencies receive an additional \$225 for administrative and direct program costs incurred by them.

CAT operates alongside of, and in conjunction, with the OLIEC Program. The CAT program bridges the gap between the portion of weatherization funding available through OLIEC (the avoided cost of natural gas) and the full cost of work performed for qualified measures. The funds are available to Agencies on a first-come, first-serve basis for the purpose of providing total installed costs for weatherization measures approved under Schedule No. 33, OLIEC program. The CAT also provides each agency with a flat fee of \$550 for an audit and \$300 for an inspection fee. The Total Installed Costs reimbursed under CAT for a single dwelling may not exceed \$10,000. Total Installed Costs are defined as all costs incurred for materials and contractor labor necessary to perform tariff-eligible natural gas weatherization work at a qualified customer premise.

The Company began piloting CAT on January 1, 2014, with a termination date of December 31, 2015. Towards the end of the pilot period, Staff offered a series of program recommendations including guidance on the collection of OLIEC/CAT funds. These recommendations limited program funding to no more than 0.625% of gross revenues for the Company's low-income weatherization programs. This amount is a close equivalent to electric utilities' collections for low income weatherization plus a .025% premium for the higher costs of serving rural areas. It was at this time that Cascade simultaneously filed Advice No. O16-10-02 which established CAT as a permanent program, added performance parameters, and addressed Staff's questions.

Over the life of the OLIEC program, from 2006 through 2019, 640 homes have been weatherized saving an estimated total of 97,224 therms. Resulting payments to partner CAP agencies have totaled \$1,891,474 for weatherization measures with payments for agency administration totaling \$143,775; CAT program delivery of \$183,310; and CNGC admin in the amount of \$86,107 with a \$3,950 adjustment to factor for the \$10,000 per project cost cap.

Cascade staff met with the low-income agencies delivering the OLIEC/CAT program in September of 2019. The agencies expressed challenges associated with their ability to fund the administrative costs associated with rural travel and other work necessary to serve the needs of the Company's service area. They also made several recommendations including:

- Removal of the <R12 starting insulation requirement as baseline insulation standards and codes have changed since the time this was developed;
- Provide administrative funds that cover agency travel. Some agencies must drive 2 ½ hours each way to reach customers in Cascade's service area and this can require an overnight stay; and
- Help with identifying eligible clients.

Cascade is currently exploring the feasibility of these program improvements and will engage with OPUC Staff to determine the best pathway forward. Without program changes, Cascade anticipates that a similar number of homes (3) will be served in 2019-20 as was the previous program year.

It is important to note that based on pilot activities, it is likely the agencies would be able to serve around 100 homes each year, if administrative and funding allowances were adjusted to match other ratepayer funded natural gas weatherization programs in Oregon.

### **Load Management Programs**

The Company also manages load by offering interruptible service, Schedule 177 in Oregon and Schedule 577 in Washington. Customers receiving interruptible service are subject to service curtailment orders during peak usage events. During curtailment events, interruptible customers reduce their consumption, thus reducing the system peak demand. Service for interruptible customers is curtailed during extreme events. The Company does not plan for interruptions or decrement its load forecast for curtailment events.

### **Environmental Policy and Legislation**

Cascade evaluates the impact of a range of externalities, including CO<sub>2</sub> emissions prices, cost adders, and supply costs. The Company also examines other influences with potential impacts to the delivery of cost-effective DSM efforts such as energy code changes, cost-effectiveness exemptions, and changes in avoided cost and valuation methodologies.

Currently, several regulatory and legislative developments have potential impacts on the demand-side management portion of the IRP. To the best extent possible, these potential impacts have been incorporated into the Oregon DSM projections.

Since the last planning cycle, Cascade has monitored the following legislation, community-driven efforts, and other external actions with the potential to influence natural gas use, and DSM projections, in the states of Washington and Oregon:

#### **Oregon**

- Cap and Invest

The Oregon State Legislature did not reach consensus on a direction this year regarding cap and invest legislation. As a result, Governor Kate Brown issued Executive Order 20-04, directing state commissions and agencies to facilitate achievement of new GHG emissions goals of at least 45% below 1990 levels by 2035, and at least 80% below 1990

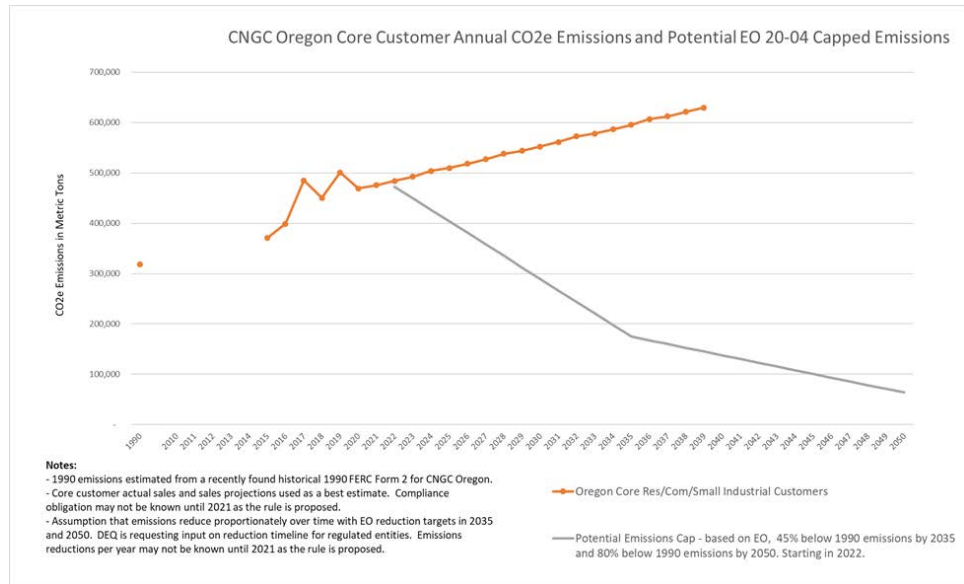
levels by 2050. The order specifically directs the Environmental Quality Council and Department of Environmental Quality to take actions necessary to cap and reduce GHG emissions. The implications of the Governor's directive can be found below.

- Executive Order 20-04
  - At the end of the 2020 legislative session, Governor Brown issued Executive Order 20-04, which is intended to build on Executive Order 17-20, Accelerating Efficiency in Oregon's Built Environment to Reduce Greenhouse Gas Emissions and Address Climate Change, and to further Oregon's goal of reducing greenhouse gas emissions. The EO provides 13 directives to multiple state agencies, with reporting requirements and deadlines. Specifically, the EO directs the Environmental Quality Council (EQC) and Department of Environmental Quality (DEQ) to take actions necessary to cap and reduce GHG emissions, consistent with the new GHG emissions goals from large stationary sources, transportation fuels, and other liquid and gaseous fuels, including natural gas. The EO directs DEQ to commence cap and reduce program options no later than January 1, 2022.
  - The first reporting deadline associated with EO 20-04 was on May 15, 2020. The Governor designated state agencies to report on proposed actions within their statutory authority to reduce greenhouse gases and mitigate climate change impacts. DEQ offered a preliminary report which describes the EQC's legal authority to cap and reduce GHG emissions, proposes a process to engage the public and stakeholders in gathering input into program design options, provides a preview of policy considerations and initial core program design elements, and describes the public comment process on the preliminary report. DEQ also sought public input on a list of questions designed to inform DEQ's final work plan and a final report was submitted to Governor Brown by June 30, 2020.
  - On June 15, 2020, Cascade submitted comments in response to the DEQ's report and associated questions. The Company identified areas of potential impact to Cascade's 75,000 customers in Oregon. As part of its planning efforts, Cascade intends to coordinate with other state agencies, specifically the OPUC and the Oregon Department of Energy (ODOE) to further understand existing program and compliance obligations that may interplay with the Department's cap and reduce efforts. Cascade will work closely with all relevant agencies to consider and manage the fiscal impacts of GHG reductions to natural gas consumers and businesses. Additional considerations may be needed if reduction requirements are difficult to achieve and compliance flexibility is limited.

- The GHG reductions for natural gas suppliers are likely to have substantive impacts to Cascade's customers. The Company has previously estimated cost increases to the company's natural gas customers under the legislative approaches from 2019 to 2020, which incorporated the same GHG reduction goals as published in EO 20-04. Although we expect DEQ's rulemaking could be different, the same goals are stated. If the same reduction goals are applied to natural gas distribution utilities, Cascade's residential and commercial customers may see rate increases in their bills starting in the first year the reductions are to be implemented and would be projected to spike to a 46 percent increase by 2035 and would be expected to increase further as the cap reduces beyond 2035. This projection was anticipated under a legislative approach which included flexibility in the form of allowances, offset purchases and trading. If DEQ's authority is constrained and cannot legally provide compliance flexibility and alternative compliance options, costs will be even higher for natural gas distribution utilities and customers. Emissions reductions required within the strict goal timelines as identified in the EO could result in noticeable increases in energy costs to customers without sufficient compliance flexibility. Cascade will continue to monitor these potential impacts as part of its resource planning.
  
- DEQ plans to commence formal rulemaking work with the appointment of a rules advisory committee (RAC) in late 2020. DEQ plans to host RAC meetings and any additional public or invited stakeholder meetings in early 2021 and to release a notice of rulemaking packet for public comment in Summer/Fall 2021. The rulemaking packet is expected to be provided to the EQC in Fall 2021. DEQ has not determined a final cap and reduce timeline/trajectory or compliance obligation for regulated entities. However, Cascade has developed a preliminary graph showing past and projected core customer emissions, using the preferred portfolio forecast, representing the combustion of natural gas sold to customers that may potentially be regulated by DEQ under Cascade's compliance requirement. The chart also has a projected emissions reduction trajectory that was estimated by applying a proportionate amount of reduction over time considering the EO's goal of 45 percent reduction of 1990 emissions by 2035 and 80% reduction of 1990 emissions by 2050. Absent a baseline and final trajectory provided by DEQ, Cascade has used an estimate of 1990 emissions from core customer sales volumes provided on a recently located 1990 FERC Form 2 schedule and applies a baseline in 2022 of a three-year average of core customer actual emissions from 2017-2019. Depending on DEQ's approach to rulemaking and designation of a specific emissions baseline, Cascade's compliance

obligations may be very different from what is presented here. As DEQ’s rulemaking process commences, Cascade is expected to have a clearer picture of compliance obligations.

**Figure 6-23: CNGC Oregon Core Customer Annual CO<sub>2e</sub> Emissions**



- Cascade is also monitoring possible increases to the market price of renewable natural gas as competition for renewable natural gas as a compliance option for multiple sectors increases. Cascade understands that DEQ is planning a rulemaking to increase landfill methane capture in Oregon. The Company has encouraged DEQ to ensure regulations allow for natural gas utilities to utilize landfill gas as a compliance option to reduce GHG emissions for utility customers. The determination of whether landfill gas is allowed as part of cap and reduce compliance will have impacts on the total available RNG potential for Cascade as it increases its planning in this area.
- In addition to its engagement with DEQ, Cascade submitted comments to ODOE in response to their implementation report submitted to Governor Brown in May 2020. Cascade understands that ODOE will launch a rulemaking process in Summer of 2020 to establish new rules for energy efficient products by September 1, 2020. In addition, ODOE plans to work with the Building Codes Division (BCD) to adopt building efficiency goals for 2030 for new residential and commercial construction. ODOE also plans to work with BCD to report on current progress toward achieving a goal of at least 60 percent reduction in new building annual site energy consumption, and to develop metrics to inform the baseline and reduction associated with code updates.



- Bend Climate Action Plan
  - On December 4, 2019, the Bend City Council approved the Climate Action Steering Committee's (CASC) recommendations concerning a pathway to reducing its fossil fuel use by 40% by 2030, and by 70% by 2050. Cascade has actively participated on the CASC and publicly supported the recommendations presented to the City. Cascade is now engaged with Bend City staff and other members of the community to identify ways to help the City meet its targets. Possible pathways forward include partnerships on the integration of biogas, and possible carbon offset programs.
  
- Renewable Energy Goals
  - Portland has developed a 100% renewable goal. The city proposes to go 100% renewable energy by 2035, and 100% economy wide by 2050. Renewable energy includes energy derived from wind, solar, existing and low-impact hydro, geothermal biogas, and wave technology sources. Similar goals are also under consideration in Hillsboro, Milwaukie, and Beaverton, Oregon. While each of these communities is outside of Cascade's service area, it is important to keep apprised of such targets in the event that they are adopted in areas served by the Company.
  
- Gas to Electric Fuel-Switching
  - The Cities of Ashland and Eugene have adopted energy action plans to help reduce carbon emissions. As a result of the Ashland Climate and Energy Action Plan, and the Community Climate and Energy Action Plan in Eugene, the Ashland Municipal Electric Utility and Eugene Water and Electric Board are reversing course on the value of the direct use of natural gas for space and water heating, and are considering potential fuel switching from natural gas to electric heat pump technology. Ashland and Eugene plan to begin with the use of renewables for electric generation before aggressively pursuing switching to low carbon and non-carbon fuels.
  
- SB 98: Pertaining to Renewable Natural Gas (RNG)
  - During 2019 the Oregon State Legislature approved SB 98, which limits the costs to natural gas utilities for procuring RNG and allows for recovery of prudently incurred costs for the purchase of RNG and associated infrastructure by means of an automatic adjustment clause. The law treats small and large gas utilities separately and offers distinct guidelines for these two categories. Cascade, with fewer than 200,000 gas customers in Oregon, qualifies as the latter. The Company is actively participating in OPUC docket AR 632, initiated to develop administrative rules for the OPUC to implement

an RNG program for Oregon gas utilities. Cascade will continue to provide feedback and closely follow the development of the regulatory guidelines that will govern the implementation of this law.

## Washington

- Energy Code Changes
  - On November 8, 2019, the Washington State Building Code Council (“SBCC”) voted to approve the Fuel Normalization and Additional Credits tables in Section R406.2 with an electric emissions factor of 0.7 lbs/kwh instead of the previously approved carbon emissions factor of 0.8 lbs/kwh for electricity. Under this new language, a heat pump gets one credit assigned when the 0.7 lbs/kwh carbon emissions factor is used. This results in a full credit going to homes using a minimum code heat pump and will likely tilt the selection of heating systems in that direction and away from efficient gas furnaces (which do not receive similar treatment under the code).
- Clean Air Rule
  - On January 16, 2020 the Supreme Court of Washington issued a 5-4 decision vacating in-part and upholding in-part the lower court’s decision to vacate the Clean Air Rule (CAR). The Court conclusively determined that the Clean Air Act’s purpose does not authorize Ecology to set emission standards for “indirect emitters” (such as natural gas utilities). The court went on to sever the portions of the rule as they applied to actual emitters (the direct emitter sources) and remanded to the superior court for further proceedings. HB 2957 was introduced to amend existing law to allow CAR to regulate "indirect emitters". A compromise between parties on certain issues in the bill was unsuccessful and the bill died when the legislature adjourned on March 12, 2020.
- HB 1257: Concerning Energy Efficiency
  - On July 28, 2019 HB 1257, the Washington bill concerning energy efficiency, went into effect. The law set new requirements for conservation planning, and energy efficiency target setting, as well as new rules governing the development of conservation potential assessments. It also included language to allow for the recovery of certain biogas investments under the guidance of the WUTC. Cascade is currently engaged in workshops and other regulatory discussions to fully understand the changes that will need to be made to energy efficiency programs, and what opportunities may arise concerning renewable natural gas.

- Other Relevant Legislation
  - Cascade is keeping apprised of additional legislation in Washington State with potential impacts to demand side management and energy usage. Examples include HB 2311, the Greenhouse Gas Emissions Bill which updated Washington's GHG emissions reduction goals to 45% below 1990 levels by 2035, 75% below 1990 levels by 2040, and 95% below 1990 levels by 2050, and HB 2518, the Natural Gas Transmission bill which requires natural gas transmission and distribution companies to expedite mitigation of hazardous leaks, reduce as practicable non-hazardous leaks, and provides utilities rate recovery. Both of these bills were approved this session, and Cascade anticipates that the Governor will sign them into law. Further, the Company anticipates some form of carbon emissions reduction or carbon pricing legislation may be adopted in the 2021 legislative session which will have a direct impact on the use and price of natural gas.

### **Federal Greenhouse Gas (GHG) Emissions Reduction Policy**

Cascade monitors congressional actions on reducing GHG emissions, such as through the Climate Leadership and Environmental Action for the Nation's (CLEAN) Future Act discussion draft developed in the U.S. House of Representatives Energy and Commerce Committee and the American Energy Innovation Act (AEIA) S.2657 developed in the U.S. Senate Energy and Natural Resources Committee. The CLEAN Future Act is intended to achieve a U.S. economy-wide net zero greenhouse gas (GHG) emissions goal by 2050. The House Energy and Commerce Committee will hold hearings and stakeholder meetings on this draft throughout 2020 as the Act is refined. The AEIA is a Senate Energy and Natural Resources Committee compilation of more than 50 energy-related measures proposed to strengthen the domestic economy, national security, and international competitiveness while facilitating cleaner energy that protects human health and the global environment. The AEIA would promote efficiency, renewable energy, energy storage, carbon capture, utilization, and storage (CCUS) for fossil-fired generation facilities, advanced nuclear technology, and industrial and vehicle technology, as well as facilitating energy security and workforce development.

### **EPA Natural Gas Star Methane Challenge Program**

Cascade became a Founding Partner of the EPA's Natural Gas Star Methane Challenge Program in March 2016. As a Founding Partner, Cascade has chosen to participate in the program under the Best Management Practice (BMP) Commitment – Excavation Damages within the natural gas distribution sector. The BMP Commitment entails a Partner's commitment to company-wide

implementation of BMPs to reduce methane emissions. Involvement in this program also provides a forum for companies to share knowledge on successfully implementing BMPs and methane emissions reductions. During the initial commitment timeframe, Cascade will conduct incident analyses on all excavation damages and report the relevant data to EPA as the agency finalizes the reporting forms.

Specifically, Cascade demonstrates its commitment to this program through implementation of BMPs to promote leak reductions. Cascade created the position of Public Awareness and Damage Prevention Coordinator in 2018. This position assists in providing community education and outreach opportunities, focusing on damage prevention, and further reducing potential releases of methane from excavation damages. This position also focuses on working with contractors or third parties that are repeat offenders. By identifying and reaching out to these repeat offenders prior to work beginning on their respective project, Cascade expects to see a reduction in excavation damages throughout the Company's service areas.

Additionally, Cascade actively participates in 811, Common Ground Alliance, and damage complaint programs in Oregon and Washington. Cascade continues to explore other voluntary actions which could reduce methane emissions resulting from excavation damage.

Beyond Cascade's commitment to reduce methane emissions from excavation damages, Cascade has completed operational and infrastructure changes to comply with federal requirements which have resulted in lower methane emissions, and therefore lower GHG emissions in the State of Oregon. This has mainly been realized through pipeline replacement projects where newer pipeline materials such as polyethylene and steel are used to replace older materials. Since 2012, Cascade has replaced nearly 25 miles of early vintage steel pipe in Oregon, ranging from service lines up to 12-inch mains, with new steel or polyethylene pipe. Also, Cascade has no unprotected steel pipe and no leak-prone cast iron pipe in its systems.

Further, Cascade is better positioned than most U.S. utilities as the Company has no unprotected steel pipeline and none of the potentially leak-prone cast iron pipe seen elsewhere. There are many LDCs who still have cast iron pipe in their systems and are focusing on replacement of that infrastructure.

## **CHAPTER 7**

### **RENEWABLE NATURAL GAS**

## Overview

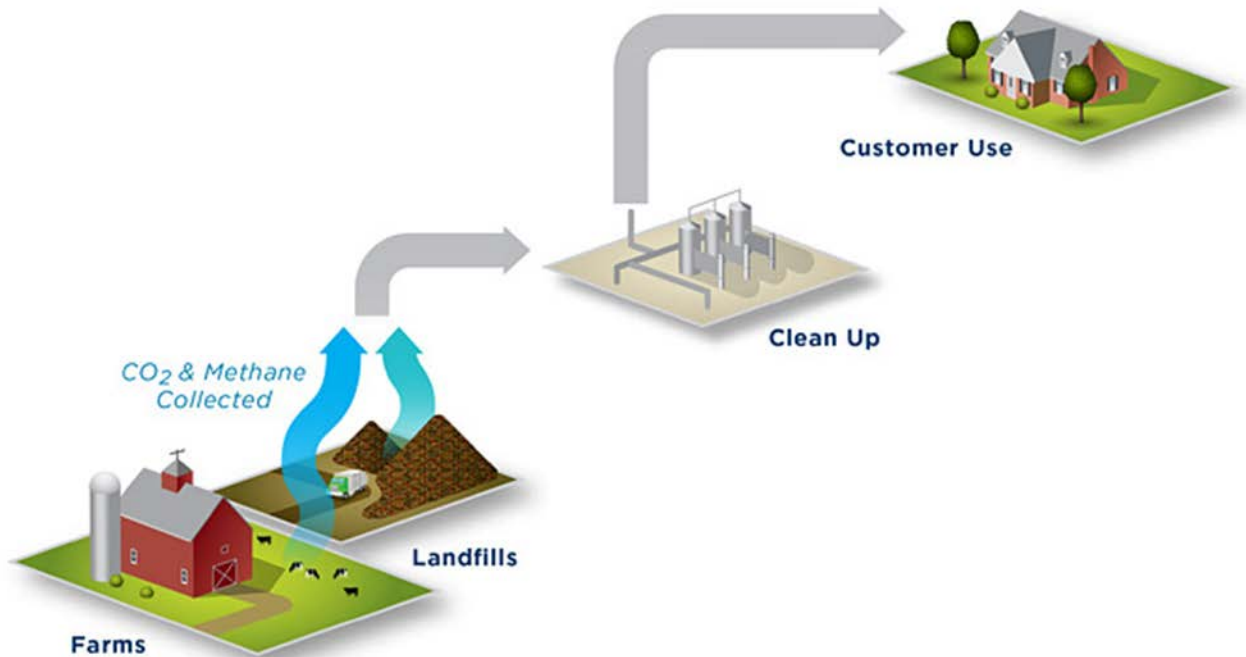
Renewable Natural Gas (RNG), as defined in Senate Bill 98 (SB 98<sup>1</sup>), is any of the following products processed to meet pipeline quality standards or transportation fuel grade requirements:

- Biogas
- Hydrogen gas derived from renewable energy sources; or
- Methane gas derived from a combination of biogas and hydrogen gas derived from renewable energy sources; or
- Natural gas that has been bundled with the necessary environmental attributes so as to represent the full environmental benefits of renewable natural gas.

## Key Points

- Cascade is committed to developing programs that allow Cascade to acquire RNG under guidelines and rules stated in Oregon SB 98 and Washington HB-1257.
- The Company has met with several individuals, companies, and producers, potentially sponsoring RNG projects such as municipals, wastewater treatment plans, biodigesters, and landfills.
- On December 4, 2019, the Bend City Council approved its citywide Community Climate Action Plan.
- Taking best practices from other regional LDCs, Cascade has developed a potential RNG cost effectiveness methodology.

Figure 7-1: Example of RNG process from landfill to end user

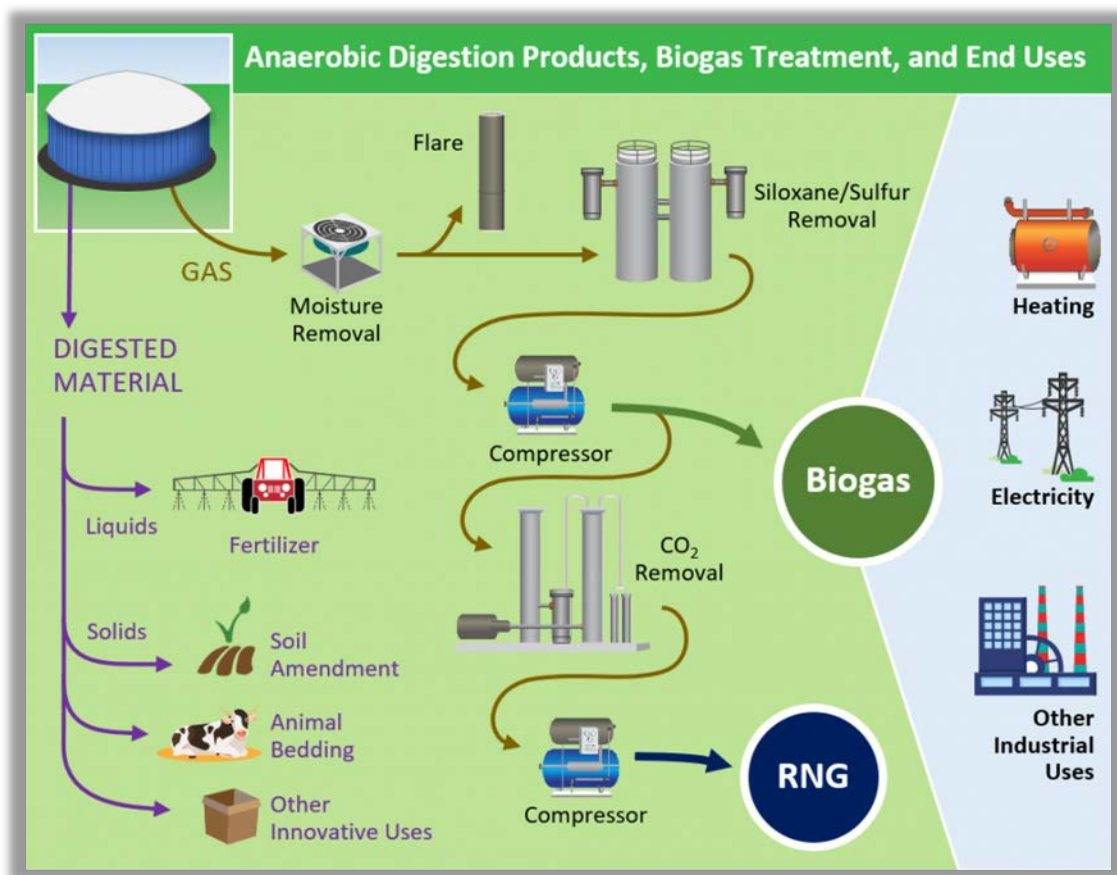


<sup>1</sup> <https://olis.leg.state.or.us/liz/2019R1/Downloads/MeasureDocument/SB98/Introduced>

Examples of RNG are:

- Biogas from Landfills
  - Collect waste from residential, industrial, and commercial entities.
  - Digestion process takes place in the ground, rather than in a digester.
- Biogas from Livestock Operations
  - Collects animal manure and delivers to anaerobic digester.
- Biogas from Wastewater Treatment
  - Produced during digestion of solids that are removed during the wastewater treatment process.
- Other sources include organic waste from food manufacturers and wholesalers, supermarkets, restaurants, hospitals, and more.<sup>2</sup>

Figure 7-1: Anaerobic Digestion Products, Biogas Treatment, and End Uses

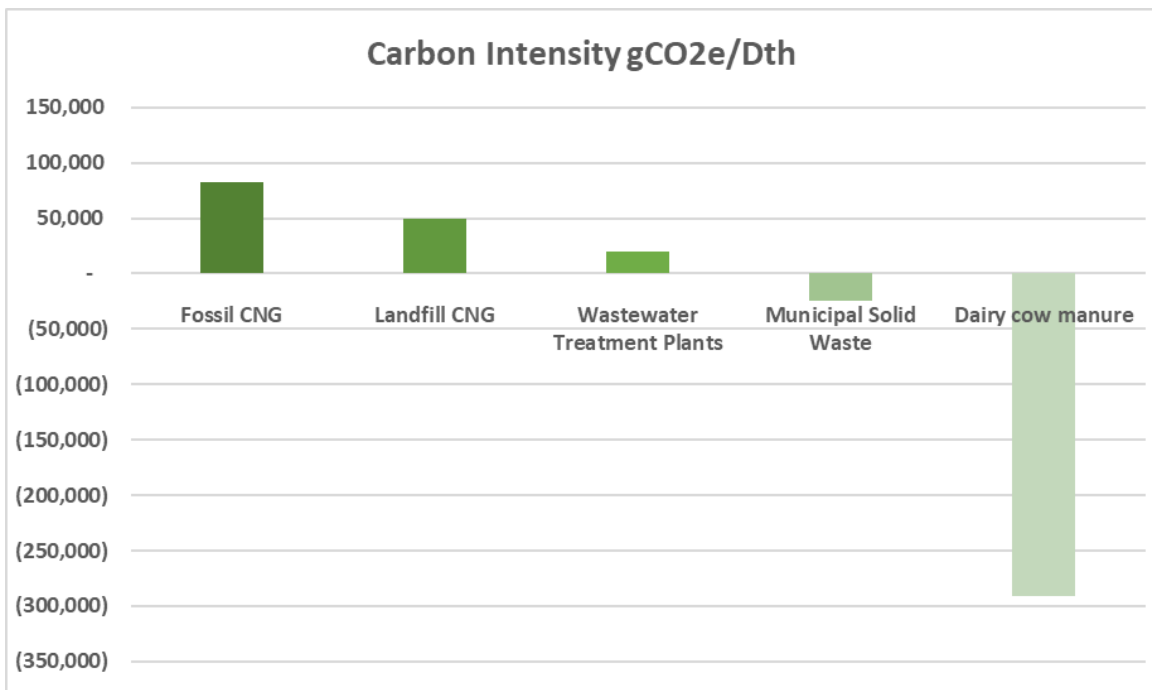


<sup>2</sup> U.S. Department of Energy, Alternative Fuels Data Center, Renewable Natural Gas

## Carbon Intensity

One of the major driving forces behind investment in RNG is the potential to mitigate the carbon footprint of the natural gas industry. For some types of projects such as compressed natural gas (CNG) from landfills, this means RNG is the utilization of a resource that still emits carbon into the environment, but at a lower intensity. For others like gas from solid waste and dairy cow manure, this means preventing the escape of gas with such high carbon intensity that the net impact to the environment by redirecting this gas to end-users would be positive. Figure 7-2 highlights the different impact of five different types of natural gas<sup>3</sup>.

Figure 7-2: Carbon Intensity of Natural Gas by Source



From a regulatory perspective, there is some debate in both Oregon and Washington as to how these differences should be treated with regards to the valuation of renewable natural gas as a carbon neutralizing resource. Some parties believe it is best to treat all RNG the same to encourage investment in any projects available to produce RNG, while others argue it is critical to capture the exact impact of each RNG project. Cascade will closely monitor the legislative efforts in both states to ensure that the Company properly values all future RNG projects.

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<sup>3</sup> <https://ww2.arb.ca.gov/sites/default/files/classic/research/apr/past/13-307.pdf>



## **Regulatory Matters Regarding RNG**

On January 14, 2019, SB 98 was introduced in Oregon legislation. SB 98 requires the Oregon Public Utility Commission (OPUC) to adopt by rule renewable natural gas program for natural gas utilities to recover prudently incurred qualified investments in meeting certain targets for including renewable natural gas in gas purchases for distribution to retail natural gas customers. On June 23, 2019, SB 98 was signed into law effective September 29, 2019.

On August 27, 2019, the OPUC initiated docket UM 2030, an investigation into the use of Northwest Natural's RNG evaluation methodology. The Company is an active participant in UM 2030. Cascade has developed its own potential Cost Effectiveness Evaluation Methodology which can be seen in the next section.

On October 1, 2019, the OPUC Staff initiated docket AR 632, in the matter of rulemaking regarding the 2019 SB 98 RNG programs. Cascade has participated in multiple meetings regarding this docket. On February 20, 2020, the OPUC provided informal draft rules for the docket. On April 28, 2020, the OPUC held a hearing to discuss formal comments to the rules in AR 632.

Below, Cascade lists key portions of the preliminary rule followed by the Company's compliance:

(1) According to preliminary rule 860-150-100 of AR 632, each large natural gas utility and small natural gas utility must, as part of an integrated resource plan (IRP) filed after August 1, 2020, include information relevant to the RNG market, prices, technology, and availability that would otherwise be required under the Commission's IRP guidelines, by order of the Commission, or by administrative rules.

Cascade has provided information relative to the RNG market, prices, technology, and availability under the Cascade Market Research subsection later on in the chapter.

(3) In addition to the information required under section (1), each small natural gas utility must also include in its IRP:

(a) An indication whether and when the utility expects to make a filing with the Commission, pursuant to OAR 860-150-0400, of its intent to begin participating in the RNG program described in these rules, if the utility has not already started to participate in the RNG program;

Cascade has been in discussions with several RNG producers. Currently, none of the projects have a timeline to implement putting RNG on the system. The Company will file an update in the next Annual IRP Update.

(b) Information about opportunities, challenges, perceived barriers, and the natural gas utility’s strategy for participation in the RNG program described in these rules; and

Cascade has listed information about opportunities, challenges, and perceived barriers in the Cascade Market Research section. Cascade’s current strategy is to gather all market intelligence regarding RNG by meeting with RNG producers and other regional LDCs, as well as following RNG legislation. Gathering as much information as possible will give Cascade the opportunity to make prudent decisions when the Company begins participation in RNG programs.

(c) The cost effectiveness calculation that the utility will use, pursuant to OAR 860-150-0200, to evaluate RNG resources, if the utility has not already filed this with the Commission pursuant to OAR 860-150-0400.

Cascade’s cost effectiveness calculation is described in the following section.

### Cascade Project Cost Effectiveness Evaluation Methodology

$$C_{RNG} = I_{RNG} - AC_U - AC_D + \sum_{T=1}^{365} (P_{RNG} + VC - CIF) * Q$$

$$C_{Conventional} = \sum_{T=1}^{365} (P_{Conventional} + VC) * Q$$

Where

$C_{RNG}$  = The all-inclusive annual cost of a proposed RNG project

$I_{RNG}$  = The annual required investment to procure a proposed RNG resource. If Cascade is simply buying the gas and/or environmental attributes, this value is zero.

$AC_U$  = Avoided upstream costs

$AC_D$  = Avoided distribution system costs

$P$  = Daily price of gas being evaluated

$Q$  = Daily quantity of gas being evaluated

$VC$  = Variable cost to move one dekatherm of gas to Cascade’s distribution system. This value can be zero if a project connects directly to the Company’s system.

$CIF$  = Carbon Intensity Factor. This is calculated by multiplying the Company’s expected carbon compliance cost by 1 minus the ratio of a proposed projects carbon intensity to conventional gas’ carbon intensity.

$C_{Conventional}$  = The all-inclusive annual cost of conventional natural gas.

If  $C_{Conventional} \geq C_{RNG}$ , a project can be considered cost effective, and should be acquired. If not, the project may still be considered under the regulatory exceptions discussed earlier in this chapter.

## **Cascade Market Research**

The Company has met with several individuals and companies within the RNG industry such as producers, municipals, wastewater treatment plants, biodigesters, and landfills. During these conversations, Cascade has gathered market intelligence around RNG. Some of the Company's findings include:

- Options for securing RNG will involve purchase and/or participation in infrastructure.
- No "spot market" for RNG at this point due to long off-take commitments.
- Lead times on new RNG projects up to 36 months.
- Landfill projects are typically the largest RNG opportunity at 300-600 dth/day and usually require lowest capital investment.
- Digester projects, due to higher carbon intensity, do very well in the Renewable Identification Numbers (RINs) market and run 50-500 dth/day (expensive to operate).
- Food waste/wastewater treatment projects seen as an ideal option for utilities as they have low RINs and Low Carbon Fuel Standards (LCFS) potential.
- \$13-\$30/dth long-term off-take deals.

## **City of Bend Climate Action Plan**

On December 4, 2019, the Bend, OR city council approved its citywide Community Climate Action Plan. The plan, which was developed with the guidance of the Climate Action Steering Committee (CASC), was designed to guide the City and the community in pursuit of reducing fossil fuel use by 40% by 2030 and by 70% by 2050.

The Climate Action Plan is comprised of voluntary efforts to encourage greater energy efficiency, use of renewable energy, and resource management in the Bend community. Cascade served as an active participant on Bend's CASC, and continues to support the City's carbon reduction planning efforts.

Cascade and the City share a mutual desire to identify areas of partnership on RNG development. Cascade is currently in discussion with Bend on the exploration of renewable natural gas through the City's wastewater treatment plant, or similar facilities. The Company is also considering the development of a voluntary program to offset fossil gas usage.

Cascade will continue to work with Bend in exploration of RNG and other low carbon opportunities in support of its climate ambitions. The Company will also keep apprised of other communities interested in placing RNG in the distribution system and will coordinate as appropriate.

## **RNG Projects**

As mentioned earlier, the Company has met with several individuals and companies within the RNG industry such as producers, municipals, wastewater treatment plants, biodigesters, and landfills. Location, type of project, and other details are discussed throughout this process to evaluate specific resources. Due to the sensitive nature regarding the detailed information of actual RNG projects, Cascade will provide those sensitive details in Appendix J under confidential treatment.

## **RNG Goals**

An internal committee composed of Business Development, Gas Supply Operations, Resource Planning, Engineering, and Regulatory personnel has been working with senior management with the goal of developing Cascade's long-term strategy for RNG. As part of these discussions the Company is considering the development of a unique staff position for RNG policy, practice, and direction within the corporate structure. This RNG specific function would likely have overall responsibility for coordinating among various corporate departments and activities (such as the IRP) that are affected by RNG activities.

Additionally, the Company has a goal of continued participation in various RNG rulemakings across the region. Cascade is actively engaged with other LDCs and industry groups to respond to RNG-related legislation in Oregon and Washington (e.g. Oregon SB-98 and Washington HB-1257). Cascade is working towards ensuring compliance RNG rules and regulations identified in dockets such as OPUC dockets AR632, UM2030 and WUTC docket U-190818.

Cascade recognizes that RNG related rules includes the development of potential programs to make RNG available to customers. The Company will work to develop programs that allow Cascade to acquire RNG, while ensuring that related costs to rate base don't result in rate increases of over 5% of the Company's authorized revenue requirement. As implied earlier, resources will ultimately be required to implement rules and create required programs.

Please see Chapter 11, Four-Year Action Plan, for more information about future RNG action items.

## **RNG Scenarios**

For the 2020 IRP, Cascade is introducing two new scenarios related to RNG modeling. Both scenarios are purely hypothetical and do not reflect any current negotiations with actual RNG producers, but rather allow the company to model the financial impacts of adding either off-system or on-system RNG to its portfolio. An

on-system project would be a project that connects directly to Cascade’s distribution system. An off-system project would require upstream capacity to get the RNG to Cascade’s distribution system. Additionally, it is important to note that while the information from these scenarios is valuable, SENDOUT® modeling is only one tool that will be used in the RNG evaluation process. Qualitative review of these results, along with other elements that cannot be captured in SENDOUT® but are discussed in Cascade’s Project Cost Effectiveness Evaluation Methodology, will be key to the final decisions regarding the acquisition of RNG.

Figure 7-3 compares the annual costs of the Company’s portfolio to the costs when an on-system RNG project is added, while figure 7-4 shows the impacts of an off-system RNG project. For both scenarios, Cascade models 300 dekatherms per day of must take supply at \$13.50 per dekatherm before environmental attributes.

Figure 7-3: RNG Cost Comparison – On-System RNG

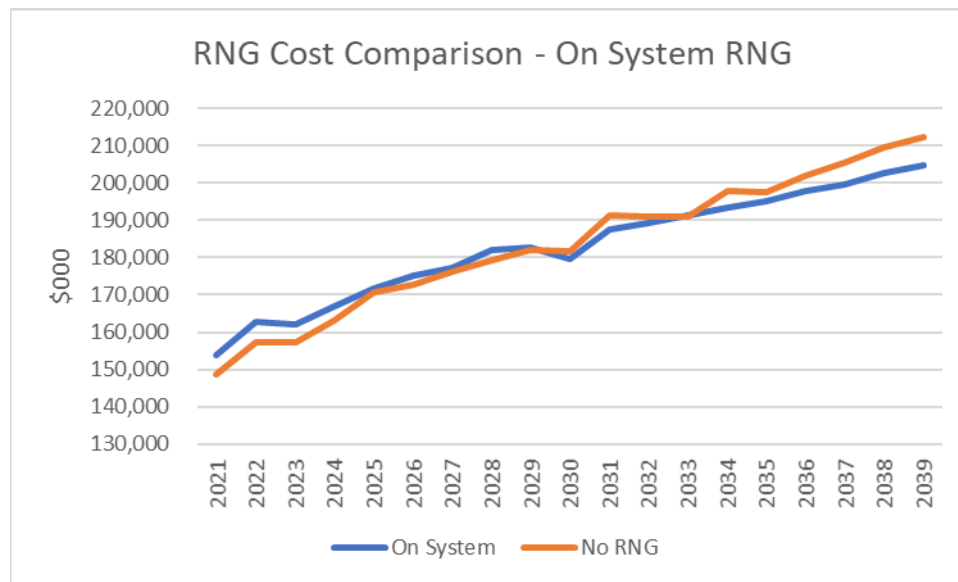
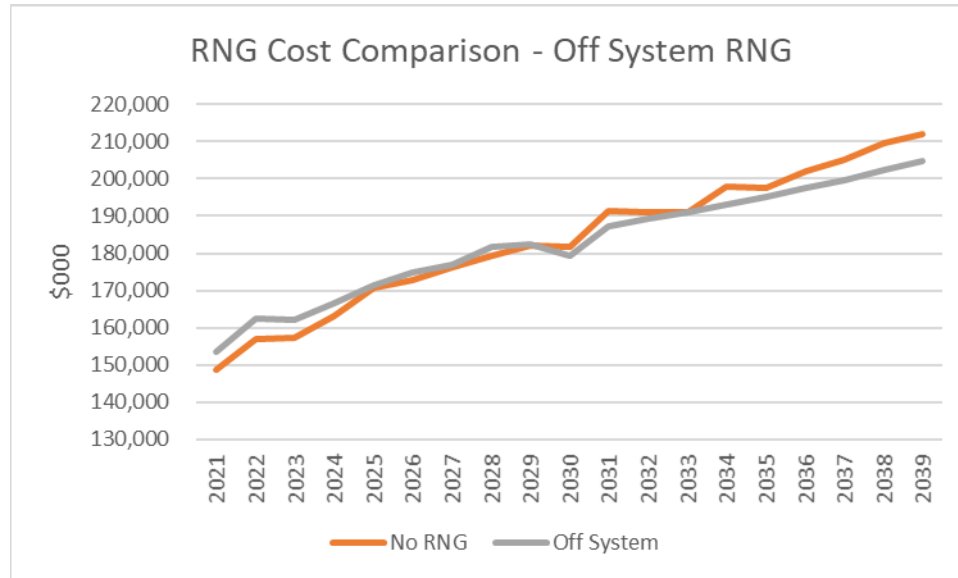


Figure 7-4: RNG Cost Comparison – Off-System RNG



Although not initially cost effective, one noteworthy result of this analysis is that both types of RNG projects do present cost savings opportunities in the later years of the scenarios. The major driver of this inversion is avoided carbon compliance costs, as discussed in Chapter 5, Avoided Costs. If the cost of carbon does ultimately follow a cap and trade marketplace as the Company has modeled, RNG programs may potentially become cost effective starting in 2030 under these scenarios.

**Conclusion**

RNG presents Cascade with an exciting opportunity to introduce a new resource into the Company’s integrated resource plan. Cascade echoes the sentiment of both regulatory bodies and the general public for the Company to use RNG in its system, but decisions to purchase RNG must still follow the regulatory principles of reasonable and reliable least cost, least risk resource acquisition.

Because of the uncertainty surrounding what will ultimately be the value of environmental attributes, Cascade cannot yet definitively conclude what types of RNG programs will prove to be cost effective during the 2020 IRP planning horizon. As more information become available, the Company will update its models and analysis in future IRPs.

## **CHAPTER 8**

# **DISTRIBUTION SYSTEM PLANNING**

## Overview

Cascade's IRP includes the evaluation of safe, economical, and reliable full-path delivery of natural gas from basin to the customer meter. Securing adequate natural gas supply and ensuring sufficient pipeline transportation capacity to Cascade's citygates are necessary elements for providing gas to the customer. The other essential element is ensuring the distribution system growth behind the citygates are not constrained. Important parts of the planning process include forecasting local demand growth, determining potential distribution system constraints, analyzing possible solutions, and estimating costs for distribution system enhancements.

Analyzing resource needs in the IRP ensures adequate upstream capacity is available to the citygates, especially during a peak event. Distribution planning focuses on determining if adequate pressure will be available during a peak hour. Given this nuance, distribution planning supplements the goals, objectives, risks, and solutions as resource planning.

Cascade's natural gas distribution system consists of approximately 1,604 miles of distribution main pipelines in Oregon, and 4,744 miles in Washington, as well as numerous regulator stations, service distribution lines, monitoring and metering devices, and other equipment. Cascade operates one compressor station located within Cascade's distribution system near Fredonia, Washington. The vast majority of the distribution network pipelines and regulating stations operate and maintain system pressure solely from the pressure provided by the interstate transportation pipelines.

## Network Design Fundamentals

Gas distribution networks rely on pressure differentials to move gas from one location to another. If the pressure is exactly the same on both ends of a pipe, the gas will not flow. Therefore, it is important that gas engineers design the distribution network such that the pressure in the pipe will always be high enough that a differential can be created when gas leaves the system. As gas flow increases, pressure is lost due to friction. Using the laws of fluid mechanics,

### Key Points

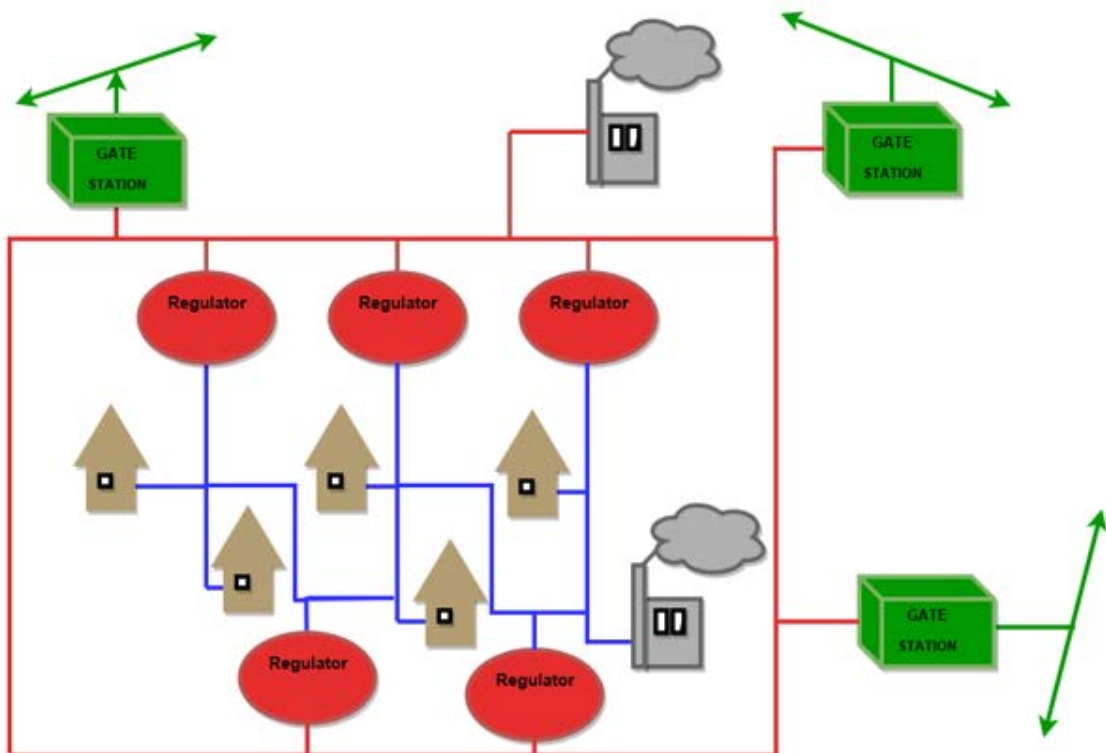
- Distribution system network design fundamentals anticipate demand requirements and identify potential constraints.
- Cascade utilizes its internal GIS environment and other input data to create system models through the use of Synergi® software.
- Distribution system enhancements include analyses of pipelines, regulators, and compressor stations.
- Impacts of proposed conservation resources on anticipated distribution constraints are reviewed.
- Analyses are performed on every system at design day conditions to identify areas where potential outages may occur.
- Cascade has identified enhancement projects over the next four years.



engineers, informed by flow modeling data, determine the maximum flow of gas through a pipe of a certain diameter and length that will not cause pressure drops that are too great.

Not all natural gas flows equally throughout a network. Certain points within the network constrain flow and restrict overall network capacity. Network constraints can occur as demand requirements evolve. Anticipating these demand requirements, identifying potential constraints, and forming cost-effective solutions with sufficient lead time without overbuilding infrastructure, are the key challenges in network design. Figure 8-1 provides an example of a network diagram.

Figure 8-1: Network Design Fundamentals



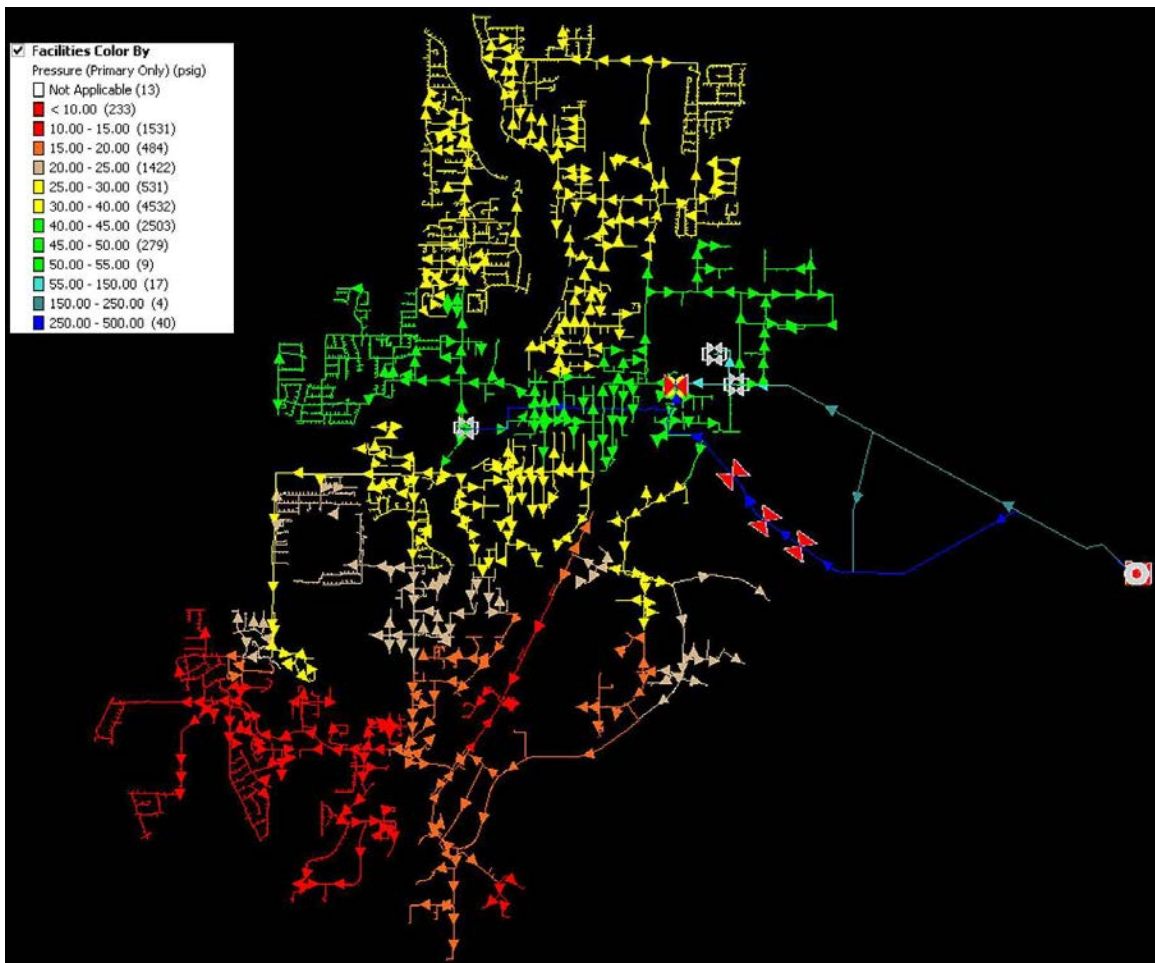
## Computer Modeling

Developing and maintaining effective network design is aided by computer modeling for network demand studies. Demand studies have evolved with technology in the past decade to become a highly technical and powerful means of analyzing distribution system performance. Utilizing computer software, individual models are created for each of Cascade's different systems. These models include both high-pressure lines and distribution system networks. As gas loads are simulated to increase according to the demand forecasts, the pressures within each system are checked. When the simulation shows the pressure dropping to an unacceptable level, that system and the surrounding area are

determined to be a constraint area. When constraint areas are found, an engineer determines the most cost-effective way of solving the problem.

Cascade's geographical information system (GIS) keeps an up-to-date record of pipe and facilities, complete with all system attributes such as date of installation and operating pressure. Using the internal GIS environment and other input data, Cascade creates system models through the use of Synergi<sup>®</sup> software. The software provides the means to model piping and facilities to represent current pressure and flow conditions while predicting future events and growth. Combining these models with historical weather data provides a design day model that can predict a worst-case scenario. Design day models predicting a constraint area are identified and remedied before a real problem is encountered. Figure 8-2 is an example of a low-pressure scenario (constraint area) identified using Synergi<sup>®</sup>. Ultimately, the planned projects can be funneled through the Distribution Project Process Flow (Figure 8-4 on Page 8-9) to be prioritized and slotted into the budget.

Figure 8-2: Constraint Area Example



Synergi® is used in conjunction with the GasWorks models that were built years ago and have been upgraded as needed. Cascade's philosophy is that models should be reviewed for significant changes annually and recalibrated to represent the system more accurately. Synergi® is more advanced than GasWorks and is much more user-friendly. Synergi® is also the modeling software of choice for many other local distribution companies (LDCs).

### **Distribution System Planning**

Many LDCs conduct two primary types of evaluations in their distribution system planning efforts to determine the need for resource additions such as distribution system reinforcements and expansions. A reinforcement is an upgrade to existing infrastructure or new system additions, which increases system capacity, reliability, and safety. An expansion is a new system addition to accommodate an increase in demand. Collectively, these are known as distribution enhancements.

The engineering department works closely with field operations coordinators and energy services representatives and district management to assure the system is safe and reliable. As towns develop, the need for pipeline expansions and reinforcements increases. The expansions are historically driven by new city developments or new housing plats. Before expansions and installation can be constructed to serve these new customers, engineering analysis is performed. Using system modeling software to represent cold weather scenarios, predictions can be made about the capacity of the system. As new groups of customers seek natural gas service, the models provide feedback on how best to serve them reliably.

Another aspect of system planning involves gate capacity analysis and forecasting. Over time each gate station will take on more and more demand and it is Cascade's goal to get out in front with predictions. The IRP growth data received, along with design day modeling, allows for forecasting of necessary gate upgrades. SCADA technology utilized by Cascade allows verification of numbers with real time and historic gate flow and pressure data. The data proves reliable in verifying models and forecasting projects.

### **Distribution System Enhancements**

Demand studies facilitate modeling multiple demand forecasting scenarios, constraint identification, and corresponding optimum combinations of pipe modification, and pressure modification solutions to maintain adequate pressures throughout the network. Distribution system enhancements increase the overall capacity of a distribution pipeline system while utilizing existing gate station supply points. The purpose of this is to get in front of potential constraints on the distribution

system. Distribution system enhancements do not reduce demand nor do they create additional supply. The two broad categories of distribution enhancement solutions are pipelines and regulators.

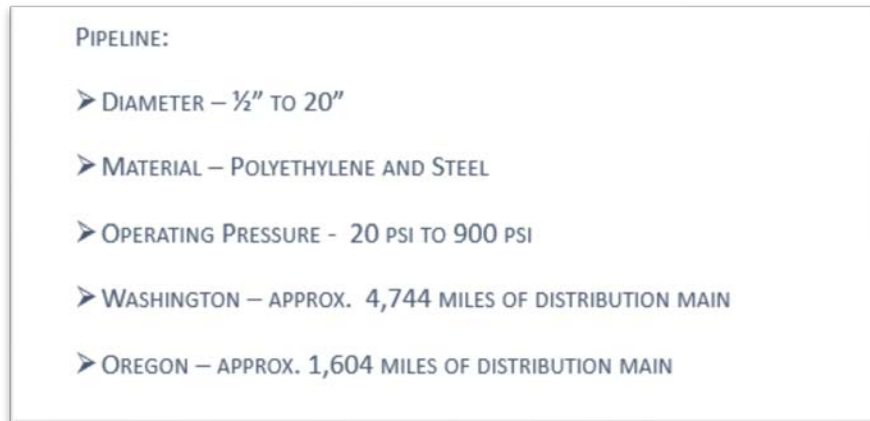
## **Pipelines**

Pipeline solutions consist of looping, upsizing, and uprating. Pipeline looping is the most common method of increasing capacity in an existing distribution system. It involves laying new pipe parallel to an existing pipeline that has, or may become, a constraint point. Constraint points inhibit flow capacities downstream of the constraint creating inadequate pressures during periods of high demand. When the parallel line connects to the system, this alternative path allows natural gas flow to bypass the original constraint and bolsters downstream pressures. Looping can also involve connecting previously unconnected mains. The feasibility of looping a pipeline depends upon the location where the pipeline will be constructed. Installing gas pipelines through private easements, residential areas, existing asphalt, and steep or rocky terrain can increase the cost to a point where alternative solutions are more cost effective.

Pipeline upsizing involves replacing existing pipe with a larger size pipe. The increased pipe capacity relative to surface area results in less friction, and therefore, a lower pressure drop. This option is usually pursued when a pipe is damaged or has integrity issues. If the existing pipe is otherwise in satisfactory condition, looping augments existing pipe, which remains in use.

Pipeline uprating increases the maximum allowable operating pressure of an existing pipeline. This enhancement can be a quick and relatively inexpensive method of increasing capacity in the existing distribution system before constructing more costly additional facilities. However, safety considerations and pipe regulations may prohibit the feasibility or lengthen the time before completion of this option. Also, increasing line pressure may produce leaks and other pipeline damage creating costly repairs. A thorough review is conducted to ensure pipeline integrity before pressure is increased. Figure 8-3 provides a snapshot of some of the major components of Cascade's pipeline system.

Figure 8-3: Cascade System Pipeline Overview



## Regulators

Regulators or regulator stations reduce pipeline pressure at various stages in the distribution system. Regulation provides a specified and constant outlet pressure before natural gas continues its downstream travel to a city's distribution system, a customer's property, or a natural gas appliance. Regulators also ensure that flow requirements are met at a desired pressure regardless of pressure fluctuations upstream of the regulator. Regulators are at citygate stations, district regulator stations, farm taps, and customer services. Utilization and strategic positioning of new stations can be very helpful in increasing system reliability and capacity. Cascade has over 700 regulator stations along its system.

## Compression

Compressor stations present a capacity enhancing option for pipelines with significant natural gas flow and the ability to operate at higher pressures. For pipelines experiencing a relatively high and constant flow of natural gas, a large volume compressor installation along the pipeline boosts downstream pressure.

A second option is the installation of smaller compressors located close together or strategically placed along a pipeline. Multiple compressors accommodate a large flow range and use smaller and very reliable compressors. These smaller compressor stations are well suited for areas where gas demand is growing at a relatively slow and steady pace, so that purchasing and installing these less expensive compressors over time allow a pipeline to serve growing customer demand into the future.

Compressors can be a cost-effective option to resolving system constraints;

however, regulatory and environmental approvals to install a station, along with engineering and construction time, can be a significant deterrent. Adding compressor stations typically involves considerable capital expenditure. Based on Cascade's detailed knowledge of the distribution system, there are no foreseeable plans to add compressors to the distribution network.

## **Conservation Resources**

Reviewing the impacts of proposed conservation resources on anticipated distribution constraints is equally important. Although Cascade historically provides utility-sponsored energy efficiency programs throughout a particular jurisdiction (i.e. all of Cascade's Washington or Oregon service territory), there may be instances where a more targeted approach could reduce or delay the estimated reinforcement for a specific area. As discussed in Chapter 6, Demand Side Management, the acquisition of conservation resources is entirely dependent upon the individual consumer's day-to-day purchasing and behavior decisions. While Cascade attempts to influence these decisions through its energy efficiency programs, the consumer is still the ultimate decision maker regarding the purchase of a conservation measure. Therefore, Cascade does not anticipate that the peak day load reductions resulting from incremental energy efficiency measures will be adequate to eliminate distribution system constraint areas at this time. However, over the longer term (through 2027), the opportunity for targeted energy efficiency programs to provide a cumulative benefit that offsets potential constraint areas may be an effective strategy.

## **Distribution Project Process Flow**

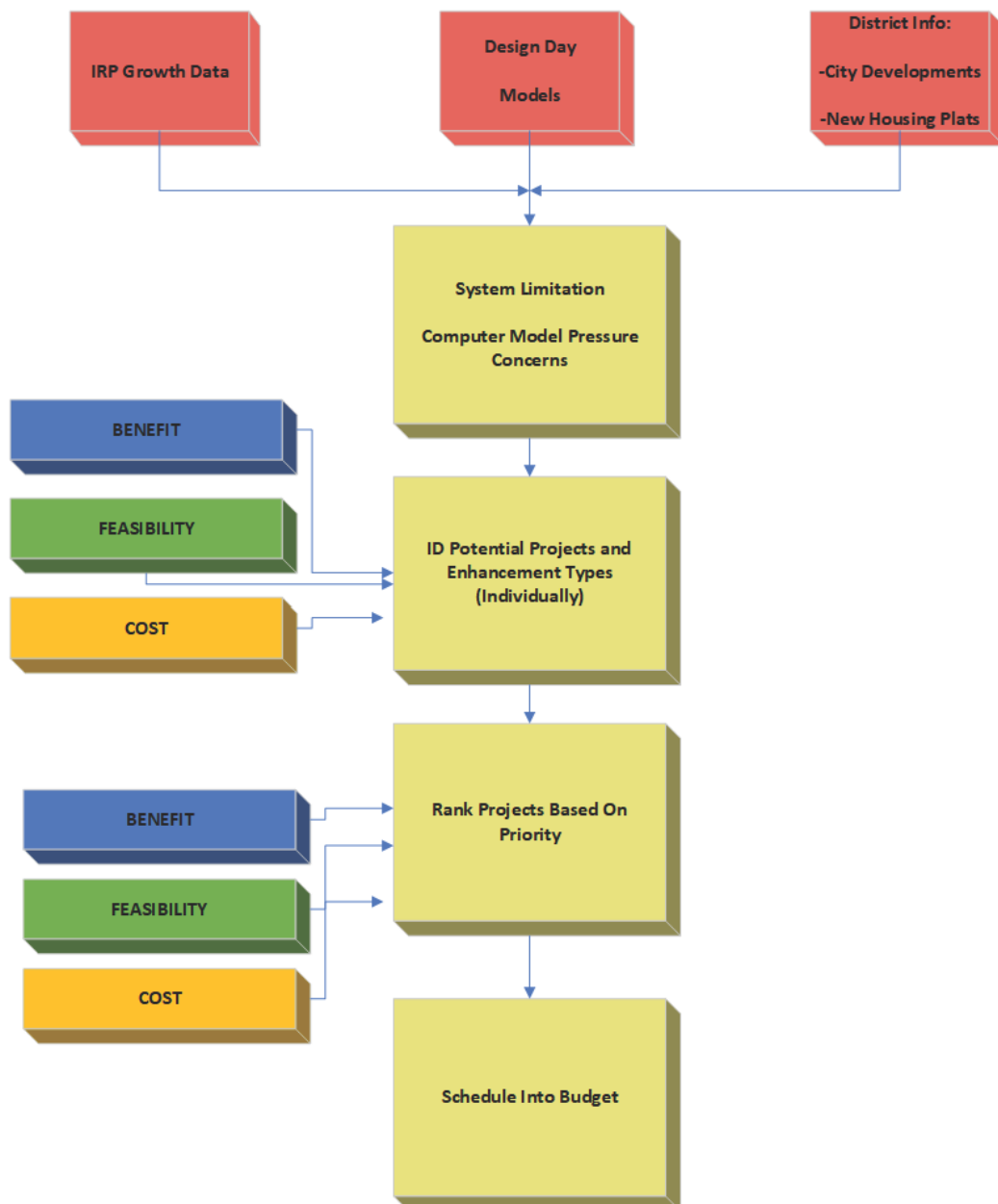
After developing a working demand study, analyses are performed on every system at design day conditions to identify areas where potential outages may occur. These constraint areas are then risk-ranked against each other to ensure the highest risk areas are corrected first and that others are properly addressed. Within a given area, projects/reinforcements are selected using the following criteria:

- The shortest segment(s) of pipe that improves the deficient part of the distribution system.
- The segment of pipe with the most favorable construction conditions, such as ease of access or rights or traffic issues.
- Minimal to no water, railroad, major highway crossings, etc.
- The segment of pipe that minimizes environmental concerns including minimal to no wetland involvement, and the minimization of impacts to local communities and neighborhoods.
- The segment of pipe that provides opportunity to add additional customers.

- Total construction costs including restoration.

Once a project/reinforcement is identified, the design engineer, field operations coordinator, or energy services representative begins a more thorough investigation by surveying the route and filing for permits. This process may uncover additional impacts such as moratoriums on road excavation, underground hazards, discontent among landowners, etc., resulting in another iteration of the above project/reinforcement selection criteria. Figure 8-4 provides a schematic representation of the distribution project process flow.

Figure 8-4: Distribution Project Process Flow



## **Distribution System Planning Results**

Figure 8-5 summarizes the estimated costs and timing of distribution system enhancements in Cascade's three Oregon Districts. The summary of these enhancements provides preliminary estimates of timing and costs of major reinforcement solutions addressing growth-related system constraints. The scope and needs of distribution system enhancement projects generally evolve with new information requiring ongoing reassessment. Actual solutions may differ due to changes in growth patterns and/or construction conditions that diverge from the initial assessment.

The following discussion provides a summary of the planned distribution enhancements in Cascade's Oregon Districts:

- **Bend District:** The Bend area is experiencing rapid growth. The projected customer growth over the next five years will result in constraints in Cascade's distribution system in the cities of Bend, Redmond, and Prineville. Several distribution enhancements have been planned in these cities over the next four years to mitigate the potential constraints. These enhancements include gate station upgrades, extending distribution pipe, installing new regulator stations, and upsizing existing pipe.
- **Eastern Oregon District:** Baker City is served by one gate station to the south and customer growth results in constrained areas during design day events. The proposed distribution enhancement is to install a new gate station to the north to remediate the low pressure areas and improve reliability by providing a second feed to Baker City.
- **Pendleton District:** Steady growth in the cities of Pendleton and Hermiston and isolation of the distribution systems due to minimal highway and stream crossings, results in areas of the system requiring enhancement to alleviate potential constraints. The enhancements proposed involve looping the pipeline systems in the constrained areas to provide additional capacity and reliability.

Figure 8-5 provides a summary of Cascade's upcoming growth projects. The specific engineering projects can be found in Appendix I. With the use of the computer modeling software and Cascade's Distribution Project Process Flow, Cascade can identify projects for the longer term. As projects are completed they are integrated into the system to assure the model is current.



Figure 8-5: Distribution Planning Project Summary

| Location                | 2020         | 2021         | 2022         | 2023         |
|-------------------------|--------------|--------------|--------------|--------------|
| Bend District           | \$ 2,433,788 | \$ 2,665,856 | \$ 3,052,484 | \$ 2,562,402 |
| Eastern Oregon District | \$ -         | \$ 1,229,692 | \$ -         | \$ -         |
| Pendleton District      | \$ -         | \$ 486,118   | \$ 377,393   | \$ 830,765   |

### Conclusion

Cascade’s goal is to maintain its natural gas distribution system’s reliability and to cost-effectively deliver natural gas to every core customer. This goal relies on modeling to increase the capacity and reliability of the distribution system by identifying specific areas that may require changes. The ability to meet the goal of reliable and cost-effective natural gas delivery is enhanced through localized distribution planning, which enables coordinated targeting of distribution projects responsive to customers’ growth patterns.



## **CHAPTER 9**

# **RESOURCE INTEGRATION**

## Overview

Resource integration is the last step in Cascade's IRP process. It involves finding the reasonable least cost and least risk mix of reliable demand and supply side resources to serve the forecasted load requirements of the core customers. The tool used to accomplish this task is a computer optimization model known as SENDOUT®.

SENDOUT® is very powerful and complex. It operates by combining a series of existing and potential demand side and supply side resources, and optimizing their utilization at the lowest net present cost over the entire planning period for a given demand forecast. SENDOUT® permits the Company to develop and analyze a variety of resource portfolios quickly, to determine the type, size, and timing of resources best matched to forecast requirements.

## Key Points

- Cascade utilizes SENDOUT® to find the optimal solve for forecasted resource deficiencies, as well as alternative portfolios.
- Once a solution is found under expected conditions, the candidate portfolio is stress-tested through stochastic and deterministic scenarios using Value at Risk (VaR) analysis.
- The optimal portfolio includes all existing resources plus incremental DSM.
- Cascade's first material long-term As-Is deficiency occurs in 2033 around Bend, Oregon. Shortfalls are projected across the Company's entire service area by the end of the planning period.
- With incremental resources, all forecasted deficiencies are eliminated, at costs that are within Cascade's VaR limit.

## Supply Resource Optimization Process

The process for optimizing supply resources is summarized in the following eight steps and shown graphically in Figure 9-2 on page 9-5.

- **Step 1: As-Is Analysis**
  - Cascade began its optimization process by running a deterministic analysis of its existing resources with a three-day peak event. This allowed the Company to uncover the timing and quantity of resource deficiencies. Once the resource need was identified, Cascade utilized its market intelligence to identify all potential options to solve for the projected shortfall.
- **Step 2: Introduce Additional Resources**
  - Once shortfalls were identified, Cascade utilized SENDOUT® to derive a diverse selection of potential portfolios to eliminate the deficiency. This was done through a deterministic analysis of the alternative resources. For the 2020 IRP, Cascade tested seven potential portfolios. Figure 9-1 groups these portfolios by the source of each resource. Further details regarding the components of each candidate portfolio can be found in Appendix.

Figure 9-1: Breakdown of Candidate Portfolios

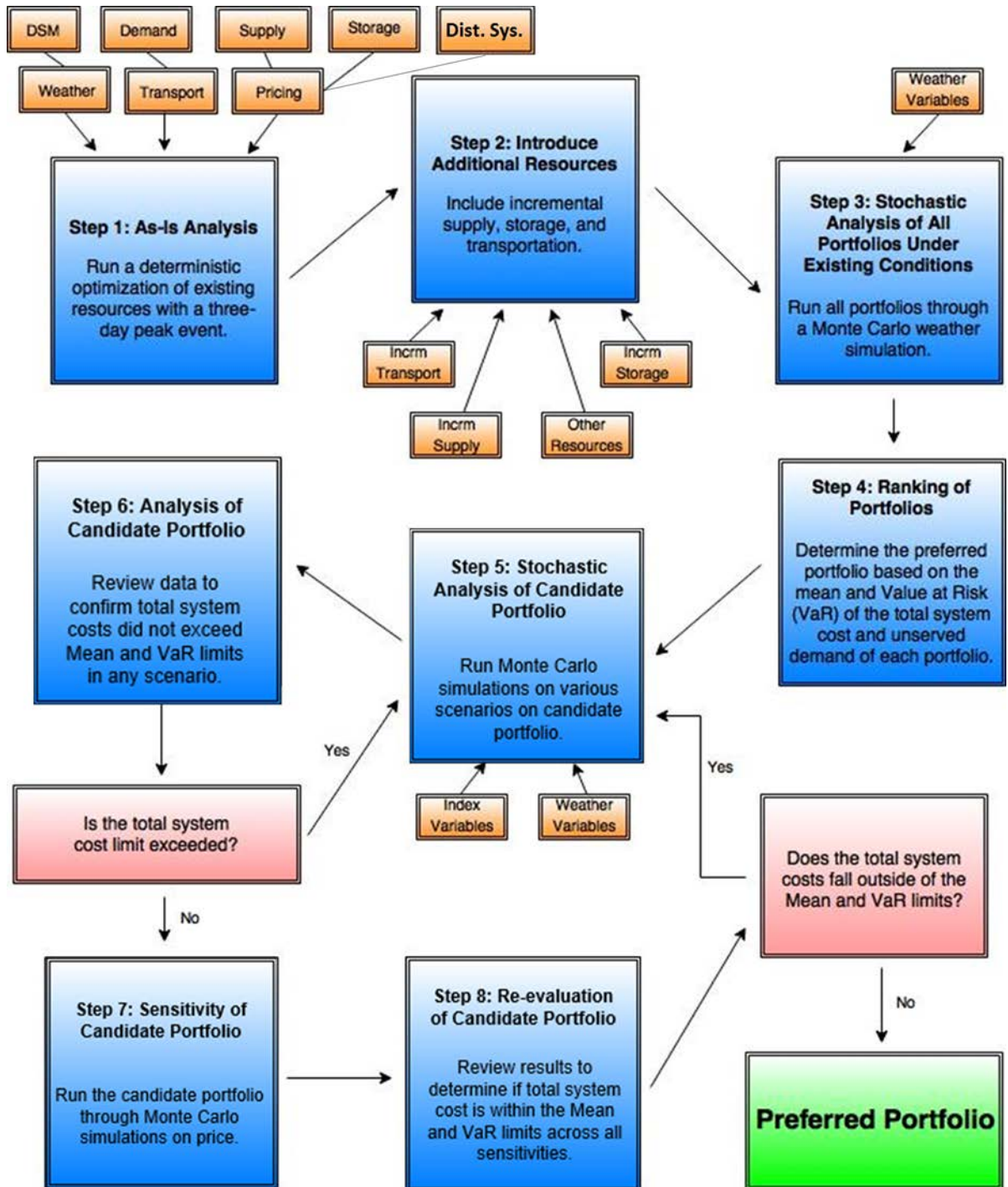
|        | GTN                                 | No GTN                              |
|--------|-------------------------------------|-------------------------------------|
| NWP    | - All-In<br>- All-In Less DSM       | - NWP Only<br>- NWP Only w/ Storage |
| No NWP | - GTN Only<br>- GTN Only w/ Storage | - Storage Only                      |

- **Step 3: Stochastic Analysis of All Portfolios Under Existing Conditions**
  - Once Cascade selected its portfolios, each one was tested stochastically. Each portfolio was run through a 10,000 draw Monte Carlo weather simulation under normal growth, pricing, and storage/supply accessibility. The Company recorded the total system cost and unserved demand of each draw, as these are the metrics used to rank the portfolios.
- **Step 4: Ranking of Portfolios**
  - Cascade took the unserved demand and total system cost of all draws in each portfolio and calculated the mean and VaR of the portfolios. For its modeling purposes, the Company defines VaR as the 99<sup>th</sup> percentile of unserved demand and total system cost. This is a generally-accepted methodology for determining a reasonable worst-case scenario for risk analysis. Cascade ranked its portfolios by first giving preference to any portfolio that fully solved for unserved demand in both stochastic and deterministic analysis. After that, portfolios were ranked based on a risk-adjusted total system cost metric, which gives 75% weight to the total system cost under deterministic conditions for a given portfolio, and 25% weight to the costs under stochastic conditions. Cascade believes the top ranked portfolio is the one with the most reasonable least cost and least risk mix of reliable energy supply resources and energy efficiency for Cascade and its customers. This is now deemed to be the Top Ranked Candidate Portfolio, but it is still just a Candidate Portfolio until it has passed a rigorous scenario and sensitivity analysis.
- **Step 5: Stochastic Scenarios of Candidate Portfolio**
  - Cascade created nineteen different scenarios to stochastically test its candidate portfolio. These scenarios, which are detailed in Figure 9-3, measure how the portfolio performed in high and low growth environments, as well as various restrictions related to storage availability. In each scenario, the portfolio was run through a 10,000 draw Monte Carlo weather simulation, and the total system cost at the 99<sup>th</sup> percentile was recorded as the VaR for the Candidate Portfolio in that scenario.
- **Step 6: Scenario Analysis of Candidate Portfolio**
  - The VaR of the Candidate Portfolio in each scenario was compared to the Company's VaR limit, which was set by Cascade's Gas Supply Oversight

Committee (GSOC) and was equal to 1.25 times the mean total system cost of the portfolio under expected conditions. If the VaR in any scenario exceeded this limit, that portfolio may be rejected, and the next highest ranked portfolio would become the new Top Ranked Candidate Portfolio for scenario analysis. If the VaR of all scenarios did not exceed this limit, the portfolio passed scenario testing and moved to sensitivity testing.

- **Step 7: Sensitivity Testing of Candidate Portfolio**
  - Cascade created eight different pricing environments to stochastically test its candidate portfolio. These sensitivities, which are detailed in Figure 9-3, measure how the portfolio performed in high and low price situations, as well as with a range of adders related to carbon legislation. In each sensitivity, the portfolio was run through a 10,000 draw Monte Carlo NYMEX price simulation, and the total system cost at the 99<sup>th</sup> percentile was recorded as the VaR for the Candidate Portfolio in that sensitivity.
  
- **Step 8: Sensitivity Analysis of Candidate Portfolio**
  - Similar to comparing the scenarios in Step 6, the VaR of the Candidate Portfolio in each sensitivity was compared to the Company's VaR limit, which was set by Cascade's GSOC and was equal to 1.25 times the mean total system cost of the portfolio under expected conditions. If the VaR in any sensitivity exceeded this limit, that portfolio may be rejected, and the next highest ranked portfolio would become the new Top Ranked Candidate Portfolio for scenario analysis. If the VaR of all sensitivities did not exceed this limit, the portfolio passed sensitivity testing and could be confirmed as Cascade's Preferred Portfolio. Figure 9-2 displays this process as a flowchart.

Figure 9-2: Supply Resource Optimization Process Flow Chart



Cascade Natural Gas Corporation  
2020 Integrated Resource Plan

Figure 9-3: Breakdown of Scenarios & Sensitivities Modeled

| Scenarios and Sensitivities |                       | Assumptions        |                                 |   |  |                                  | First Year Unserved |
|-----------------------------|-----------------------|--------------------|---------------------------------|---|--|----------------------------------|---------------------|
|                             |                       | Growth             | Weather                         | Price   | Carbon Forecast                                  | Constraints                      |                     |
| Expected Conditions         |                       | Medium Load Growth | Stochastic Weather              | Stochastic Pricing                                | Cap and Trade                                    | None                             | N/A                 |
| Transportation              | No Evergreen          | Medium Load Growth | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | No Current Contracts Evergreen   | 2024                |
| Growth                      | High Growth           | High Load Growth   | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | None                             | 2035                |
|                             | Low Growth            | Low Load Growth    | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | None                             | N/A                 |
| Environmental Adder         | 0%                    | Medium Load Growth | Average Weather with Peak Event | Stochastic Pricing with a 0% Environmental Adder  | Cap and Trade                                    | None                             | N/A                 |
|                             | 20%                   | Medium Load Growth | Average Weather with Peak Event | Stochastic Pricing with a 20% Environmental Adder | Cap and Trade                                    | None                             | N/A                 |
|                             | 30%                   | Medium Load Growth | Average Weather with Peak Event | Stochastic Pricing with a 30% Environmental Adder | Cap and Trade                                    | None                             | N/A                 |
| No Supply                   | No Alberta Supply     | Medium Load Growth | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | No gas from Alberta              | 2020                |
|                             | No BC Supply          | Medium Load Growth | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | No gas from British Columbia     | 2020                |
|                             | No Rockies Supply     | Medium Load Growth | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | No gas from Rockies              | 2021                |
|                             | No Canada Supply      | Medium Load Growth | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | No gas from Canada               | 2020                |
| Limit Supply                | Limit Alberta         | Medium Load Growth | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | No day gas from Alberta          | N/A                 |
|                             | Limit BC              | Medium Load Growth | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | No day gas from British Columbia | N/A                 |
|                             | Limit Rockies         | Medium Load Growth | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | No day gas from Rockies          | N/A                 |
|                             | Limit Canada          | Medium Load Growth | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | No day gas from Canada           | N/A                 |
| No Storage                  | No JP                 | Medium Load Growth | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | No access to Jackson Prairie     | N/A                 |
|                             | No Plymouth           | Medium Load Growth | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | No access to Plymouth storage    | N/A                 |
|                             | No Mist               | Medium Load Growth | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | No access to Mist storage        | N/A                 |
| Limit Storage               | Limit JP              | Medium Load Growth | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | 25% access to Jackson Prairie    | N/A                 |
|                             | Limit Plymouth        | Medium Load Growth | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | 25% access to Plymouth storage   | N/A                 |
|                             | Limit Mist            | Medium Load Growth | Stochastic Weather              | Medium Pricing Environment                        | Cap and Trade                                    | 25% access to Mist storage       | N/A                 |
| Carbon Forecasts            | No Carbon             | Medium Load Growth | Average Weather with Peak Event | Stochastic Pricing                                | No Carbon Forecast                               | None                             | N/A                 |
|                             | Social Cost of Carbon | Medium Load Growth | Average Weather with Peak Event | Stochastic Pricing                                | SCC w/ 3% Discount Rate                          | None                             | N/A                 |
|                             | Market Choice         | Medium Load Growth | Average Weather with Peak Event | Stochastic Pricing                                | House of Representatives' Market Choice Proposal | None                             | N/A                 |
|                             | Stochastic Carbon     | Medium Load Growth | Average Weather with Peak Event | Stochastic Pricing                                | 95th percentile of potential Carbon Forecasts    | None                             | N/A                 |
| Price Forecast              | High Price Forecast   | Medium Load Growth | Average Weather with Peak Event | High Pricing Environment                          | Cap and Trade                                    | None                             | N/A                 |
| RNG                         | RNG #1                | Medium Load Growth | Average Weather with Peak Event | Medium Pricing Environment                        | Cap and Trade                                    | Must Take On-System RNG Added    | N/A                 |
|                             | RNG #2                | Medium Load Growth | Average Weather with Peak Event | Medium Pricing Environment                        | Cap and Trade                                    | Must Take Off-System RNG Added   | N/A                 |

While Chapter 12 includes a full glossary, terms related to Figure 9-3 are shown below for convenience.



### Terms Used in Figure 9-3

**Average Weather with Peak Event** – The weather pattern was modeled using historical weather data in each of Cascade's climate zones for the past 30 years. In addition, a design peak day was inserted on December 21<sup>st</sup> of each year to allow for conservative forecasting to model the coldest day in Cascade's system over the past 30 years.

**Stochastic Weather** – The weather pattern was modeled using historical weather data in each of Cascade's climate zones. This data is run through a Monte Carlo simulation, which allows the Company to derive the 99<sup>th</sup> percentile of potential system weighted heating degree days (HDDs).

**No Evergreen** – A transportation constraint where Cascade models the impact of not renewing any contracts with a termination date before the end of the 20-year planning horizon.

**Low Customer Growth** – Low customer growth scenarios were created by examining the low end of the confidence intervals of Cascade's customer forecast, as mentioned on page 3-17.

**Medium Customer Growth.** Cascade used its expected customer forecast, as mentioned on page 3-17 for the expected growth scenario

**High Customer Growth** – High customer growth scenarios were created by examining the high end of the confidence intervals of Cascade's customer forecast, as mentioned on page 3-17.

**Medium Pricing Environment** – Price was modeled using Cascade's price forecast, which was derived by weighting the forecasts from multiple sources over the 20-year planning horizon.

**High Pricing Environment** – Price was modeled using Cascade's price forecast, which was derived by weighting the forecast of a number of sources over the 20-year planning horizon. Prices were then increased by 5% at all markets to simulate a high pricing environment over the 20-year period.

**Stochastic Pricing** – NYMEX Pricing was modeled by running Cascade's price forecast through a Monte Carlo simulation, which allows the Company to identify the 99<sup>th</sup> percentile of potential NYMEX pricing based on the deterministic projections.

**Stochastic Pricing with 0% Adder** – Price was modeled using Cascade's price forecast, which was derived by weighting the forecasts from its sources over the 20-year planning horizon. Cascade then removed the 10%

environmental adder, originally in place to simulate the impact of unforeseen environmental conditions.

**Stochastic Pricing with 20% Adder** – Price was modeled using Cascade's price forecast, which was derived by weighting the forecast of its sources over the 20-year planning horizon. Prices were then increased by 20% at all markets to simulate the impact of unforeseen environmental conditions.

**Stochastic Pricing with 30% Adder** – Price was modeled using Cascade's price forecast, which was derived by weighting the forecast of its sources over the 20-year planning horizon. Prices were then increased by 30% at all markets to simulate the impact of unforeseen environmental conditions.

**Cap and Trade** – This is modeled as Cascade's base carbon forecast for the 2020 IRP as an adder to Cascade 20-year price forecast and avoided cost starting in 2021. The Company uses the California Energy Commission's Integrated Energy Policy Report (IERP) 2019 Preliminary GHG Allowance Price Projection as a proxy for the projected pricing of an Oregon Marketplace.

**SCC w/ 3% Discount Rate** – This is modeled as an adder to Cascade 20-year price forecast and avoided cost starting in 2021. The source of this forecast is the Interagency Working Group on Social Cost of Greenhouse Gases' Technical Support Document: Technical Update of the Social Cost of Carbon (SCC) for Regulatory Impact Analysis Under Executive Order 12866.

**House of Representatives' Market Choice Proposal** – A carbon sensitivity based on the proposed carbon tax that was introduced to the US House of Representative on January 24, 2019 (H.R. 763)<sup>1</sup>. The proposal is not expected to pass but is a good proxy for a potential national tax. This is modeled as an adder to Cascade 20-year price forecast and avoided cost starting in 2020.

**Must Take On-System RNG** – This is a hypothetical renewable natural gas resource that is inserted into the scenario at the zonal level, meaning no additional upstream capacity is needed to inject the supply at a citygate. Pricing, quantity, and timing of the resource, as well as the impact of this resource, is discussed further in Chapter 7, Renewable Natural Gas.

**Must Take Off-System RNG** – This is a hypothetical renewable natural gas resource that is inserted into the scenario at the supply basin level, meaning additional upstream capacity is needed to inject the supply at a citygate. Pricing, quantity, and timing of the resource, as well as the impact of this resource, is discussed further in Chapter 7, Renewable Natural Gas.

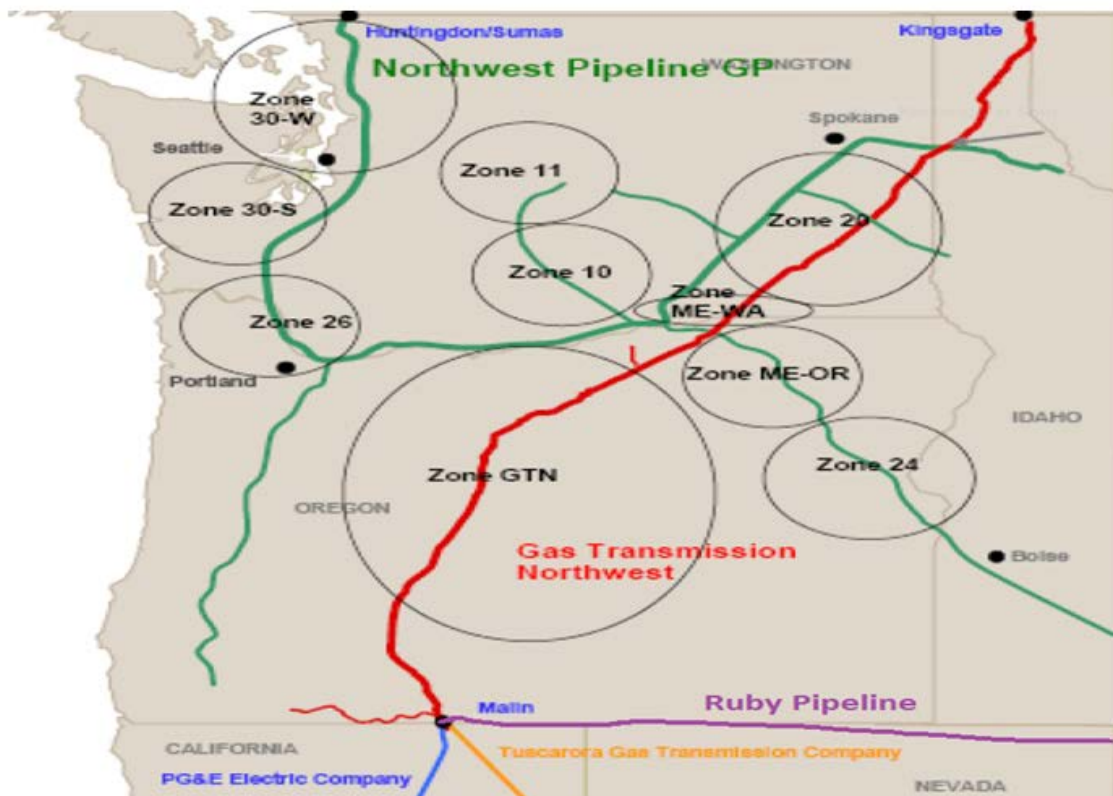
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<sup>1</sup> H.R.763 - Energy Innovation and Carbon Dividend Act of 2019 (<https://www.congress.gov/bill/116th-congress/house-bill/763/text>)

## Planning and Modeling

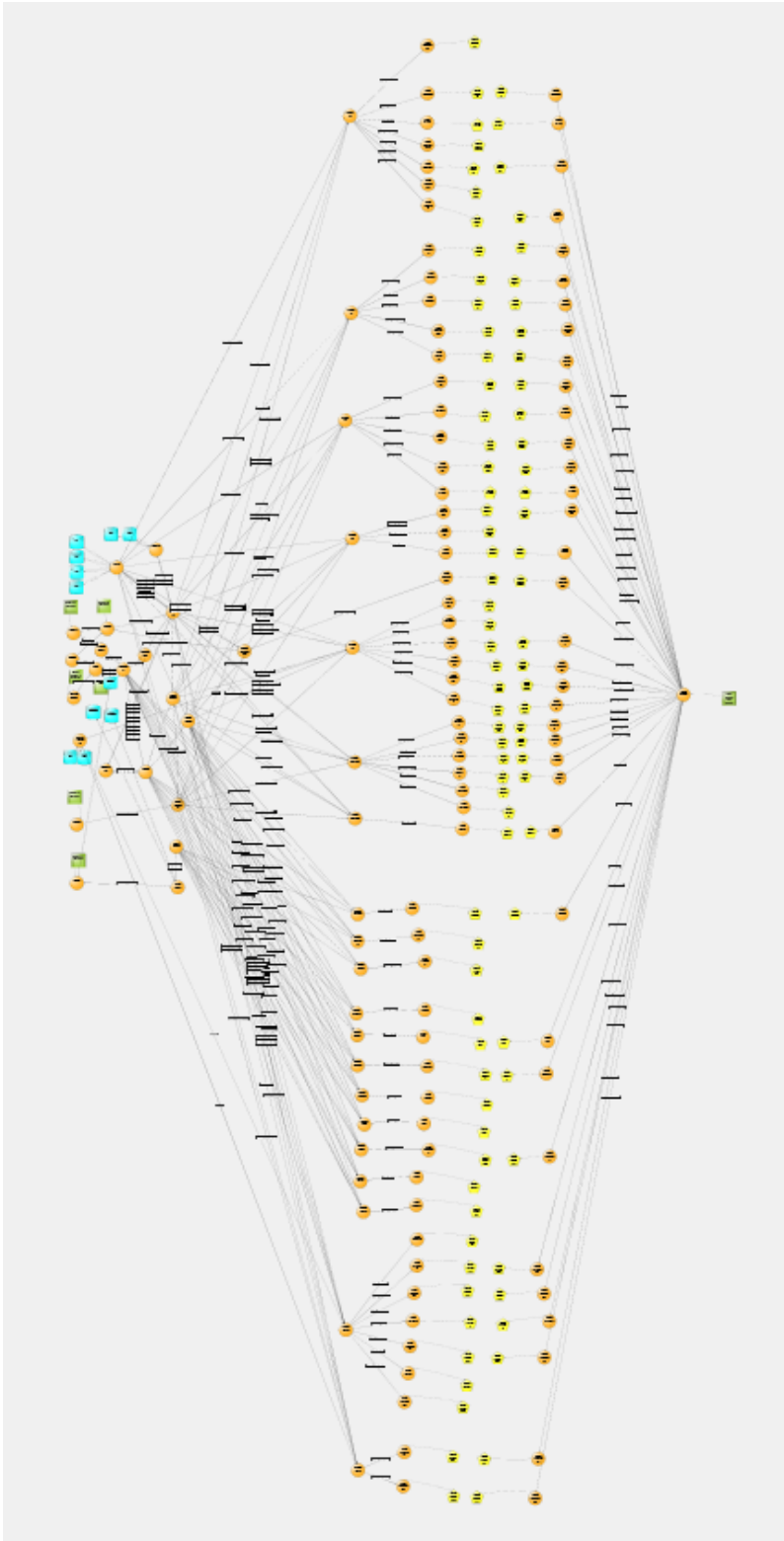
SENDOUT® has broad capabilities that allow the Company to develop supply and demand relationships that closely mirror Cascade’s existing operations. Beginning with the 2008 IRP, Cascade expanded its modeling from the district level to modeling the system grouped by the various pipeline zones. Figure 9-4 shows the location of these pipeline zones. These pipeline zones reflect Cascade’s customers being served from either Northwest Pipeline LLC (NWP) or Gas Transmission Northwest (GTN) interstate pipeline facilities.

Figure 9-4: Pipeline Zones Used in this IRP



With the in-house load forecast model (LFM) application, which is discussed in detail in Chapter 3, Demand Forecast, modeling dives into an even more granular level. This IRP takes more of a citygate and rate schedule view, which allows Cascade to take a deeper view of capacity shortfalls and potential constraints. A copy of the network diagram is shown in Figure 9-5. The network diagram is provided for illustrative purposes to emphasize the difficulties in configuring the model to best replicate Cascade’s complex system rather than being provided for its readability.

Figure 9-5: SENDOUT® Network Diagram of Cascade's System



## Stochastic Methodology Discussion

Cascade has implemented two major changes to its stochastic process. First, the Company now runs its Monte Carlo simulations on all candidate portfolios, which is used to create the risk-adjusted metrics discussed in Step 4 of Cascade's supply resource optimization process. The rationale behind this is to use the deterministic results to capture the intrinsic value of each portfolio, while the stochastic results capture the extrinsic value of the portfolios. Cascade chose to weight these with a 75/25 split, as the Company believes this mix properly assigns value to results under expected conditions versus results under unexpected conditions. Additionally, this follows the regional best practices.

Second, Cascade has moved from using the Monte Carlo functionality within SENDOUT<sup>®</sup> to building its own simulation engine in Excel and R. While SENDOUT<sup>®</sup> was able to generate adequate results in the past, the Company wanted to run a more robust simulation to supplement the functionality of SENDOUT<sup>®</sup>. SENDOUT<sup>®</sup> ran Monte Carlo simulations on monthly data and then used historical patterns to create weather patterns. The new methodology allows Cascade to be more detailed by running Monte Carlo simulations on daily data and creating multiple weather patterns. The new methodology of utilizing R to run stochastic analysis allows Cascade to be transparent on each step of the stochastic analysis process. Using historical data for weather, along with Cholesky decomposition matrices, Cascade can now run a 10,000 draw Monte Carlo simulation on price and weather, which will allow for a more accurate distribution when identifying what is the 99<sup>th</sup> percentile of price and weather for stochastic analysis. The negative aspect of running stochastic analysis outside of SENDOUT<sup>®</sup> is that Cascade needs to manually insert the weather data of a specific stochastic analysis draw to run the linear optimization of that weather profile. The Monte Carlo functionality embedded within SENDOUT<sup>®</sup> allows the program to read and optimize the stochastic weather results from all generated draws automatically.

The Cholesky decomposition matrix is a positive-definite covariance matrix. This matrix is used to draw or sample random vectors from the N-dimensional multivariate normal distribution that follow a desired distribution. In Cascade's case, this allows for correlations between weather zones to be included when drawing or sampling data distributions for Monte Carlo runs. Figure 9-6 shows Cascade's historical correlations between weather stations for the month of January. A realistic Monte Carlo draw would show similar correlations between weather stations, which Cascade manages to accomplish with the Cholesky Decomposition Matrix. By correlating random variables, there is always the potential issue of overfitting and not allowing for enough randomness between each draw. Also, Cascade is aware of the possibility of introducing bias into its models. Cascade is monitoring this by constantly evaluating and cross-validating the results.

Figure 9-6: January Historical Correlations between Weather Stations

| City        | Baker City | Bellingham | Bremerton | Pendleton | Redmond | Walla Walla | Yakima  |
|-------------|------------|------------|-----------|-----------|---------|-------------|---------|
| Baker City  | 1.00000    |            |           |           |         |             |         |
| Bellingham  | 0.63383    | 1.00000    |           |           |         |             |         |
| Bremerton   | 0.65848    | 0.86889    | 1.00000   |           |         |             |         |
| Pendleton   | 0.70245    | 0.73001    | 0.69979   | 1.00000   |         |             |         |
| Redmond     | 0.71736    | 0.76293    | 0.76183   | 0.79743   | 1.00000 |             |         |
| Walla Walla | 0.71051    | 0.72579    | 0.69180   | 0.95952   | 0.78995 | 1.00000     |         |
| Yakima      | 0.66974    | 0.69391    | 0.68315   | 0.79445   | 0.70062 | 0.81950     | 1.00000 |

Stochastic analysis of price presents a different set of challenges. Cascade only performs its Monte Carlo simulation on NYMEX, as the basins are ultimately calculated as a function of the NYMEX price plus or minus a basis differential. This eliminates the need to correlate multiple variables, while simplifying the process. Prices also follow a different distribution from weather, which adds a layer of complexity. HDDs have historically shown to be distributed normally, which allows for the use of Gaussian distributions in weather stochastic analysis, and while the month to month percentage changes in gas prices are shown to be normally distributed, gas prices tend to follow a more lognormal distribution. Practically speaking, prices appear to be just as likely to move up or down month over months, but the dollar impact of these movements is greater for price increases. For example, with a starting price of \$2/dth, five straight months of 10% gains result in an increase of \$1.22/dth, while five straight months of 10% losses result in a loss of \$0.82/dth.

Cascade models these price movements with a Geometric Brownian motion stochastic process. For each of its 10,000 draws, the month over month price change is determined by two elements: a drift term and a shock term. The drift term is the expected movement of NYMEX, derived from the Company's price forecast. The shock term is the main stochastic element, which takes the month over month return variance and multiplies it by a random normal variable to create a normal distribution of price movements for a given month, and a lognormal distribution of prices as illustrated above.

A more in-depth breakdown of the data justifying this new methodology, including the monthly present value revenue requirement (PVRR) calculations of a sampling of stochastic draws, can be found in Appendix G.

## **Resource Optimization Output and Analysis Reports**

After the model run is performed and SENDOUT® selects the optimal set of resources from the available portfolio, output reports are generated. SENDOUT® provides an assortment of input and output reports that it can generate, provided they are selected prior to the optimization run. SENDOUT® offers dozens of separate input reports that summarize various items such as demand inputs, the resulting forecast, temperature patterns as well as supply, storage, and transportation resource inputs. These reports verify that the information supplied to SENDOUT® is being accurately interpreted by the model.

The results of the optimization process are provided in the dozens of output summary reports. These reports summarize various aspects of the optimal portfolio resource size and selection as well as cost and utilization over the planning period. For purposes of this discussion, certain key output reports will be summarized below.

### **Key Output Report - Cost and Flow Summary**

The Cost and Flow Summary Report consolidates a myriad of informative aspects of the optimization run. The report provides a breakdown of portfolio costs on a yearly basis, unit cost detail, as well as a total planning period basis, in several different formats. For example, an aggregate portfolio cost total is provided for comparison between years, as well as between various optimization runs, if the analyst is attempting to compare the impact that one or more resources can have on the portfolio. This total portfolio cost figure is also broken down into supply, storage and transportation cost summaries on both a yearly and planning period basis.

The report also contains the Resource Mix summary. This summarizes SENDOUT® decisions regarding the sizing and optimal mix of incremental resources, which determines whether one or many different types of resources should be considered for inclusion in the total resource portfolio.

### **Key Output Report - Month to Month Summary**

While the Cost and Flow summary provides an indication of individual resource utilization, the Month to Month summary allows greater examination of how SENDOUT® utilizes each resource. The user can determine if the particular type of resources presented to SENDOUT® are being utilized as envisioned or whether other types of resources would more closely match requirements. For example, as has been done by Cascade, the analyst may offer annual supply contracts to SENDOUT® to address load growth over the planning period. The analyst can examine this report to determine if SENDOUT® uses these supplies throughout the year or only occasionally. If SENDOUT® utilizes this resource on a short-term basis during the

winter, the analyst can introduce seasonal resources to SENDOUT® to determine whether it would choose them over the annual supplies already available in the portfolio.

SENDOUT® also presents monthly information in other specific reports. For example, the supply information provided in this Month to Month report is also available in greater detail in the Supply Summary Report. The same is true with the Transportation Summary Report and the Storage Summary Report. SENDOUT® also offers monthly supply utilization information in the Load Factor Summary Report, which some analysts may prefer to use in their approach to analyze the SENDOUT® results.

### **Key Output Report - Supply vs. Requirements**

The Supply vs. Requirements report compares a particular forecast's monthly demand requirement quantity against the optimal portfolio's various supply quantities. This shows supply utilization as well as determines whether the supply portfolio quantities are sufficient to meet demand. If an insufficiency exists, the report isolates the shortfall by month as well as the location of the Company's demand requirement. With this information, the Daily Unserved Demand report determines if a pattern exists with respect to the shortfall. For example, if the daily report indicates that the shortfall occurs on the peak day the analyst could turn to the Peak Day Report to determine if the shortfall is supply or transportation related. If the shortfall occurs on any number of days surrounding the peak or at other times during the year, the analyst can turn to the Daily Supply Take and Daily Transport Flow reports to determine whether the portfolio is constrained by supply availability or transport capacity on those particular days.

### **Key Output Reports - Custom Report Writer**

Ultimately, the availability and interpretation of information gained through SENDOUT® output reports contribute to developing better resource portfolios. SENDOUT® output report(s) contains vast amounts of information, which may overwhelm the casual observer. Therefore, SENDOUT® offers the user a Custom Report Writer (or Report Agent) module, which can isolate certain information contained in the various output reports and improve the analysis activity. Report Agent provides the user a menu of report information sources from which to choose specific items. The user has the option of viewing or downloading the information into spreadsheets or databases. Provided the information is available, the analyst can readily access specific items, which simplifies the data acquisition process if further analysis is desired. While the report writer is a useful tool in this regard, not all SENDOUT® output information can be accessed through this module.



## **Key Inputs**

Individual transportation segments, storage, supply and demand side resources, both existing and potential, are targeted to demand segments representing the citygates connected to the system and the various classes of core customers behind those gates. This level of precision allows SENDOUT® to consider each resource on an individual basis within the portfolio while also recognizing where physical system limitations exist. Resource characteristics such as a supply contract's daily delivery capability, minimum take requirements, maximum daily transport capability by individual segment, storage inventory limitations and withdrawal, and injection curve characteristics are part of each resource's basic model inputs. The ability to model resources in this fashion allows SENDOUT® to tailor the optimization within envisioned constraints and ensures that the model's optimal solution can work under anticipated operating conditions.

The optimization process compares a portfolio of resources against a specific demand requirement. SENDOUT® generates a daily demand forecast by combining base load and temperature sensitive usage factor inputs with a specified daily temperature pattern input. For IRP purposes usage factor inputs were specifically developed under high, medium, or low demand profiles culled from Cascade's in-house LFM. Daily temperature patterns are available as either design or average weather. Due to the complexity of the SENDOUT® application, the model has some combined demand areas compared to the LFM. Therefore, both usage factor and temperature pattern inputs from the LFM may be slightly adjusted within SENDOUT® on an area specific basis without creating any material difference in the load demand.

In SENDOUT®, each supply contract requires a Maximum Daily Quantity (MDQ) input to establish its specific delivery capabilities. Review of the daily, annual, monthly, or seasonal minimum utilization of the contract is required. Maximum take quantities can also be established on either an annual, monthly, or seasonal basis. The commodity rate input can reflect either a known price, in the case of a fixed cost contract, or index prices, if the user has established a representative index as a separate input item. Several fixed and variable cost rate inputs are also available for establishing separate contract cost items, if necessary. Most of the gas supply options discussed above are also available as transportation inputs.

Penalty rates on an annual, seasonal, monthly or daily basis are needed if either minimum or maximum utilization requirements are required or desired. The penalty rate can be any amount desired or a specific amount if known. The intent of the penalty option is to direct SENDOUT® to adhere to whatever minimum or maximum characteristic is specified.

Resource mix is one of the more powerful and highly desirable input tools available in the model. By toggling on resource mix and providing an MDQ maximum and minimum, the user directs SENDOUT® to appraise the supply contract, on a total

cost basis, against all other supply resources available within the portfolio. Under resource mix, SENDOUT® will determine whether the resource is desirable within the portfolio and at what MDQ size, within the MDQ maximum and minimum, the resource should be made available within the portfolio. This aspect of SENDOUT® is crucial to the evaluation of potential resources, as the Company conducts its resource planning, appraisal, and acquisition activities.

In addition to most of the items discussed above, storage resources have additional input considerations. Instead of MDQ inputs, the analyst establishes inventory maximums and/or minimums. If monthly inventory levels are to change over the years or within a year, SENDOUT® allows the analyst to establish that target. Injection and withdrawal capability, as well as the period within the year that each is available, are also input decisions.

A unique feature of SENDOUT® storage input is the Storage Volume - Dependent Deliverability (SVDD) Tables. This input item allows the user to tailor injection and withdrawal rates as either a line or step function based upon whether the facility has varying operating pressure constraints as the injection or withdrawal activity is conducted. The analyst can also establish whether inventory exists at the beginning of the planning period, and whether various prices and specific quantities exist at that time. SENDOUT® provides the analyst with five separate volume and price levels to reflect existing inventories.

Finally, SENDOUT® allows for input of a penalty rate for unserved demand. Cascade uses this functionality to give SENDOUT® a way to prioritize which rate tariff to serve when demand is higher than the resources available to serve that demand. These penalties are always higher than the cost of any incremental resources, as SENDOUT® should always elect to purchase these resources versus leaving demand unserved. Residential customers are always assigned the highest penalty. This tells SENDOUT® to prioritize serving these customers above all others. Commercial customers have the next highest penalty, followed by commercial/industrial customers, and finally Industrial customers. It is important to note the customers on an interruptible tariff do not have a penalty assigned to leaving their demand unserved. This allows SENDOUT® the flexibility to serve the demand of these customers when possible, while making sure not to purchase additional resources if they will only be used to serve interruptible demand.

## **Decision Making Tool**

Analysis of optimization model results and other operational and contractual constraints allows Cascade to make more informed resource decisions. The IRP optimization model output and Monte Carlo simulation analysis provide the quantifiable output from numerous model inputs. The model does not prescribe the ultimate resource portfolio. It can only calculate the least cost set of resources given

their specific pricing and quantifiable constraint characteristics. However, many other resource combinations may be available over the planning horizon. Therefore, Cascade must include subjective risk judgments about unquantifiable and intangible issues related to resource selections. These include future flexibility, supplier deliverability risk, pipeline(s) risk, financial risk to the utility and its customers, operational constraints, regulatory risk, etc. The risk judgments are combined with the quantitative IRP analyses to form the actual resource decisions.

## **Resource Integration**

The following subchapters summarize the preceding chapters bringing together the demand forecast, existing supply and demand side resources and potential alternative resources to develop the 20-year, most reasonably priced reliable portfolio.

## **Demand Forecast**

Load growth across Cascade's system through 2039 is expected to fluctuate between 0.78% and 1.80% annually, accounting for leap years. Load growth is split between residential, commercial, and industrial customers. Residential and commercial customer classes are expected to grow annually at an average rate of 1.66% and 0.91%, while industrial expects a growth rate of approximately 0.51%. Load across Cascade's two-state service territory is expected to increase at an average annual rate of 1.26% over the planning horizon, with the Oregon portion outpacing Washington, 1.58% versus 1.15%.

## **Long-Term Price Forecast**

In Chapter 4, Supply Side Resources, Cascade discusses how the 20-year price forecast is based on a blend of current market pricing along with long-term fundamental price forecasts. Since pricing on the market is heavily influenced by Henry Hub prices, the Company closely monitors this market trend. The fundamental forecasts of Wood Mackenzie, the Energy Information Administration, the Northwest Power and Conservation Council, and trading partners are resources for the development of Cascade's blended long-range price forecast. Since the Company's physical supply-receiving areas (Sumas, AECO, and Rockies) are usually at a discount to Henry Hub, the Company utilizes the basis differential from Wood Mackenzie's most recently available update and compares that to the future markets' basis trading as reported in the public market.

Natural gas prices have stabilized after dramatic fluctuations over the course of the last ten years. Figure 9-7 shows the history of regional and Henry Hub prices over the past ten years. The shale boom, environmental concerns around carbon,

conservation efforts, and improvements in renewable energy have led to a market with prices as low as they have been in recent history. Recently, prices have remained relatively stable due to abundant supply, with one noticeable exception occurring at the end of 2018 with the Enbridge pipeline explosion. The inability to move gas from British Columbia to the US Pacific Northwest created extreme upward pricing pressure across the region, and specifically at the Sumas basin. Fortunately, the pipeline was repaired swiftly, and pricing stabilized by the summer of 2019.

Figure 9-7: Historical Regional Pricing for Past Ten Years

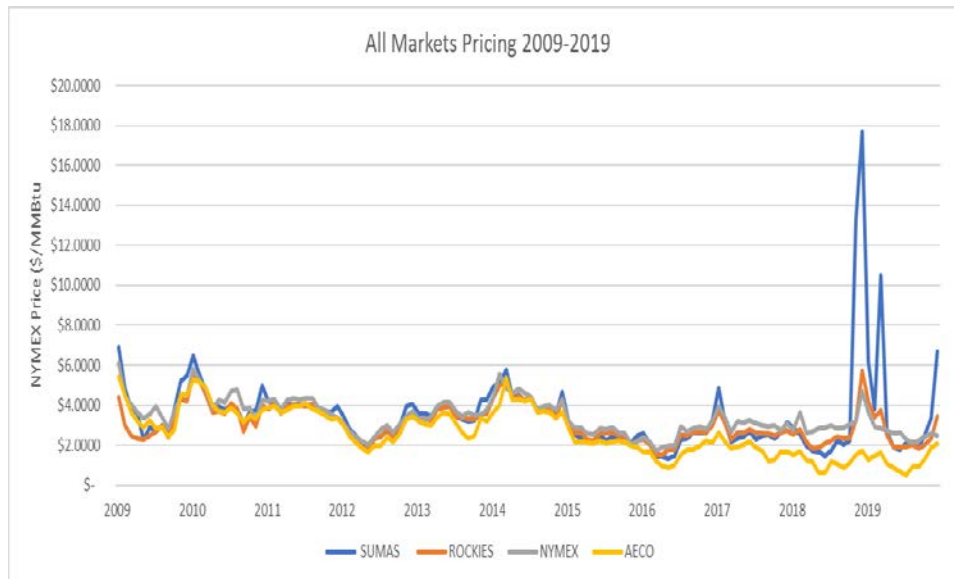
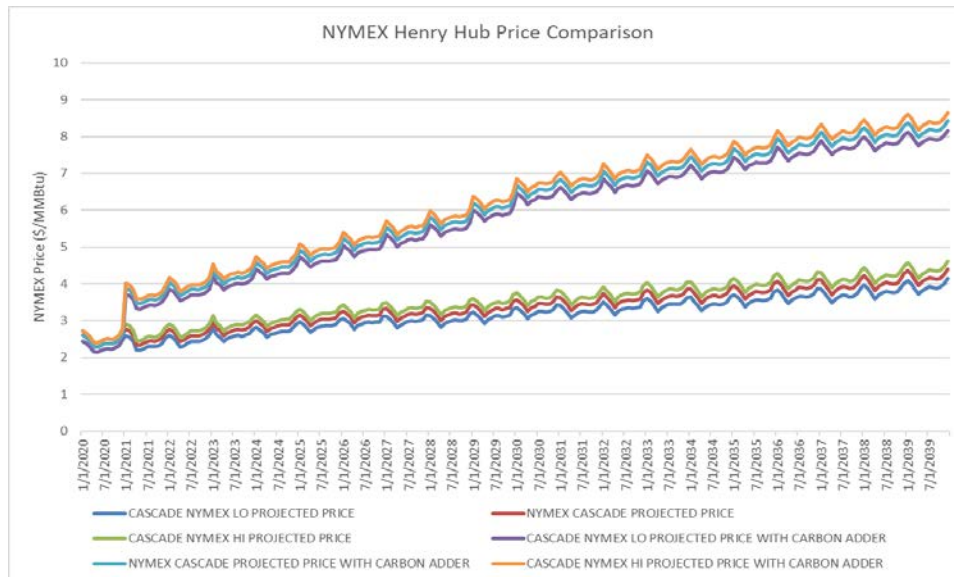


Figure 9-8 shows the comparison of ranges of pricing for the planning horizon, including the expected low, medium and high price, with and without a carbon adder for the impact of a potential cap and trade marketplace. The large jump starting in 2021 is a result of Cascade modeling that year as the start of the carbon tax.

Figure 9-8: NYMEX Annual Price Comparison



### Environmental Adder

As discussed in Chapter 5, Avoided Cost, Cascade included a 10% environmental adder in its 2020 IRP’s 20-year price forecast.

### Transportation/Storage

Chapter 4, Supply Side Resources, describes the range of current upstream pipeline transportation capacity and storage services under contract to serve core customers. Additionally, the Company identified several proposed transportation resources, as seen in Figure 9-9, such as a potential expansion of NWP along the I-5 corridor and acquiring currently unsubscribed GTN capacity that can be used to meet customer growth and address potential capacity shortfalls. The Company also continues to work with NWP to look at re-aligning Cascade’s contracted delivery rights (Maximum Daily Delivery Obligations, or MDDOs) to citygates with potential peak day capacity shortfalls. The Company also uses segmenting pipeline capacity as a way to maximize the utilization of Cascade’s capacity. These resources, plus leasing incremental storage at several regional facilities, were all considered as a resource mix of possibilities to form the Company’s 20-year integrated resource portfolio.

Figure 9-9: Alternative Transportation Resources<sup>2</sup>



## Demand Side Management

Chapter 6, Demand Side Management and Environmental Policy, describes the methodology used to identify energy efficiency potential and the interactive process that utilizes avoided cost thresholds for determining the cost effectiveness of energy efficiency measures on an equivalent basis with supply side resources. For the 2020 IRP the nominal system avoided costs ranges between \$0.26/therm and \$1.11/therm over the 20-year planning horizon. Through the cost-effective use of conservation programs, the Company is able to reduce the load demand that must be met by more costly supply resources, such as a pipeline capacity expansion.

Cascade's DSM forecast is incorporated into its optimization modeling by converting the heat and base load forecasts into a peak and non-peak DSM factor. These values are then allocated to the pipeline zonal level and loaded into SENDOUT<sup>®</sup> to model

<sup>2</sup> Northwest Gas Association (NWGA) 2020 Pacific Northwest Gas Market Outlook 2020  
Page 9-20

the impact of conservation on resource acquisition needs. From a technical standpoint this is done by creating a must-take resource that acts like a supply at the zonal level equal to the peak and non-peak DSM values. While it is not actually a supply, this methodology tells SENDOUT® to use DSM to decrement demand by the forecasted energy efficiency quantities before any resource acquisition decisions are made.

## Results

After incorporating these inputs into the SENDOUT® model, Cascade analyzed the demand compared to the existing resources as well as the demand against various portfolios of available resources. This served as the foundation for the Company to see what resources are taken to meet system demand with the least cost, lowest risk mix of natural gas supply and conservation. Figure 9-10 provides a snapshot of the potential peak day unserved demand across Cascade’s system prior to applying any realignment of delivery rights, transportation contract segmentation or other alternative resources. Figure 9-11 displays the same information as Figure 9-10, but for Oregon citygates only.

Figure 9-10: Load Centers with Potential Peak Day Unserved Demand in Dekatherms– As-Is Modeling

| Demand Group | 2020 | 2021  | 2022  | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
|--------------|------|-------|-------|------|------|------|------|------|------|------|
| Bend Loop    | -    | 1,154 | 2,769 | -    | -    | -    | -    | -    | -    | -    |

| Demand Group        | 2030 | 2031 | 2032 | 2033 | 2034  | 2035  | 2036  | 2037  | 2038  | 2039   |
|---------------------|------|------|------|------|-------|-------|-------|-------|-------|--------|
| Sunnyside           | -    | -    | -    | -    | -     | -     | -     | 399   | 1,427 | 910    |
| Yakima Loop         | -    | -    | -    | -    | -     | -     | -     | 197   | 2,870 | -      |
| Kennewick Loop      | -    | -    | -    | -    | -     | -     | -     | 600   | 240   | 3,726  |
| Nyssa Ontario       | -    | -    | -    | -    | -     | 947   | 792   | 1,084 | 997   | 1,133  |
| Longview South Loop | -    | -    | -    | -    | -     | -     | -     | 82    | 82    | 82     |
| Bremerton Shelton   | -    | -    | -    | -    | -     | 1,603 | 528   | 4,939 | 4,302 | 4,774  |
| Sumas Loop          | -    | -    | -    | -    | -     | -     | -     | 1,306 | 1,553 | 4,603  |
| Bend Loop           | -    | -    | -    | 542  | 2,158 | 3,773 | 4,290 | 7,005 | 8,620 | 10,236 |
| Walla Walla         | -    | -    | -    | -    | -     | -     | -     | 1,464 | 2,524 | 2,690  |

Figure 9-11: Oregon Load Centers with Potential Peak Day Unserved Demand in Dekatherms – As-Is Modeling

| Demand Group | 2020 | 2021  | 2022  | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
|--------------|------|-------|-------|------|------|------|------|------|------|------|
| Bend Loop    | -    | 1,154 | 2,769 | -    | -    | -    | -    | -    | -    | -    |

| Demand Group | 2030 | 2031 | 2032 | 2033 | 2034  | 2035  | 2036  | 2037  | 2038  | 2039   |
|--------------|------|------|------|------|-------|-------|-------|-------|-------|--------|
| Bend Loop    | -    | -    | -    | 542  | 2,158 | 3,773 | 4,290 | 7,005 | 8,620 | 10,236 |

Because Cascade has more delivery rights than receipt rights, the Company must allocate the delivery rights to match up with receipt capability. First, the Company allocates capacity on transportation contracts that have a single receipt point. Next, Cascade allocates capacity on conjunctive contracts that provide corridor and

delivery point flexibility (re-allocation of MDDOs). The Company also gives consideration to critical delivery areas, constrained laterals and maximizing corridor flexibility—longest haul contractual rights. Cascade illustrates reallocation of MDDOs in Appendix F.

### **Analysis of Unserved Demand**

As discussed in Chapter 3, the Pacific Northwest will experience significant growth over the 20-year planning horizon. Cascade will need to acquire additional resources to solve for the deficiency caused by this growth. Of note, growth at one of the Company's citygates may cause unexpected shortfalls at other, seemingly unrelated citygates. For example, Cascade's Bremerton-Shelton citygate serves a significant number of residential customers. If that area were to experience rapid growth, existing resources for customers on an interruptible tariff, in Yakima for example, may be realigned to Bremerton-Shelton to serve this increased demand using a transportation contract with a broadly defined receipt point. This would make it appear as though Yakima had experienced the rapid growth, since that is where the shortfall would be appearing, even though this would not be the case in this hypothetical example. Page 3-10 goes into further detail regarding some of the major growth drivers.

Shortfalls in the citygates Cascade serves off the GTN pipeline are consistent with the Company's significant growth projections for its service areas in Oregon, particularly the city of Bend. The initial shortfalls are temporarily solved by incremental capacity that has been acquired starting in 2023, but long-term growth will still outpace this capacity by 2033. Potential unserved demand in NWP's Zone 30-S is a result of the pipeline's contractual philosophy of mainline versus lateral rights. Cascade has enough mainline rights to serve these citygates, but additional lateral rights may be required to reach the areas in Zone 30-S. This is not strictly enforced in a non-peak day situation, but such flexibility cannot be relied upon on peak day. Figure 12-9 and Figure 12-10, in Chapter 12, shows a map that illustrates the difference between the mainline and a lateral.

### **Portfolios Evaluated**

For the 2020 IRP, Cascade has elected to evaluate seven potential portfolios. These portfolios represent a wide variety of potential solutions for Cascade's resource deficiency, with an evaluation of all available resources in the Pacific Northwest for natural gas. Unlike electric utilities, who have a variety of options for power generation (hydro, wind, solar, etc.), Cascade is limited to a single resource, natural gas, which hinders the scope of potential portfolio analysis. The Company selected these seven portfolios after discussions with various stakeholders throughout its technical advisory group process. In future IRPs, Cascade will consider evaluating additional portfolios.



Figure 9-12 outlines the key components of each portfolio identified in Figure 9-1. SENDOUT<sup>®</sup> deterministically selects the optimal quantity of each resource based on its Resource Mix functionality. These quantities, which are provided in Appendix E, are then tested stochastically, and ranked in order of unserved demand and total system cost.

Figure 9-12: Resource Composition of All Evaluated Portfolios

|                           | All-In Less DSM | All-In | NWP Only | NWP + Storage | GTN | GTN + Storage | Storage Only |
|---------------------------|-----------------|--------|----------|---------------|-----|---------------|--------------|
| Incremental NGTL          |                 |        |          |               |     |               |              |
| Incremental Foothills     |                 |        |          |               |     |               |              |
| Incremental GTN N/S       |                 |        |          |               |     |               |              |
| I-5 Mainline Exp.         |                 |        |          |               |     |               |              |
| Wenatchee Lateral Exp.    |                 |        |          |               |     |               |              |
| Spokane Lateral Exp.      |                 |        |          |               |     |               |              |
| Eastern OR Mainline Exp.  |                 |        |          |               |     |               |              |
| Incremental Opal          |                 |        |          |               |     |               |              |
| Incremental GTN S/N       |                 |        |          |               |     |               |              |
| Incremental Ruby          |                 |        |          |               |     |               |              |
| T-South Southern Crossing |                 |        |          |               |     |               |              |
| Trail West                |                 |        |          |               |     |               |              |
| Pacific Connector         |                 |        |          |               |     |               |              |
| Spire Storage             |                 |        |          |               |     |               |              |
| AECO Hub Storage          |                 |        |          |               |     |               |              |
| Clay Basin Storage        |                 |        |          |               |     |               |              |
| Gill Ranch Storage        |                 |        |          |               |     |               |              |
| Wild Goose Storage        |                 |        |          |               |     |               |              |
| Mist Storage              |                 |        |          |               |     |               |              |
| DSM                       |                 |        |          |               |     |               |              |

| Legend |                                      |
|--------|--------------------------------------|
|        | Selected resource for the portfolio  |
|        | Considered but not selected resource |
|        | Not considered for the portfolio     |

Figure 9-13 uses the mean and VaR of the total system cost and unserved demand of the portfolios considered to calculate the risk adjusted value of each portfolio. Given Cascade’s mission to serve its customers, portfolios are first evaluated on unserved demand, and then mean total system cost.

Figure 9-13: Final Ranking of Portfolios – Mean and VaR

| Portfolio       | Deterministic        |                           | Stochastic           |                           | Risk Adjusted Results              |   |
|-----------------|----------------------|---------------------------|----------------------|---------------------------|------------------------------------|---|
|                 | Unserved Demand (DT) | Total System Cost (\$000) | Unserved Demand (DT) | Total System Cost (\$000) | Risk Adjusted Unserved Demand (DT) | Risk Adjusted Total System Cost (\$000) |
| All-In          | -                    | 4,279,132                 | 0                    | 4,398,492                 | -                                  | 4,308,972                               |
| All-In Less DSM | -                    | 4,282,291                 | 0                    | 4,422,989                 | -                                  | 4,317,466                               |
| NWP + Storage   | 13,686               | 4,299,105                 | 0                    | 4,422,992                 | 10,264.50                          | 4,330,076                               |
| NWP             | 13,686               | 4,301,075                 | 0                    | 4,424,828                 | 10,264.50                          | 4,332,013                               |
| GTN + Storage   | 18,179               | 4,294,023                 | 0                    | 4,437,641                 | 13,634.25                          | 4,329,928                               |
| GTN             | 18,179               | 4,295,876                 | 0                    | 4,439,678                 | 13,634.25                          | 4,331,827                               |
| Storage Only    | 28,155               | 4,282,291                 | 0                    | 4,437,522                 | 21,116.25                          | 4,321,099                               |

### Top-Ranking Candidate Portfolio

Using input from the alternative resources selected, the All-In portfolio was selected as the least cost, least risk solution to Cascade’s forecasted unserved demand. This portfolio is now defined as the Top-Ranking Candidate Portfolio. This portfolio provides guidance as to what resources should be considered to reduce the unserved demand with the least cost mix of all of the alternatives that the Company has considered. Furthermore, this portfolio was derived deterministically assuming average weather with a peak day event, Cascade’s average price forecast, and expected growth system-wide. The impact of these resources on both unserved demand and Cascade’s resource mix is shown graphically in Figures 9-14 through 9-17.

Figure 9-14: Annual Supply Take vs Demand – Candidate Portfolio

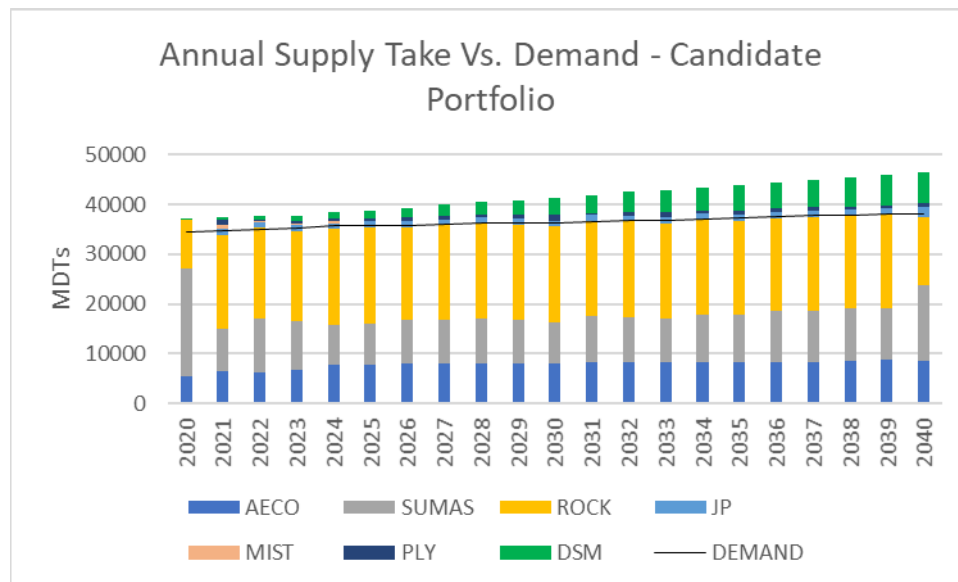


Figure 9-15: Peak Day Supply Take vs Demand – Candidate Portfolio

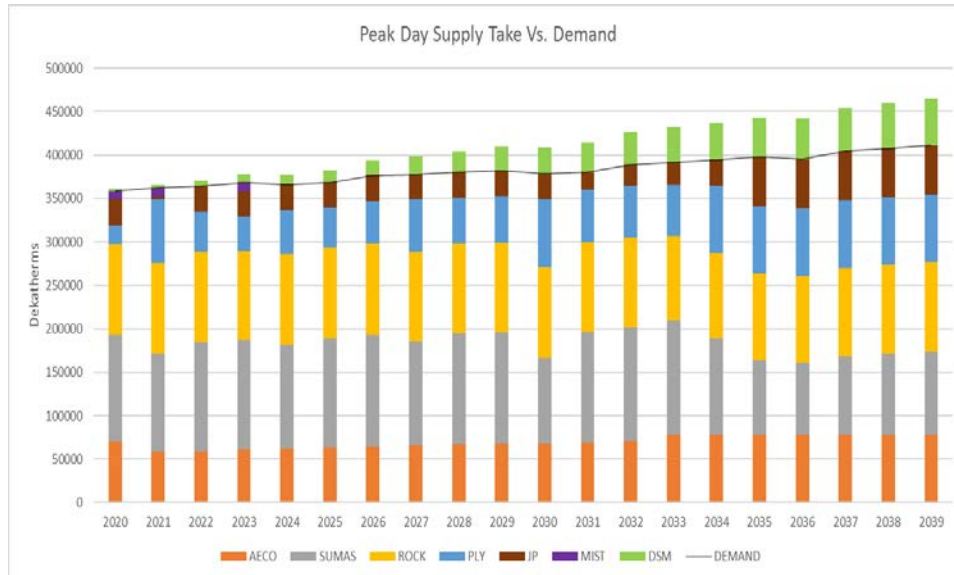


Figure 9-16: Annual Transport vs Demand – Candidate Portfolio

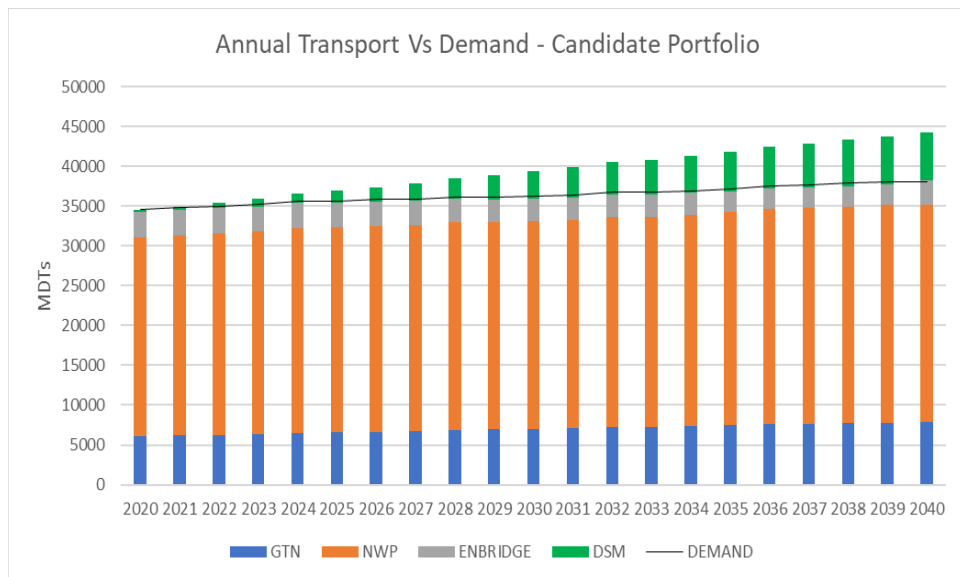
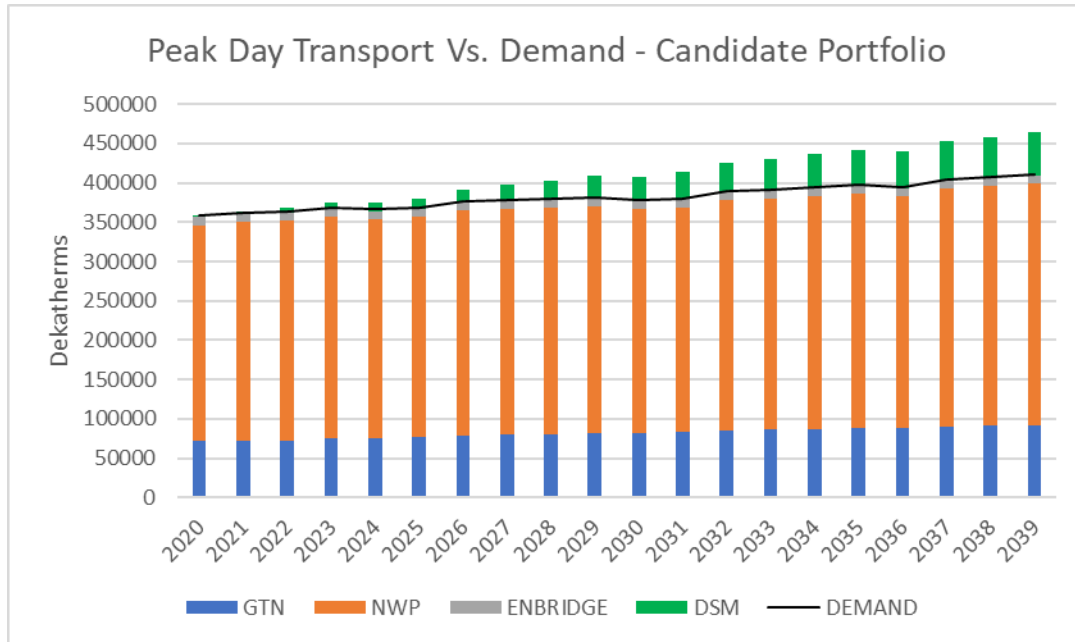


Figure 9-17: Peak Day Transport vs Demand – Candidate Portfolio



### Alternative Resources Selected

For the first time in recent Cascade IRP history, the only resource selected by the SENDOUT® model for the Top-Ranking Candidate 20-year Portfolio was incremental energy efficiency. The quantity and timing of this resource is summarized in Figure 9-18.

Figure 9-18: Projected Cumulative Incremental DSM – in Therms

| Sector                   | 2020           | 2021             | 2022             | 2023             | 2024             | 2025             | 2026             | 2027             | 2028             | 2029             |
|--------------------------|----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Residential              | 174,898        | 360,431          | 519,687          | 691,837          | 917,913          | 1,165,482        | 1,436,906        | 1,721,003        | 2,016,653        | 2,322,400        |
| Commercial               | 317,008        | 639,435          | 900,883          | 1,139,421        | 1,358,536        | 1,581,475        | 1,811,295        | 2,047,723        | 2,288,955        | 2,532,619        |
| Industrial               | 55,338         | 110,676          | 159,170          | 205,839          | 250,775          | 297,530          | 346,277          | 396,889          | 449,398          | 503,447          |
| Unclaimed Market Savings | -              | -                | 34,978           | 69,956           | 104,935          | 104,935          | 104,935          | 104,935          | 104,935          | 104,935          |
| Large Project Adder      | -              | -                | 15,990           | 31,980           | 47,970           | 63,961           | 79,951           | 95,941           | 111,931          | 127,921          |
| <b>Total</b>             | <b>547,244</b> | <b>1,110,543</b> | <b>1,630,709</b> | <b>2,139,034</b> | <b>2,680,129</b> | <b>3,213,383</b> | <b>3,779,363</b> | <b>4,366,490</b> | <b>4,971,872</b> | <b>5,591,321</b> |

| Sector                   | 2030             | 2031             | 2032             | 2033             | 2034             | 2035             | 2036              | 2037              | 2038              | 2039              |
|--------------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|
| Residential              | 2,636,242        | 2,955,897        | 3,279,298        | 3,604,742        | 3,934,254        | 4,269,108        | 4,609,748         | 4,955,437         | 5,305,334         | 5,660,658         |
| Commercial               | 2,777,880        | 3,024,936        | 3,271,584        | 3,518,368        | 3,763,510        | 4,007,124        | 4,249,410         | 4,491,421         | 4,731,341         | 4,971,039         |
| Industrial               | 559,274          | 616,726          | 675,897          | 736,870          | 800,051          | 865,286          | 932,707           | 1,001,849         | 1,073,177         | 1,146,565         |
| Unclaimed Market Savings | 104,935          | 104,935          | 104,935          | 104,935          | 104,935          | 104,935          | 104,935           | 104,935           | 104,935           | 104,935           |
| Large Project Adder      | 143,911          | 159,901          | 175,892          | 191,882          | 207,872          | 223,862          | 239,852           | 255,842           | 271,832           | 287,823           |
| <b>Total</b>             | <b>6,222,242</b> | <b>6,862,395</b> | <b>7,507,605</b> | <b>8,156,796</b> | <b>8,810,622</b> | <b>9,470,315</b> | <b>10,136,652</b> | <b>10,809,485</b> | <b>11,486,619</b> | <b>12,171,019</b> |

In an effort to mitigate the risk around the uncertain nature of DSM potential, particularly with the major role energy efficiency has in the Company’s Top-Ranking Candidate Portfolio, Cascade worked with its partner, the Energy Trust of Oregon, to evaluate the impact of different carbon futures on DSM. The results of this analysis are presented in Figure 9-19

Figure 9-19: Analysis of Alternative Carbon Futures – in Therms

| Scenario               | 2020    | 2021      | 2022      | 2023      | 2024      | 2025      | 2026      | 2027      | 2028      | 2029      |
|------------------------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Base Case Carbon       | 547,244 | 1,110,543 | 1,630,709 | 2,139,034 | 2,680,129 | 3,231,012 | 3,796,941 | 4,381,099 | 4,982,888 | 5,595,764 |
| Social Cost of Carbon  | 547,244 | 1,110,543 | 1,633,849 | 2,146,222 | 2,690,808 | 3,247,009 | 3,817,421 | 4,401,746 | 5,003,811 | 5,616,945 |
| % Difference from Base | 0.00%   | 0.00%     | 0.19%     | 0.34%     | 0.40%     | 0.50%     | 0.54%     | 0.47%     | 0.42%     | 0.38%     |
| Market Choice Carbon   | 547,244 | 1,110,543 | 1,629,432 | 2,137,628 | 2,675,453 | 3,223,014 | 3,784,324 | 4,359,312 | 4,950,040 | 5,552,338 |
| % Difference from Base | 0.00%   | 0.00%     | -0.08%    | -0.07%    | -0.17%    | -0.25%    | -0.33%    | -0.50%    | -0.66%    | -0.78%    |

| Scenario               | 2030      | 2031      | 2032      | 2033      | 2034      | 2035      | 2036       | 2037       | 2038       | 2039       |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|
| Base Case Carbon       | 6,217,575 | 6,846,458 | 7,481,429 | 8,119,908 | 8,765,178 | 9,418,231 | 10,079,170 | 10,745,491 | 11,415,053 | 12,092,748 |
| Social Cost of Carbon  | 6,239,892 | 6,870,151 | 7,512,679 | 8,158,736 | 8,816,249 | 9,482,179 | 10,157,065 | 10,836,258 | 11,520,365 | 12,213,602 |
| % Difference from Base | 0.36%     | 0.35%     | 0.42%     | 0.46%     | 0.56%     | 0.68%     | 0.77%      | 0.84%      | 0.92%      | 1.00%      |
| Market Choice Carbon   | 6,163,388 | 6,783,576 | 7,413,292 | 8,046,069 | 8,685,763 | 9,332,593 | 9,988,961  | 10,651,112 | 11,315,628 | 11,988,015 |
| % Difference from Base | -0.87%    | -0.92%    | -0.91%    | -0.91%    | -0.91%    | -0.91%    | -0.90%     | -0.88%     | -0.87%     | -0.87%     |

If the Social Cost of Carbon ultimately ends up being the cost of carbon compliance, DSM potential would only increase. If a lower carbon compliance cost such as the Market Choice Proposal materializes, the impact on the DSM potential would be minimal, never exceeding 10,000 dekatherms annually across all of Oregon, which translates to less than 100 dekatherms on a peak day. This sensitivity analysis reinforces the Company’s confidence in the role energy efficiency will play in solving resource acquisition needs.

### Alternative Resources Not Selected

The SENDOUT® model did not select the following resources for the Top-Ranking Candidate Portfolio:

#### Transport

- Incremental GTN – Allows Cascade to continue to serve customers as the Company’s core load grows in citygates that are fed by GTN capacity, specifically around Bend, Oregon. At this time the additional Oregon capacity acquired in 2023, in conjunction with incremental energy efficiency, offsets the need for more GTN capacity.
- Bremerton-Shelton Realignment – Provides the Company with the ability to secure additional firm lateral rights along the I-5 corridor. Additionally, allows Cascade to move additional gas from its’ Jackson Prairie facility to Stanfield, which can then be moved to the Company’s Oregon citygates via incremental GTN capacity from Stanfield to Malin. The Company does not forecast a need for additional I-5 capacity at this time,

but will continue to monitor growth in Western Washington, as prior IRPs have identified the region as an area with potential shortfalls in the future.

- Incremental NOVA – Provides Cascade with a cost-effective opportunity to move gas from AECO to Kingsgate, versus buying gas at Kingsgate directly. No significant quantities were identified by the model, so the Company will continue to model open seasons on NOVA.
- Incremental Foothills – Since the Company has more capacity on Foothills versus NOVA, Cascade would need to identify a significant amount of additional NOVA capacity needed before its modeling would recommend additional foothills capacity.
- Incremental Ruby/Turquoise Flats – Without a need for additional capacity on GTN, Cascade does not need additional capacity on Ruby and at Turquoise Flats to move additional gas to GTN.
- Wenatchee Expansion – Cascade’s market intelligence, in conjunction with its SENDOUT® modeling determined that it would be more cost-effective to acquire incremental NWP capacity via the Bremerton-Shelton realignment while redirecting existing flexible transportation to central Washington. Since no additional capacity is needed on the I-5 corridor, a Wenatchee expansion is not required as well.
- Zone 20 Expansion – Cascade’s market intelligence, in conjunction with its SENDOUT® modeling, determined that it would be more cost-effective to acquire incremental NWP capacity via the Bremerton-Shelton realignment while redirecting existing flexible transportation to eastern Washington. Since no additional capacity is needed on the I-5 corridor, a zone 20 expansion is not required as well.
- Incremental Starr Road – SENDOUT® determined that with Cascade’s current price forecast it did not make sense to purchase incremental capacity to move AECO gas from GTN to NWP.
- Eastern Oregon Expansion – Cascade’s market intelligence, in conjunction with its SENDOUT® modeling, determined that it would be more cost effective to acquire incremental NWP capacity via the Bremerton-Shelton realignment while redirecting existing flexible transportation to eastern Oregon. Since no additional capacity is needed on the I-5 corridor, an Eastern Oregon expansion is not required as well.
- T-South Southern Crossing – SENDOUT® determined that based on Cascade’s current price forecast it did not make sense to purchase incremental capacity to move in either direction along the Canadian border.
- Trails West (Palomar) – SENDOUT® determined that with Cascade’s current price forecast it did not make sense to purchase incremental capacity to move in either direction across central Oregon.

### Supply

- Opal Incremental – Since SENDOUT<sup>®</sup> determined there was no need for incremental Ruby capacity, there is no need to purchase additional gas to move along Ruby.
- Pacific Connector - Cascade’s market intelligence determined that at this time, the Pacific Connector would not create a significant enough impact on liquidity at Malin to impact Cascade’s modeling.

### Storage

- Gill Ranch, Clay Basin, Wild Goose, AECO Hub, Mist Storage – No incremental storage was selected. None of these storage facilities modeled were cost effective or led to an increase in served demand. The primary reason appears to be that each storage facility modeled required long-term incremental transportation.
- Spire Storage – The Company’s modeling identified this as a potentially cost-effective resource, but Cascade has concerns about the reliability of Spire Storage due to past incidents. Cascade will include an action item in this IRP to evaluate the viability of Spire further prior to the 2022 IRP.

### Impact of Top-Ranking Candidate Portfolio on Unserved Demand

As discussed earlier, the primary metric that all portfolios are evaluated on is unserved demand. If at all feasible, the Top-Ranking Candidate Portfolio must solve for all forecasted shortfalls under expected conditions. Figures 9-20 and 9-21 show the forecasted Peak Day Unserved Demand under expected growth and carbon forecasts. Weather and price are modeled using the risk adjusted methodology referenced in Step 4 of the Supply Resource Optimization Process.

Figure 9-20: Load Centers w/ Deterministic Forecasted Peak Day Unserved Demand in Dekatherms – Top Ranking Candidate Portfolio

| Demand Group        | 2020 | 2021 | 2022  | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
|---------------------|------|------|-------|------|------|------|------|------|------|------|
| Sunnyside           | -    | -    | -     | -    | -    | -    | -    | -    | -    | -    |
| Yakima Loop         | -    | -    | -     | -    | -    | -    | -    | -    | -    | -    |
| Kennewick Loop      | -    | -    | -     | -    | -    | -    | -    | -    | -    | -    |
| Nyssa Ontario       | -    | -    | -     | -    | -    | -    | -    | -    | -    | -    |
| Longview South Loop | -    | -    | -     | -    | -    | -    | -    | -    | -    | -    |
| Bremerton Shelton   | -    | -    | -     | -    | -    | -    | -    | -    | -    | -    |
| Sumas Loop          | -    | -    | -     | -    | -    | -    | -    | -    | -    | -    |
| Bend Loop           | -    | -    | 1,160 | -    | -    | -    | -    | -    | -    | -    |
| Walla Walla         | -    | -    | -     | -    | -    | -    | -    | -    | -    | -    |

Cascade Natural Gas Corporation  
2020 Integrated Resource Plan

| Demand Group        | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 |
|---------------------|------|------|------|------|------|------|------|------|------|------|
| Sunnyside           | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
| Yakima Loop         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
| Kennewick Loop      | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
| Nyssa Ontario       | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
| Longview South Loop | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
| Bremerton Shelton   | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
| Sumas Loop          | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
| Bend Loop           | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
| Walla Walla         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |

Figure 9-21: Oregon Load Centers w/ Deterministic Forecasted Peak Day Unserved Demand in Dekatherms – Top Ranking Candidate Portfolio

| Demand Group | 2020 | 2021 | 2022  | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
|--------------|------|------|-------|------|------|------|------|------|------|------|
| Bend Loop    | -    | -    | 1,160 | -    | -    | -    | -    | -    | -    | -    |

| Demand Group | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 |
|--------------|------|------|------|------|------|------|------|------|------|------|
| Bend Loop    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |

The potential shortfall identified in 2022 is a good example of the importance of pairing qualitative analysis with the quantitative results provided by SENDOUT®. From a regional evaluation of the capacity needs on GTN, the Company is confident in its ability to contract for third party citygate deliveries to serve its customers on a peak day without the need to acquire additional GTN capacity in 2022.



## Portfolio Evaluation: Additional Scenario/Sensitivity Analyses

Figure 9-22 summarizes the net present value of the PVRR of all additional demand scenarios and sensitivities reviewed. After the Candidate Portfolio was selected, the Company tested it stochastically through various extreme situations, which are further explained in Appendix E. As discussed during Cascade’s Supply Resource Optimization Process, the objective of this analysis is to ensure that the costs of the Candidate Portfolio do not exceed the VaR limit in any of the scenarios/sensitivities discussed in Figure 9-3. The results of all scenarios are also shown graphically in Figures 9-23 and 9-24.

Figure 9-22: Total System Cost and Average Cost/Served Therm of Additional Scenarios/Sensitives

| Scenario   | Total System Cost (\$000) | \$/Therm Served | Distance from VaR Limit |
|--|---------------------------|-----------------|-------------------------|
| No Carbon Forecast   | 4,067,388                 | 0.5232          | \$ 1,300,256            |
| SCC Carbon Forecast  | 4,291,633                 | 0.5521          | \$ 1,076,011            |
| Market Choice Carbon Forecast  | 4,219,313                 | 0.5428          | \$ 1,148,331            |
| Price Forecast High  | 4,348,336                 | 0.5594          | \$ 1,019,308            |
| Environmental Adder 0%   | 4,200,421                 | 0.5403          | \$ 1,167,223            |
| Environmental Adder 20%  | 4,402,809                 | 0.5664          | \$ 964,835              |
| Environmental Adder 30%  | 4,498,902                 | 0.5787          | \$ 868,742              |
| Stochastic Carbon  | 4,193,098                 | 0.5394          | \$ 1,174,546            |
| No Evergreen   | N/A*                      | N/A             | N/A                     |
| Low Growth   | 4,094,227                 | 0.5713          | \$ 1,273,417            |
| High Growth  | 4,627,197                 | 0.5478          | \$ 740,447              |
| Limit BC   | 4,470,642                 | 0.5760          | \$ 897,003              |
| No BC  | N/A*                      | N/A             | N/A                     |
| Limit Alberta  | 4,234,825                 | 0.5456          | \$ 1,132,820            |
| No Alberta   | 4,441,634                 | 0.5731          | \$ 926,010              |
| No Rockies   | 4,543,428                 | 0.5957          | \$ 824,216              |
| Limit Rockies  | 4,259,653                 | 0.5488          | \$ 1,107,991            |
| Limit Canada   | 4,419,800                 | 0.5694          | \$ 947,844              |
| No Canada  | N/A*                      | N/A             | N/A                     |
| No Plymouth  | 4,384,592                 | 0.5649          | \$ 983,053              |
| Limit Plymouth   | 4,372,424                 | 0.5633          | \$ 995,220              |
| Limit JP   | 4,397,880                 | 0.5666          | \$ 969,765              |
| No JP  | 4,421,787                 | 0.5697          | \$ 945,857              |
| Limit Mist   | 4,338,902                 | 0.5590          | \$ 1,028,742            |
| No Mist  | 4,339,958                 | 0.5591          | \$ 1,027,687            |
| RNG #1   | 4,275,469                 | 0.5500          | \$ 1,092,175            |
| RNG #2   | 4,273,400                 | 0.5497          | \$ 1,094,244            |
| * Note - SENDOUT® is unable to calculate costs for infeasible Scenarios/Sensitives |                           |                 |                         |

|                  |                  |
|------------------|------------------|
| <b>VaR Limit</b> | <b>5,367,644</b> |
|------------------|------------------|

Figure 9-23: Total System Cost Comparison by Scenarios/Sensitivity

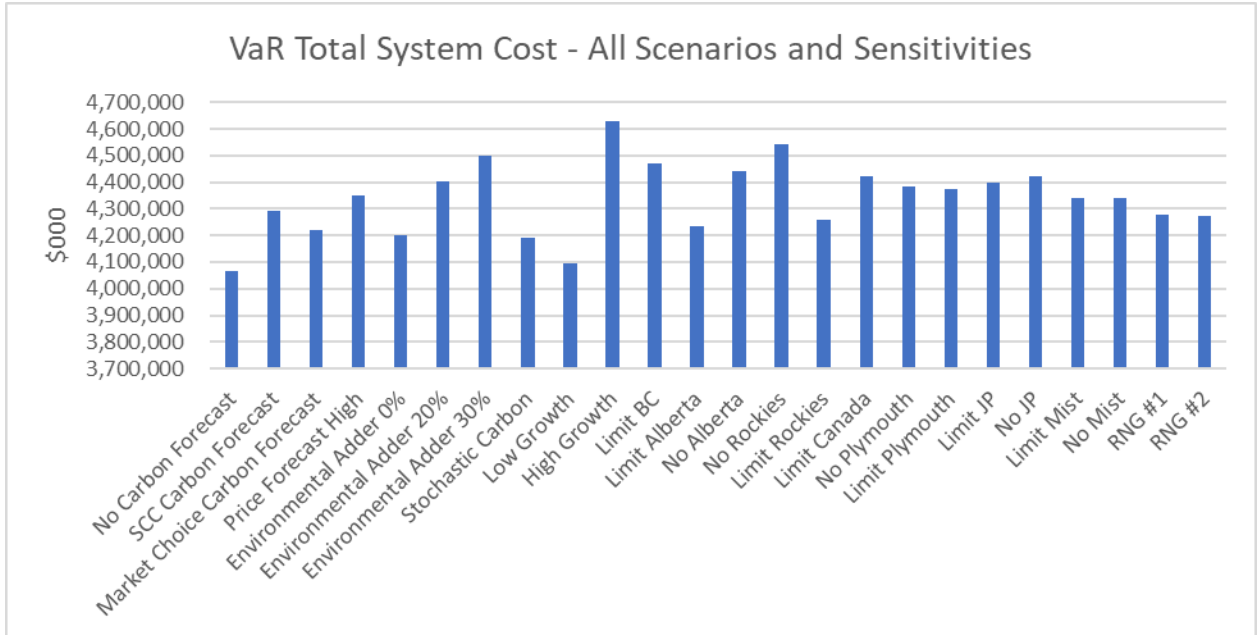
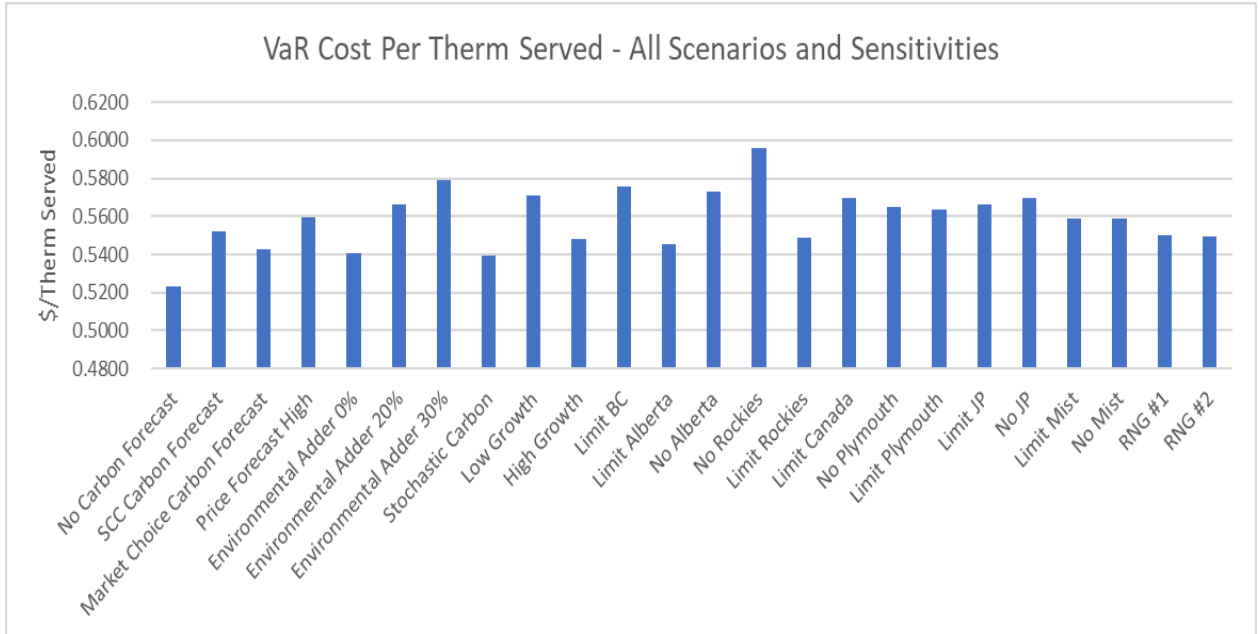


Figure 9-24: Cost per Therm Served by Scenario/Sensitivity



Three scenarios in particular provide intriguing results that merit further discussion: High Growth and Low/no BC.

In Cascade's High Growth Scenario, the Company identifies potential shortfalls systemwide starting in 2035. If these shortfalls were forecasted to occur earlier in the

planning horizon, it could be cause for concern that the Top Ranking Candidate Portfolio is not robust enough to survive near-term variance in the Company’s load projections. Fortunately, the projected deficiency occurs late in the planning horizon, which provides guidance that, if actual growth begins to follow the high growth trajectory, incremental resources may be needed.

While Cascade is hesitant to label scenarios as analogs to real life events, it is worth discussing the limit BC and no BC scenarios in the context of the 2018 Enbridge explosion. The Company’s scenarios assume a permanent impact to supplies at Sumas, while the Enbridge incident only temporarily restricted access to gas in British Columbia. If such an explosion were to cause permanent damage, the data from this scenario analysis would seem to indicate that Cascade’s system could survive restricted access to BC supplies, but would struggle to maintain the capacity to serve customers if Sumas gas were to be fully inaccessible for a sustained period of time.

### Stochastic Analyses - Annual Load Requirements & Weather Uncertainty

The annual load requirements will vary dramatically based on the weather assumptions. Through the use of its new proprietary Monte Carlo functionality, the Company has the ability to analyze the impacts of stochastic weather on its load forecast. Figure 9-25 shows the daily HDD pattern at each of Cascade’s seven weather stations, while Figure 9-26 compares the system weighted stochastic weather to the deterministic system weighted weather profile

Figure 9-25: Stochastic HDDs by Weather Station

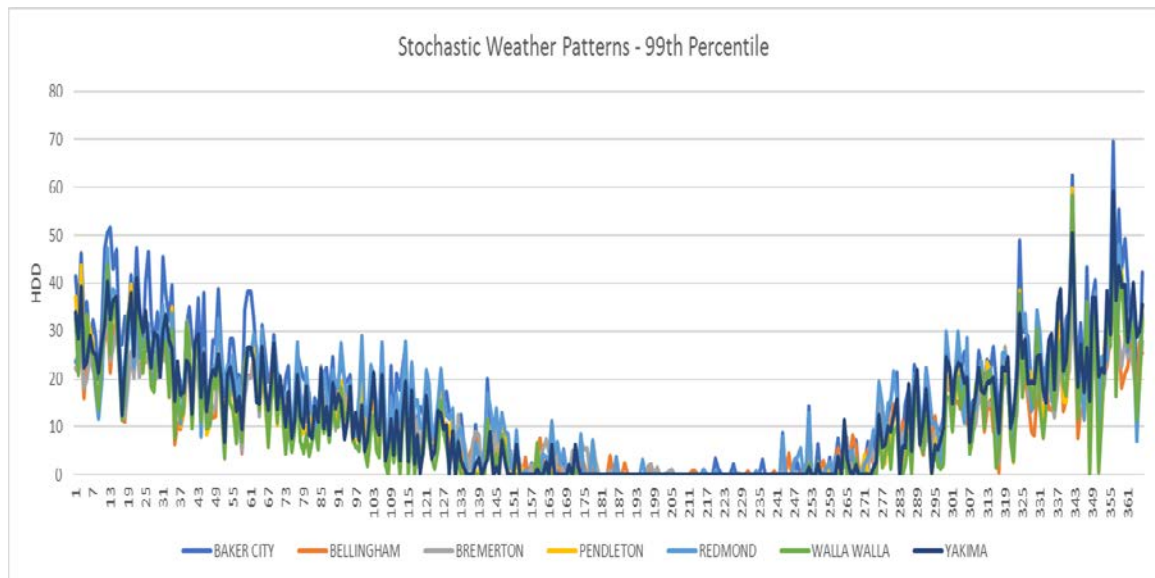
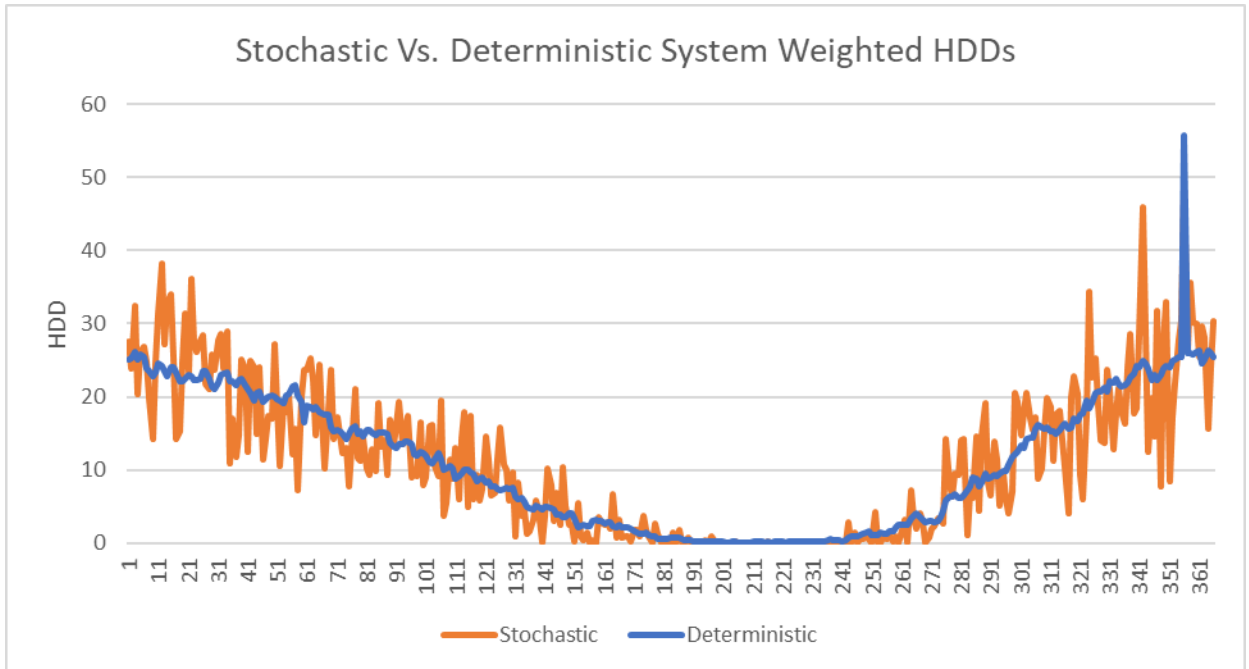


Figure 9-26: Stochastic Vs. Deterministic System Weighted HDDs



### Stochastic Analyses – Price Uncertainty

Similar to weather analysis, uncertainty related to future gas prices can have a significant impact on Cascade forecasted costs over the 20-year planning horizon. The Company analyzes the risk of price projections by running the 99<sup>th</sup> percentile of monthly load weighted prices with a variety of carbon and environmental externality costs as its sensitivity analyses. Figure 9-27 provides a potential price forecast at the 99<sup>th</sup> percentile of possible pricing for each basin. Figure 9-28 compares these forecasts to their deterministic counterparts.

Figure 9-27: 99<sup>th</sup> Percentile Price Forecast by Basin – Monte Carlo Data

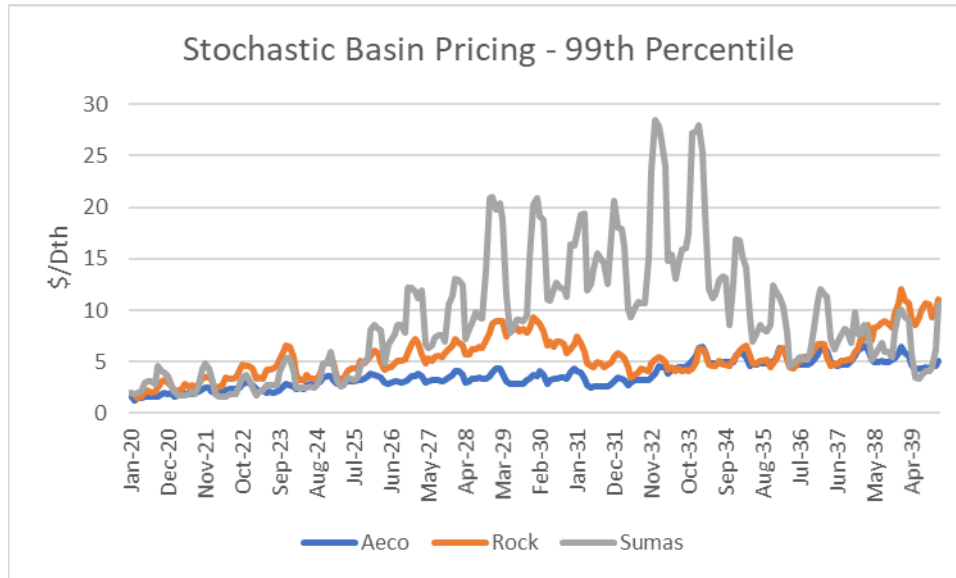
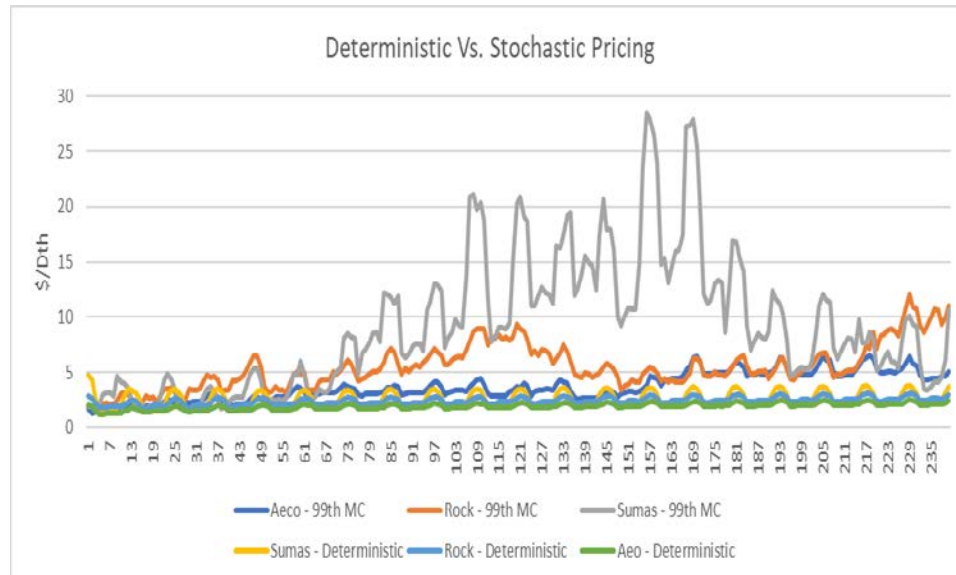


Figure 9-28: Deterministic Vs. Stochastic Pricing



## Conclusion

Cascade’s All-In portfolio includes all existing supply side resources as discussed in Chapter 4, all projected DSM savings discussed in Chapter 6, and all incremental resources discussed in this chapter. This portfolio did not exceed the VaR Limit in any scenarios or sensitivities run by the Company. This allows Cascade to deem this to be the Preferred Portfolio, which is the lowest cost and risk as expected when considering all alternate supply and demand side resources. This is primarily due to

Cascade's geographical spread across the region. The Company's existing long-term transportation contracts, coupled with robust supply basins, provides a base foundation to meet load needs of Cascade's core customers. However, Cascade's unique geographical reach creates particular challenges as the system is non-contiguous, often requiring the Company to hold transportation capacity on multiple upstream pipelines to feed the single upstream pipeline that is connected to a particular citygate.

The High Customer Growth demand analysis provides an opportunity for evaluating demand trajectories relative to the expected scenario. Based on this analysis sufficient time is expected to be available to plan for forecasted resource needs. Even under extreme pricing sensitivities related to the cost of carbon legislation compliance, Cascade has determined that this portfolio solves for resource deficiencies at an acceptable cost. Many events could occur between now and when the first resource needs materialize, so Cascade will employ adaptive management to be prepared. The Company will continue to monitor and analyze system demand through reconciling and comparing forecast to actual customer counts and will continually update and evaluate all demand side and supply-side alternatives.

## **CHAPTER 10**

# **STAKEHOLDER ENGAGEMENT**

## Overview

Input and feedback from Cascade's Technical Advisory Group (TAG) are an important resource for ensuring the IRP includes perspectives beyond the Company's and is responsive to stakeholders' concerns.

### Key Points

- Five TAG meetings were held in multiple locations.
- Multiple opportunities for public participation were available, including access to the Company's Resource Planning Team through phone discussions and email.
- TAG meeting agendas and presentations are available at [www.cngc.com](http://www.cngc.com).

## Approach to Meetings and Workshops

The Company held a series of public meetings, typically in the state of Oregon for the development of this specific IRP. Cascade's IRP stakeholders are widely spread out geographically; cities in Oregon are generally more easily accessible for individuals to attend than Kennewick for TAG meetings. For those unable to travel, all meetings were available by Skype and teleconference. Cascade scheduled five TAG meetings between August 2019 and March 2020. Cascade is offering to hold a TAG 6 after the draft IRP has been distributed and comments are returned to Cascade.

In an effort to further clarify roles and responsibilities for the Company as well as stakeholders, Cascade created a stakeholder engagement document, which can be found in Appendix A. Cascade recognizes that involvement in the Company's TAG represents a material time commitment. The Company appreciates the investment of time attendees provide to this process by reviewing multiple documents and making subsequent suggestions. This IRP has benefited from the focus of the engaged stakeholders.

## Stakeholders

The Company encourages public participation in the IRP process. Participants invited to these public meetings include interested customers, regional upstream pipelines, Pacific Northwest Local Distribution Companies and other utilities, Commission Staff, stakeholder representatives such as the Northwest Gas Association, Oregon Department of Ecology, Public Counsel, Citizens' Utility Board, and the Alliance of Western Energy Consumers.



Internally, the Cascade IRP stakeholders and participants are from the following departments:

- Resource Planning;

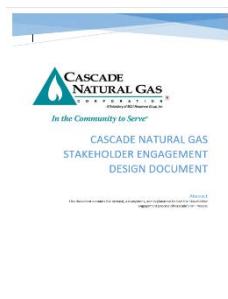


- Gas Supply/Gas Control;
- Regulatory Affairs;
- Operations/Engineering;
- Energy Efficiency;
- Finance/Accounting;
- Information Technology; and
- Executive group.

Additionally, Cascade contracted the services of an IRP consultant, Bruce W Folsom Consulting LLC, to assist the Company with meeting the 2020 IRP schedule.

### **TAG Meetings and Workshops**

Cascade held five public TAG meetings with internal and external stakeholders. In an attempt to get more public participation, Cascade held the first TAG meeting in the city of Bend, which is Cascade's largest service territory in Oregon. Prior to the meeting, Cascade also posted a Facebook campaign inviting the public to participate in the first TAG meeting. Despite those efforts, Cascade did not have anyone from the public join the first TAG meeting. Cascade did reach 3330 people, which means there were 3330 unique viewers of Cascade's Facebook campaign. Robust discussion occurred, in particular, around energy efficiency, carbon, renewable natural gas during TAG 4. This meeting is a good example of stakeholder participation and good input to the Company. Information about each meeting date and major agenda items are provided below as well as in Appendix A.



#### **2020 IRP TAG 1 Meeting – Thursday, August 15, 2019**

- Location: Bend, OR, 9 am to 12 pm
- Process
- Key Points
- IRP Team
- Timeline
- Regional Market Outlook
- Plan for dealing with issues raised in 2018 IRP

#### **2020 IRP TAG 2 Meeting – Thursday, September 5, 2019**

- Location: Salem, OR, 9 am to 12 pm
- Demand and Customer Forecast and Non-Core Outlook
- Drilling down into segments of demand forecast

#### **2020 IRP TAG 3 Meeting – Wednesday, November 6, 2019**

- Location: Kennewick, WA, 9 am to 12 pm
- Presentation from Ruby Pipeline of Kinder Morgan
- Distribution System Planning

- Planned Scenarios and Sensitivities
- Alternative Resources
- Price Forecast
- Avoided Cost
- Current Supply Resources
- Transport Issues.

2020 IRP TAG 4 Meeting – Wednesday, January 15, 2020

- Location: Portland International Airport Conference Center, 9 am to 12 pm
- Carbon Impacts
- Energy Efficiency (Energy Trust of Oregon)
- Renewable Natural Gas
- Preliminary Resource Integration Results

2020 IRP TAG 5 Meeting – Wednesday, March 11, 2020

- Location: Salem, OR, 9 am to 12 pm
- Final Integration Results
- Finalization of plan components
- Four-year Action Plan

2020 IRP TAG 6 Meeting – Tuesday, June 30, 2020

- Location: Microsoft Teams Meeting 1 pm to 1:45 pm
- Cascade's Cost-Effective Evaluation Model for Renewable Natural Gas

### **Opportunity for Public Participation**

Cascade is fully committed to ensuring the public is invited to participate in its IRP process. Cascade has a dedicated Internet webpage where customers and parties can view the IRP timeline, TAG presentations and minutes, as well as current and past IRPs.<sup>1</sup>

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<sup>1</sup> See: <https://www.cngc.com/rates-services/rates-tariffs/oregon-integrated-resource-plan>

## **CHAPTER 11**

### **FOUR-YEAR ACTION PLAN**

## 2020 Action Plan

The Four-Year Action Plan demonstrates Cascade's commitment to implementing the Company's Integrated Resource Plan and creating a portfolio of resources with the reasonable least cost mix of energy supply resources and conservation.

### Key Points

Cascade's 2020 Action Plan focuses on:

- Supply Side Resources
- Environmental Policy
- Avoided Cost
- Demand Side Management
- Renewable Natural Gas
- Distribution System Planning
- IRP Process

## Resource Planning

Cascade recognizes the importance of gathering best practices from other jurisdictional LDCs. To that end, the Company will continue to participate in the IRP process of at least three regional utilities over the course of the next two years with the objective of incorporating aspects that may enhance Cascade's IRP. Cascade will also attempt to get additional stakeholder involvement through convening the IRP TAG meetings in various locations within Cascade's territory, updates to Company website, and/or other means. The Company will also perform cross validation on new methodologies to ensure the accuracy of the new models.

Cascade will also:

- continue to work with Northwest Pipeline to pursue opportunities to better align Maximum Daily Delivery Obligations (MDDO) contract delivery rights at no incremental costs to customers through the use of segmentation or other proposals.
- determine if the temporary Jackson Prairie account JP3 release from Puget Sound Energy should be made permanent.
- continue to work on developing scenarios to replicate potential supply and transport impacts for pipeline operational flow orders (OFO) and consideration of other strategies to minimize OFO impacts.
- continue to develop SENDOUT<sup>®</sup> direct models for gas cost workbooks provided to commissions during PGA filings to better improve the alignment of resources/costs between the PGA and the IRP.
- develop more scenarios to specifically address potential Canadian supply market changes such as diversion of Station 2 supplies to Liquefied Natural Gas and/or Nova Gas Transmission, Limited, and the impact of the Canadian federal fuel charge on the price and potential switching of supply basins utilization/needs of upstream pipeline transportation over time.
- add Renewable Natural Gas as a candidate portfolio for the supply resource optimization process.
- work with Staff and Stakeholders to develop a more effective presentation for the severity of negative outcomes. Cascade will report on the status of this action item when filing the 2021 OR IRP Update.

## **Demand**

Cascade will look into making adjustments to a few methodologies on the demand forecast and scenarios. Those adjustments include:

- Adding wind in the stochastic weather analysis.
- A new methodology for peak day. Cascade's peak day is currently the coldest day in past 30 years. Beginning with the 2022 IRP, Cascade's current peak day will fall outside of the 30-year range.
- The 2021 Annual Update will discuss any potential impacts the COVID-19 crises may have on demand.

## **Environmental Policy**

Cascade will either begin or continue to participate/monitor the following items:

- Continue to support the City of Bend's Climate Action Plan efforts which were approved by the City Council on December 4, 2019.
- Participate in City of Bellingham Climate Action Plan discussions.
- Monitor service areas for potential Greenhouse Gas reduction goal development relating to energy delivery and supply.
- Monitor carbon pricing and policy developments nationally and statewide (i.e., OR ballot measure, 2020 carbon tax or cap and trade bills, Social Cost of Carbon, Market Choice, The Clean Future Act, etc.).
- Monitor federal and state GHG regulation development for energy industry.
- Continuation of current emission reduction and monitoring endeavors (i.e., Methane Challenge Program, Renewable Natural Gas studies).

## **Demand Side Management (Energy Efficiency)**

The Company will examine the impact that changes such as revised building codes, OPUC exemptions granted for non-cost-effective measures, and changes to avoided cost calculations may have on the Company's long- and short-term conservation potential. Success shall be measured by the following:

- The Company shall hold at least one meeting with the Energy Trust to discuss any changes that might affect the Company's energy efficiency therm savings targets, and, if applicable, what actions may need to be taken to comply with or adapt to the changes.
- Cascade will provide a summary of its meeting with the Energy Trust in its 2021 IRP Annual Update. In compliance with OAR 860-021-0400(9), the Company will file an update as soon as is reasonably possible if any changes result in a significant deviation from the 2020 IRP.

- The Company will work with the Energy Trust of Oregon to identify potential areas for expanded engagement in support of local communities' climate action planning goals. These discussions could include consideration of biogas engagement where cost-effective and regulatorily permitted. Findings on how to best support local climate plans will be included in the next IRP.

Cascade will strive to acquire the following amount of cost-effective gas therm savings over the next two years:

Figure 11-1: Cost-effective gas therm savings

|            | 2020      | 2021      | 2022                   | 2023      |
|------------|-----------|-----------|------------------------|-----------|
| Oregon     | 547,244   | 563,251   | 520,166                | 508,325   |
| Washington | 726,625   | 853,253   | 2,041,847 <sup>1</sup> | 2,407,954 |
| Total      | 1,273,869 | 1,416,504 | 2,562,013              | 2,916,279 |

- The Company will acquire cost-effective therm savings by partnering with Energy Trust in Oregon and by delivering programs under the oversight of the Company's Conservation Advisory Group in Washington. Short-term annual therm savings targets are refined annually in Oregon by the Energy Trust through the budgeting process and in Cascade's Conservation Plan, which the Company files each December 1st in Washington.

As an additional action item, the Company will iterate with Energy Trust to identify and target specific areas where Energy Trust programs can alleviate load constraints in order to defer supply side investments in expanding the Company's system. Energy Trust and the Company will work together to set load reduction targets in these areas. Energy Trust will coordinate with the Company to design marketing and program implementation solutions to achieve these targets. The Company will coordinate with Energy Trust to report results and related progress toward achieving these targets to the Oregon Public Utility Commission on an annual basis.

## Renewable Natural Gas

Cascade has begun creating an RNG Project Cost Effectiveness Evaluation Methodology as seen on page 7-6. Due to uncertainty around environmental attributes, as well as other rules and guidelines for RNG, Cascade will continue to develop and update the cost-effective evaluation tool.

<sup>1</sup> The Washington targets for 2022 and 2023 can also be found on page 7-24 in Cascade's 2018 Integrated Resource Plan (Docket UG-171186). The Company is currently finalizing an update to its Conservation Potential Assessment via AEG which will change the Washington cost-effective gas therm savings. The OPUC will have access to the updated numbers when the next WA IRP is filed in February 2021.

### **Distribution System Planning**

The Company has provided a list of projects that require an increase in capacity as shown in Appendix I. Over the next four years, Cascade plans to construct citygate upgrades in Bend and Prineville. A few of the other projects include pipe upgrades as well as increased pipe capacity, while continuing to maintain compliance with Maximum Allowable Operation Pressure regulations.

Figure 11-1 on the following page highlights specific activities of the 2020 Action Plan.

Cascade Natural Gas Corporation  
2020 Integrated Resource Plan

Figure 11-1: Highlights of 2020 Action Plan

| Functional Area              | Anticipated Action   | Timing                              |
|------------------------------|--|-------------------------------------|
| Resource Planning            | <p>Cascade will:</p> <ul style="list-style-type: none"> <li>attend other regional LDC IRP meetings;</li> <li>work with NWP on realigning MDDOs;</li> <li>determine if the temporary Jackson Prairie contract should be made permanent;</li> <li>develop modeling scenarios that represent Pipeline OFOs;</li> <li>improve the alignment of resource/costs between the PGA and the IRP;</li> <li>develop more scenarios that address changing Canadian Markets;</li> <li>add RNG as a candidate portfolio; and</li> <li>work with Staff and Stakeholders to develop a more effective presentation for the severity of negative outcomes. Cascade will report on the status of this action item when filing the 2021 OR IRP Update.</li> </ul>   | Ongoing, for inclusion in 2022 IRP. |
| Demand                       | <p>Cascade will look into making adjustments to a few methodologies on the demand forecast and scenarios. Those adjustments include:</p> <ul style="list-style-type: none"> <li>Adding wind in the stochastic weather analysis; and</li> <li>A new methodology for peak day.</li> </ul>  | Ongoing, for inclusion in 2022 IRP. |
| Environmental Policy         | <p>Cascade will either begin or continue to participate/monitor the following items:</p> <ul style="list-style-type: none"> <li>Continue to support the City of Bend's Climate Action Plan;</li> <li>Participate in City of Bellingham Climate Action Plan discussions;</li> <li>Monitor service areas for potential GHG reduction goal development relating to energy delivery and supply;</li> <li>Monitor carbon pricing and policy developments nationally and statewide;</li> <li>Monitor federal and state GHG regulation development for energy industry; and</li> <li>Continuation of current emission reduction and monitoring endeavors.</li> </ul>  | Ongoing, for inclusion in 2022 IRP. |
| DSM (Energy Efficiency)      | The Company will execute the Demand Side Management action items as described on page 11-3 and 11-4.   | Ongoing, for inclusion in 2022 IRP. |
| Renewable Natural Gas        | Cascade will continue to develop and update the cost-effective evaluation tool.  | Ongoing, for inclusion in 2022 IRP. |
| Distribution System Planning | <p>These projects are budgeted over the next five years:</p> <ul style="list-style-type: none"> <li>FP-306990 - PENDLETON 4" IP REINFORCEMENT</li> <li>FP-306991 - PENDLETON 4" HP REINFORCEMENT</li> <li>FP-306992 - PENDLETON KORVOLA ROAD 4"</li> <li>FP-316851 - South Hermiston to Feedville</li> <li>FP-316854 - BEND GATE REBUILD</li> <li>FP-316863 - Prineville Gate Rebuild</li> <li>FP-317586 - RF-REDM-6"S-4,750'-VETERANS WY</li> <li>FP-318466 - RF-Baker-GT-NW Baker Gate</li> <li>FP-318468 - RF-Baker-GT-NW Baker Regulation</li> <li>FP-318469 - RF-Baker-GT-NW Baker Gate Odorizer</li> <li>FP-318475 - RF-Baker-GT-NW Baker GT Line</li> <li>FP-318682 - RF-BEND-6"S-1100'-SHEVLIN PK</li> <li>FP-318733 - RF-BEND-6"S-2MI-SHEVLIN PK</li> <li>FP-318737 - RF-BEND-R-SHEVLIN PK RD 2"</li> <li>FP-318741 - RF-BEND-6"PE-1200'-PONDEROSA ST</li> <li>FP-318744 - RP-PRINEVILLE-GT-TRANSCANADA</li> <li>FP-318745 - RP-BEND-GT-TRANSCANADA</li> <li>FP-318770 - RF-REDM-R-VETERANS WAY-2" STD</li> </ul> | Ongoing over the next five years.   |



## **CHAPTER 12**

## **GLOSSARY AND MAPS**

## **Glossary of Definitions and Acronyms**

The glossary is provided to allow the reader to maintain a location of definitions and acronyms for the content provided in this Integrated Resource Plan. Definitions and Acronyms can be found on pages 12-2 through 12-16. Cascade's citygates and the zone and pipeline each gate is associated with are listed on pages 12-17 through 12-19. Pipeline maps of gas systems that Cascade utilizes are provided on pages 12-20 through 12-33.

### **ABB™**

Add-in product to the SENDOUT® model that facilitates the ability to model gas price and load uncertainty (driven by weather) into the future. ABB™ brings a Monte Carlo approach into the linear programming approach utilized in SENDOUT®.

### **ACEEE**

American Council for an Energy-Efficient Economy.

### **ACHIEVABLE POTENTIAL**

Represents a realistic assessment of expected energy savings, recognizing and accounting for economic and other constraints that preclude full installation of every identified conservation measure.

### **AECO INDEX**

Alberta Canada natural gas trading price.

### **AKAIKE INFORMATION CRITERION (AIC)**

A measure of the relative quality of statistical models for a given set of data. Given a collection of models for the data, AIC estimates the quality of each model, relative to each of the other models. Hence, AIC provides a means for model selection.

### **ANNUAL FUEL UTILIZATION EFFICIENCY (AFUE)**

Thermal efficiency measure of combustion equipment like furnaces, boilers, and water heaters.

### **ANNUAL MEASURES**

Conservation measures that achieve generally uniform year-round energy savings independent of weather temperature changes. Annual measures are also often called base load measures.

### **ARIMA MODELING**

Autoregressive integrated moving average. A time series analysis technique employed by Cascade in its demand and customer forecast.

**ASSET MANAGEMENT AGREEMENT (AMA)**

An arrangement that an LDC may enter into with a marketing company to assist with transportation and storage assistance.

**AVOIDED COST**

Marginal cost of serving the next unit of demand, which is saved through conservation efforts.

**BASE LOAD**

As applied to natural gas, a given demand for natural gas that remains fairly constant over a period of time, usually not temperature sensitive.

**BASE LOAD MEASURES**

Conservation measures that achieve generally uniform year-round energy savings independent of weather temperature changes. Base load measures are also often called annual measures.

**BIO NATURAL GAS (BNG)**

Typically refers to a gas produced by the biological breakdown of organic matter in the absence of oxygen.

**BRITISH THERMAL UNIT (BTU)**

The amount of heat required to raise the temperature of one pound of pure water one-degree Fahrenheit under stated conditions of pressure and temperature; a therm of natural gas has an energy value of 100,000 BTUs and is approximately equivalent to 100 cubic feet of natural gas.

**CANADIAN ENERGY REGULATOR (CER)**

The Canadian equivalent to the Federal Energy Regulatory Commission (FERC). The CER replaced the National Energy Board (NEB) on August 14, 2019.

**CHOLESKY DECOMPOSITION**

A positive-definite covariance matrix. This matrix is used to draw or sample random vectors from the N-dimensional multivariate normal distribution that follow a desired distribution. This allows for correlations between weather zones to be included when drawing or sampling data distributions for Monte Carlo runs.

**CITYGATE (ALSO KNOWN AS GATE STATION OR PIPELINE DELIVERY POINT)**

The point at which natural gas deliveries transfer from the interstate pipelines to Cascade's distribution system.

**CITYGATE LOOP**

Two or more citygates that transfer natural gas from the interstate pipeline to the same distribution system. Citygates are combined into a loop for modeling purposes because it is difficult to distinguish which citygate feeds a certain distribution system.

**CLEAN AIR RULE (CAR)**

Greenhouse gas emissions standards codified in WAC 173-442. Invalidated Dec. 15, 2017.

**COEFFICIENT OF PERFORMANCE (COP)**

The coefficient of performance or COP of a heat pump, refrigerator or air conditioning system is a ratio of useful heating or cooling provided to work required. Higher COPs equate to lower operating costs.

**COMPRESSION**

Increasing the pressure of natural gas in a pipeline by means of a mechanically driven compressor station to increase flow capacity.

**COMPRESSOR**

Equipment which pressurizes gas to keep it moving through the pipelines.

**CONSERVATION MEASURES**

Installations of appliances, products, or facility upgrades that result in energy savings.

**CONSUMER PRICE INDEX (CPI)**

As calculated and published by the U.S. Department of Labor, Bureau of Labor Statistics.

**CONTRACT DEMAND (CD)**

The maximum daily, monthly, seasonal, or annual quantities of natural gas, which the supplier agrees to furnish, or the pipeline agrees to transport, and for which the buyer or shipper agrees to pay a demand charge.

**CORE CUSTOMERS**

Residential, firm industrial and commercial gas customers who require utility gas service.

**COST EFFECTIVENESS**

The determination of whether the present value of the therm savings for any given conservation measure is greater than the cost to achieve the savings.

**CUSTOMER CARE & BILLING (CC&B)**

Internal billing data system for Cascade Natural Gas.

**DAY GAS**

Gas that can be purchased as needed to cover demand in excess of the base load.

**DEKATHERM (DTH)**

Unit of measurement for natural gas; a dekatherm is 10 therms, which is 1000 cubic feet (volume) or 1,000,000 BTUs (energy).

**DEMAND SIDE MANAGEMENT (DSM)**

The activity pursued by an energy utility to influence its customers to reduce their energy consumption or change their patterns of energy use away from peak consumption periods.

**DEMAND SIDE RESOURCES**

Energy resources obtained through assisting customers to reduce their demand or use of natural gas. Also represents the aggregate energy savings attained from installation of conservation measures.

**ELECTRONIC BULLETIN BOARD (EBB)**

Online communication systems where one can share, request, or discuss information on just about any subject.

**ENERGY INFORMATION ADMINISTRATION (EIA)**

The U.S. Energy Information Administration (EIA) is a principal agency of the U.S. Federal Statistical System responsible for collecting, analyzing, and disseminating energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment. EIA programs cover data on coal, petroleum, natural gas, electric, renewable and nuclear energy. EIA is part of the U.S. Department of Energy.

**ENTITLEMENTS**

Flow management tool used by upstream pipelines, in conjunction with operational flow orders.

**EXTERNALITIES**

Costs and benefits that are not reflected in the price paid for goods or services.

**FEDERAL ENERGY REGULATORY COMMISSION (FERC)**

The government agency charged with the regulation and oversight of interstate natural gas pipelines, wholesale electric rates and hydroelectric licensing; the FERC regulates the interstate pipelines with which Cascade does business and determines rates charged in interstate transactions.

**FIRM SERVICE OR FIRM TRANSPORTATION**

Service offered to customers under schedules or contracts that anticipate no interruptions; the highest quality of service offered to customers.

**FIRST OF THE MONTH PRICE (FOM)**

Supply contracts entered into on a short-term basis to cover expected demand for that month.

**FORCE MAJEURE**

An unexpected event or occurrence not within the control of the parties to a contract, which alters the application of the terms of a contract; sometimes referred to as "an act of God;" examples include severe weather, war, strikes, pipeline failure, and other similar events.

**FOURIER TERMS**

An alternative to using seasonal dummy variables, especially for long seasonal periods, is to use Fourier terms. Fourier terms consist of a series of sine and cosine terms of frequencies that can approximate any periodic function. These terms can be used for seasonal patterns with great advantage over seasonal dummy variables.

**FUEL-IN-KIND (FUEL LOSS)**

A statutory percent of gas based on the tariff from the pipeline that is lost and unaccounted for from the point where the gas was purchased to the citygate.

**FUGITIVE METHANE EMISSIONS**

Natural gas that escapes the system during drilling, extraction, and/or transportation and distribution of gas.

**GAS MANAGEMENT SYSTEM (GMS)**

A transactional and reporting system to consolidate natural gas nominations, contracts, balancing and pricing data.

**GAS SUPPLY OVERSIGHT COMMITTEE (GSOC)**

Oversees the Company's gas supply purchasing and hedging strategy. Members of GSOC include Company senior management from Gas Supply, Regulatory, Accounting & Finance, Engineering, and Operations.

**GAS TRANSMISSION NORTHWEST (GTN)**

A subsidiary of TransCanada Pipeline which owns and operates a natural gas pipeline that runs from the Canada/U.S. border to the Oregon/California border. One of the six natural gas pipelines Cascade transacts with directly.

**GAUSSIAN (NORMAL) DISTRIBUTION**

A distribution of many random variables that form a symmetrical bell-shaped graph.

**GEOMETRIC BROWNIAN MOTION (GBM)**

A continuous-time stochastic process in which the log of the randomly varying quantity follows a random shock combined with a drift element.

**GREENHOUSE GAS (GHG)**

A greenhouse gas is a gas that absorbs and emits radiant energy within the thermal infrared range. Increasing greenhouse gas emissions cause the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide and ozone.

**HEATING DEGREE DAY (HDD)**

A measure of the coldness of the weather experienced, based on the extent to which the daily average temperature falls below 60 degrees Fahrenheit; a daily average temperature representing the sum of the high and low readings divided by two.

**HENRY HUB (NYMEX)**

The physical location found in Louisiana that is widely recognized as the most important pricing point in the United States. It is also the trading hub for the New York Mercantile Exchange (NYMEX).

**INJECTION**

The process of putting natural gas into a storage facility or biomethane into the distribution system.

**INTEGRATED RESOURCE PLAN (IRP)**

The document that explains Cascade's long-range plans and preparations to maintain sufficient resources to meet customer needs at a reasonable price.

**INTERRUPTIBLE SERVICE**

A service of lower priority than firm service, offered to customers under schedules or contracts that anticipate and permit interruptions on short notice; interruption occurs when the demand of all firm customers exceeds the capability of the system to continue deliveries to all firm customers.

**INTERSTATE PIPELINE**

A federally regulated company that transports and/or sells natural gas across state lines.

**JACKSON PRAIRIE**

An underground storage facility jointly owned by Avista Corp., Puget Sound Energy, and NWP. The facility is a naturally occurring aquifer near Chehalis, Washington, which is located some 1,800 feet beneath the surface and capped with a very thick layer of dense shale.

**LINEAR PROGRAMMING**

A mathematical method of solving problems by means of linear functions where the multiple variables involved are subject to constraints; this method is utilized in the SENDOUT® Gas Model.

**LIQUEFIED NATURAL GAS (LNG)**

Natural gas that has been liquefied by reducing its temperature to minus 260 degrees Fahrenheit at atmospheric pressure. It is liquefied to reduce its volume and thereby facilitate bulk storage and transport.

**LOAD FACTOR**

The average load of a customer, a group of customers, or an entire system, divided by the maximum load factor that can be calculated over any time period.

**LOAD FORECAST**

A forecast, an estimate, or a prediction of how much gas will be needed for residences, companies, and other institutions.

**LOAD MANAGEMENT**

The reduction of peak demand during specific, limited time periods by temporarily curtailing usage or shifting usage to other time periods. Load management reduces system peak demand very well, but can have little or no effect on total energy use. Its effects are temporary and of short duration.

**LOAD PROFILE**

The pattern of a customer's gas usage, hour to hour, day to day, or month to month.

**LOADMAP**

Microsoft Excel-based modeling tool developed by AEG to determine the Technical/Economic/Achievable Potential savings of various proposed DSM programs

**LOCAL DISTRIBUTION COMPANY (LDC)**

LDCs are regulated utilities involved in the delivery of natural gas to consumers within a specific geographic area.

**LOOPING**

The construction of a second pipeline parallel to an existing pipeline over the whole or any part of its length, thus increasing the capacity of that section of the system.

**LOWEST REASONABLE COST (LRC)**

LRC methodology is used when evaluating alternatives to determine the optimal solution to a given problem.



**MCF**

A unit of volume equal to 1,000 cubic feet.

**MDDO**

Maximum daily delivery obligation.

**MDQ**

Maximum daily quantity.

**MDT**

Thousands of dekatherms.

**MEMORANDUM OF UNDERSTANDING (MOU)**

A memorandum of understanding (MOU) is a nonbinding agreement between two or more parties outlining the terms and details of an understanding, including each parties' requirements and responsibilities. An MOU is often the first stage in the formation of a formal contract.

**MONTE CARLO ANALYSIS**

A type of stochastic mathematical simulation which randomly and repeatedly samples input distributions (e.g. reservoir properties) to generate a results distribution.

**NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)**

A United States environmental law that promotes the enhancement of the environment and established the President's Council on Environmental Quality (CEQ). The law was enacted on January 1, 1970.

**NATURAL GAS**

A naturally occurring mixture of hydrocarbon and non-hydrocarbon gases found in porous geologic formations beneath the earth's surface, often in association with petroleum; the principal constituent is methane, and it is lighter than air.

**NEEDLE PEAKING RESOURCE**

Utilized during severe or "arctic" cold weather.

**NEW YORK MERCANTILE EXCHANGE (NYMEX)**

An organization that facilitates the trading of several commodities including natural gas.

**NGV**

Natural gas vehicles.

**NOMINAL**

Discounting method that does not adjust for inflation.

**NOMINATION**

The scheduling of daily natural gas requirements.

**NON-COINCIDENT PEAK**

The sum of two or more peak loads on individual systems that do not occur in the same time interval. Meaningful only when considering loads within a limited period of time, such as a day, week, month, a heating or cooling season, and usually for not more than one year.

**NON-CORE CUSTOMER**

Large customers who contract with a third party for supply and upstream pipeline capacity. Cascade provides distribution services only. Typical customers include large commercial, industrial, cogeneration, wholesale, and electric generation customers.

**NORTH AMERICAN ENERGY STANDARDS BOARD (NAESB)**

Serves as an industry forum for the development and promotion of standards which will lead to a seamless marketplace for wholesale and retail natural gas and electricity, as recognized by its customers, business community, participants, and regulatory entities.

**NORTHWEST BUILDER OPTION PACKAGES (NWBOP)**

A prescriptive method for labeling new homes as ENERGY STAR. BOPs specify levels and limitations for the thermal envelope (insulation and windows), HVAC and water heating equipment efficiencies for the Pacific Northwest. BOPs require a third-party verification, including testing the leakage of the envelope and duct system, to ensure the requirements have been met.

**NORTHWEST GAS ASSOCIATION (NWGA)**

A trade organization of the Pacific Northwest natural gas industry. The NWGA's members include six natural gas utilities serving communities throughout Idaho, Oregon, Washington and British Columbia; and three natural gas transmission pipelines that transport natural gas from supply basins into and through the region.

**NORTHWEST PIPELINE CORPORATION (NWP)**

A principal interstate pipeline serving the Pacific Northwest and one of six natural gas pipelines Cascade transacts with directly. NWP is a subsidiary of The Williams Companies and is headquartered in Salt Lake City, Utah.

**NORTHWEST POWER AND CONSERVATION COUNCIL (NWPCC)**

NWPCC consists of two members from each of the four Northwest states- Oregon, Washington, Idaho and Montana- who develop a plan for meeting the region's electric demand.

**NOVA GAS TRANSMISSION (NOVA or NGTL)**

See TransCanada Alberta System.

**OFF-SYSTEM**

Any point not on or directly interconnected with a transportation, storage, and/or distribution system operated by a natural gas company within a state.

**OPAL (OPAL HUB)**

Natural gas trading hub in Lincoln County, Wyoming.

**OPERATIONAL FLOW ORDER (OFO)**

A mechanism to protect the operational integrity of the pipeline. Upstream pipelines may issue and implement System-Wide or Customer-Specific OFOs in the event of high or low pipeline inventory. OFOs require shippers to take action to balance their supply with their customers' usage on a daily basis within a specified tolerance band. Shippers may deliver additional supply or limit supply delivered to match usage. Violations or failure to comply with an OFO can result in the pipeline assessing penalties to offending shippers.

**OREGON PUBLIC UTILITY COMMISSION (OPUC)**

The chief electric, gas and telephone utility regulatory agency of the government of the U.S. state of Oregon. It sets rates and establishes rules of operation for the state's investor-owned utility companies. The OPUC's official name is Public Utility Commission of Oregon.

**PACIFIC CONNECTOR GAS PIPELINE PROJECT (PCGP)**

A proposed 232-mile, 36-inch diameter pipeline designed to transport up to 1 billion cubic feet of natural gas per day from interconnects near Malin, Oregon, to the Jordan Cove LNG terminal in Coos Bay, Oregon, where the natural gas will be liquefied for transport to international markets

**PEAK DAY**

The greatest total natural gas demand forecasted in a 24-hour period used as a basis for planning peak capacity requirements.

**PEAK DAY GAS**

Gas that is purchased in a peak day situation to serve demand that cannot be satisfied by base or day gas.

**PERFORMANCE TESTED COMFORT SYSTEMS (PTCS)**

Northwest regional programs with a focus on improving HVAC system comfort and increasing savings. They promote contractor training for properly sealing ducts and installing high-efficiency heat pumps, with a focus on sizing, commissioning, and setting controls. Technicians must complete a BPA-approved training to be certified to perform work in this program. These programs are supported by BPA and Northwest Public Utilities.

**POUNDS PER SQUARE INCH (PSI)**

The standard unit of measure when determining how much pressure is being applied when gas is flowing through a pipe.

**PREFERRED PORTFOLIO**

Cascade's term of art for the optimal mix of resources to solve for forecasted shortfalls in the 20-year planning horizon.

**PRESENT VALUE OF REVENUE REQUIREMENT (PVRR)**

The annual revenues required by the firm to cover both its expenses and have the opportunity to earn a fair rate of return. The annual costs to provide safe and reliable service to the company's customers that the company is allowed to recover through rates. The present value a future sum of money or stream of cash flows given a specified rate of return. Future cash flows are discounted at the discount rate, and the higher the discount rate, the lower the present value of the future cash flows.

**PRICE ELASTICITY**

Economic concept which recognizes that customer consumption changes as prices rise or fall.

**R**

A programming language and free software environment for statistical computing and graphics supported by the R Foundation for Statistical Computing.

**REAL**

Discounting method that adjusts for inflation.

**RECOURSE RATE**

Cost-of-service based rate for natural gas pipeline service that is on file in a pipeline's tariff and is available to customers who do not negotiate a rate with the pipeline company. Also see negotiated rate. (Source: FERC <https://www.ferc.gov/resources/glossary.asp#R>)

**REFERENCE CASE**

Average annual demand from the forecast results without peak day.

**REGASIFICATION RESOURCE**

Process by which LNG is heated, converting it to a gaseous state. Designed for vaporizing LNG where and when it will be used.

**REGULATOR STATION**

A point on a distribution system responsible for controlling the flow of gas from higher to lower pressures.

**RENEWABLE FUEL**

A power source that is continuously or cyclically renewed by nature, i.e. solar, wind, hydroelectric, geothermal, biomass, or similar sources of energy.

**ROCKIES INDEX**

Natural gas trading price near the Rocky Mountains.

**SATELLITE LNG FACILITIES**

A facility for storing and vaporizing LNG to meet relatively modest demands at remote locations or to meet short-term peak demands. LNG is usually trucked to such facilities.

**SEASONAL PEAKING SERVICE**

The delivery of gas, firm or interruptible, sold only during certain times of the year, generally when system demands are not high.

**SENDOUT<sup>®</sup>**

Natural gas planning system from ABB<sup>™</sup>; a linear programming model used to solve gas supply and transportation optimization questions.

**SERVICE TERRITORY**

Territory in which a utility system is required or has the right to provide natural gas service to ultimate customers.

**SPOT MARKET GAS**

Natural gas purchased under short-term agreements as available on the open market; prices are set by market pressure of supply and demand.

**STANDBY**

Support service that is available, as needed, to supplement a consumer, a utility system, or to another utility to replace normally scheduled energy that becomes unavailable.

**STORAGE**

The utilization of facilities for storing natural gas which has been transferred from its original location for the purposes of serving peak loads, load balancing, and the optimization of basis differentials. The facilities are usually natural geological reservoirs such as depleted oil or natural gas fields or water-bearing sands sealed on the top by an impermeable cap rock. The facilities may be man-made or natural caverns. LNG storage facilities generally utilize above ground insulated tanks.

**SUMAS INDEX**

Natural gas trading price near the city of Sumas, which is on the Washington/Canadian border approximately 25 miles from the Pacific Ocean.

**SWAP**

A financial instrument where parties agree to exchange an index price for a fixed price over a defined period.

**SYNERGI®**

Engineering software used to model piping and facilities to represent current pressure and flow conditions, while also predicting future events and growth.

**TARIFF**

A published volume of regulated rate schedules plus general terms and conditions under which a product or service will be supplied.

**TECHNICAL ADVISORY GROUP (TAG)**

Industry, customer, and regulatory representatives that advise Cascade during the IRP planning process.

**TECHNICAL POTENTIAL**

An estimate of all energy savings that could theoretically be accomplished if every customer that could potentially install a conservation measure did so without consideration of market barriers such as cost and customer awareness.

**THERM**

A unit of heating value used with natural gas that is equivalent to 100,000 British thermal units (BTU); also, approximately equivalent to 100 cubic feet of natural gas.

**THROUGHPUT**

The total of all natural gas volume moved through a pipeline system, including sales, company use, storage, transportation, and exchange.

**TOTAL RESOURCE COST (TRC)**

Measures the net costs of a demand side management program as a resource option based on the total costs of the program, including both the participants' and the utility's costs. The test is applicable to conservation, load management, and fuel substitution programs.

**TRANSCANADA ALBERTA SYSTEM**

Previously known as NOVA Gas Transmission (NGTL); a natural gas gathering and transmission corporation in Alberta that delivers natural gas into the TransCanada BC System pipeline at the Alberta/British Columbia border; one of six natural gas pipelines Cascade transacts with directly.

### **TRANSCANADA BC SYSTEM**

Also known as Foothills Pipeline. Previously known as Alberta Natural Gas; a natural gas transmission corporation of British Columbia that delivers natural gas between the TransCanada-Alberta System and GTN pipelines that runs from the Alberta/British Columbia border to the United States border; one of six natural gas pipelines Cascade transacts with directly.

### **TRANSPORTATION GAS**

Natural gas purchased either directly from the producer or through a broker, and used for either system supply or for specific end-use customers, depending on the transportation arrangements; NWP and GTN transportation may be firm or interruptible.

### **TRANSPORTATION SERVICE AGREEMENT (TSA)**

A transportation services agreement is a contract made between goods providers and those who offer transportation for those goods. In the context of the IRP, this refers to shippers and upstream pipelines.

### **TURN-BACK CAPACITY**

When natural gas shippers, upon expiration of their contract(s) for pipeline capacity do not renew capacity rights, in whole or in part, with the original pipeline, return said capacity rights back to the pipeline.

### **UPSTREAM PIPELINE CAPACITY**

The pipeline delivering natural gas to another pipeline at an interconnection point where the second pipeline is closer to the consumer. In the context of the IRP this refers to any transmission pipeline that is upstream of the Cascade distribution system.

### **VALUE AT RISK (VaR)**

A metric used to quantify uncertainty into a tangible number.

### **WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION (WUTC)**

A three-member commission appointed by the governor and confirmed by the state senate. The Commission's mission is to protect the people of Washington by ensuring that investor-owned utility and transportation services are safe, available, reliable and fairly priced.

### **WINTER GAS SUPPLIES**

Gas supply purchased for all (base gas) or part (day gas) of the heating season.

### **WITHDRAWAL**

The process of removing natural gas from a storage facility, making it available for delivery into the connected pipelines; vaporization is necessary to make withdrawals from an LNG plant.

**WOODS & POOLE (W&P)**

An independent firm that specializes in long-term county economic and demographic projections.

**ZONE**

A geographical area. A geological zone means an interval of strata of the geologic column that has distinguishing characteristics from surrounding strata.

**ZONE - IRP**

For modeling purposes, Cascade's distribution system is divided into several zones. These zones are generally organized by the location of compressor stations on upstream pipelines or by specific weather areas. Where appropriate, the Zone-IRP is separated by state. Please see the chart on the next page that references the citygate/location to the appropriate IRP zone.



Cascade Natural Gas Corporation  
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| DESCRIPTION                | METER            | ZONEID         | PIPELINE |
|----------------------------|------------------|----------------|----------|
| 7TH DAY ADVENTIST FARM TAP | ADVENSCH         | ZONE 10        | NWP      |
| A & M RENDERING            | AMRENDER         | ZONE 30-<br>W  | NWP      |
| A & W FEED LOT FARM TAP    | AWFEED           | ZONE 20        | NWP      |
| ABERDEEN/HOQUIAM/MCCLEARY  | ABRNDHOQ         | ZONE 30-S      | NWP      |
| ACME                       | ACME             | ZONE 30-<br>W  | NWP      |
| ALCOA, WENATCHEE           | ALCOA            | ZONE 11        | NWP      |
| ARLINGTON                  | ARLINGTN         | ZONE 30-<br>W  | NWP      |
| ATHENA/WESTON              | ATHENA           | ZONE ME-<br>OR | NWP      |
| BAKER                      | BAKER            | ZONE 24        | NWP      |
| BELLINGHAM II              | BLLINGII         | ZONE 30-<br>W  | NWP      |
| BELLINGHAM/FERNDALE        | BLHAM            | ZONE 30-<br>W  | NWP      |
| BEND TAP                   | BEND             | ZONE GTN       | GTN      |
| BREMERTON (SHELTON)        | BREMERTON        | ZONE 30-S      | NWP      |
| BRULOTTE HOP RANCH         | BRULOTTE         | ZONE 10        | NWP      |
| BURBANK HEIGHTS            | BURBANKH         | ZONE 20        | NWP      |
| CASTLE ROCK                | CASTLERK         | ZONE 26        | NWP      |
| CHEMICAL LIME              | CHEMLIME         | ZONE 24        | NWP      |
| CHEMULT                    | CHEM             | ZONE GTN       | GTN      |
| DEHANN'S DAIRY FARM TAP    | DEHANDRY         | ZONE 10        | NWP      |
| DEMING                     | DEMING           | ZONE 30-<br>W  | NWP      |
| EAST STANWOOD              | EAST<br>STANWOOD | ZONE 30-<br>W  | NWP      |
| FINLEY                     | FINLEY           | ZONE 20        | NWP      |
| GILCHRIST TAP              | GILC             | ZONE GTN       | GTN      |
| GRANDVIEW                  | GRDVEW           | ZONE 10        | NWP      |
| GREEN CIRCLE FARM TAP      | GRENCIRL         | ZONE 26        | NWP      |
| HERMISTON                  | HERMSTON         | ZONE ME-<br>OR | NWP      |
| HUNTINGTON                 | HTINGTON         | ZONE 24        | NWP      |
| KALAMA FARM TAP            | KALAMA           | ZONE 26        | NWP      |
| KALAMA NO. 2               | KALAMA2          | ZONE 26        | NWP      |
| KAWECKI, WENATCHEE         | KAWECKI          | ZONE 11        | NWP      |
| KENNEWICK                  | KENEWICK         | ZONE 20        | NWP      |
| KOMOS FARMS TAP            | KOMO             | ZONE GTN       | GTN      |
| LA PINE TAP                | LAPI             | ZONE GTN       | GTN      |
| LAMBERT'S HORTICULTURE     | LAMBERTS         | ZONE 10        | NWP      |

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|                           |           |                |     |
|---------------------------|-----------|----------------|-----|
| LAWRENCE                  | LAWRENCE  | ZONE 30-<br>W  | NWP |
| LDS CHURCH FARM TAP       | LDSCHURC  | ZONE 30-<br>W  | NWP |
| LONGVIEW-KELSO            | LONGVIEW  | ZONE 26        | NWP |
| LYNDEN                    | LYNDEN    | ZONE 30-<br>W  | NWP |
| MADRAS TAP                | MADR      | ZONE GTN       | GTN |
| MENAN STARCH              | MEMANSTR  | ZONE 20        | NWP |
| MILTON FREEWATER          | MILFREE   | ZONE ME-<br>OR | NWP |
| MISSION TAP               | MISSION   | ZONE ME-<br>OR | NWP |
| MOSES LAKE                | MOS LAKE  | ZONE 20        | NWP |
| MOUNT VERNON              | MTVERNON  | ZONE 30-<br>W  | NWP |
| MOXEE CITY                | MOXEE     | ZONE 11        | NWP |
| NORTH BEND                | NBEND     | ZONE GTN       | GTN |
| NORTH PASCO METER STATION | NPASCO    | ZONE 20        | NWP |
| NYSSA-ONTARIO             | NYSSA     | ZONE 24        | NWP |
| OAK HARBOR/STANWOOD       | OAKHAR    | ZONE 30-<br>W  | NWP |
| OTHELLO                   | OTHELLO   | ZONE 20        | NWP |
| PASCO                     | PASCO     | ZONE 20        | NWP |
| PATERSON                  | PATERSON  | ZONE 26        | NWP |
| PENDLETON                 | PENDLETN  | ZONE ME-<br>OR | NWP |
| PLYMOUTH                  | PLYMTH    | ZONE 20        | NWP |
| PRINEVILLE TAP            | PRVL      | ZONE GTN       | GTN |
| PRONGHORN TAP             | PRONGHORN | ZONE GTN       | GTN |
| PROSSER                   | PROSSER   | ZONE 10        | NWP |
| QUINCY                    | QUINCY    | ZONE 11        | NWP |
| REDMOND TAP               | REDM      | ZONE GTN       | GTN |
| RICHLAND                  | RICHLAND  | ZONE 20        | NWP |
| SANDVIK, KENNEWICK        | SANDVIK   | ZONE 20        | NWP |
| SEDRO/WOOLLEY ET AL.      | SEDRO     | ZONE 30-<br>W  | NWP |
| SELAH                     | SELAH     | ZONE 11        | NWP |
| SOUTHRIDGE                | STHRDG    | ZONE 20        | NWP |
| SOUTH BEND                | S BEND    | ZONE GTN       | GTN |
| SOUTH HERMISTON TAP       | SHRM      | ZONE GTN       | GTN |
| SOUTH LONGVIEW FIBRE      | SOLONG    | ZONE 26        | NWP |
| STANFIELD CITY TAP        | STTAP     | ZONE GTN       | GTN |

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|                           |          |                |     |
|---------------------------|----------|----------------|-----|
| STEARNS TAP               | STEA     | ZONE GTN       | GTN |
| SUMAS, CITY OF            | SUMASC   | ZONE 30-<br>W  | NWP |
| SUNNYSIDE                 | SUNSIDE  | ZONE 10        | NWP |
| TOPPENISH ET AL. (ZILLAH) | TOPENISH | ZONE 10        | NWP |
| U & I SUGAR, MOSES LAKE   | UI SUGAR | ZONE 20        | NWP |
| UMATILLA                  | UMATILLA | ZONE ME-<br>WA | NWP |
| WALLA WALLA               | WALLA    | ZONE ME-<br>WA | NWP |
| WALULA                    | WALULA   | ZONE ME-<br>WA | GTN |
| WENATCHEE                 | WENATCHE | ZONE 11        | NWP |
| WOODLAND WA               | WOODLAND | ZONE 26        | NWP |
| YAKIMA CHIEF FARMS        | YAKCHFRM | ZONE 11        | NWP |
| YAKIMA FIRING CENTER      | YAKFIRCR | ZONE 11        | NWP |
| YAKIMA/UNION GAP          | YAKIMA   | ZONE 11        | NWP |

## Maps of System Infrastructure

Figure 12-1: Map – AECO Hub Storage

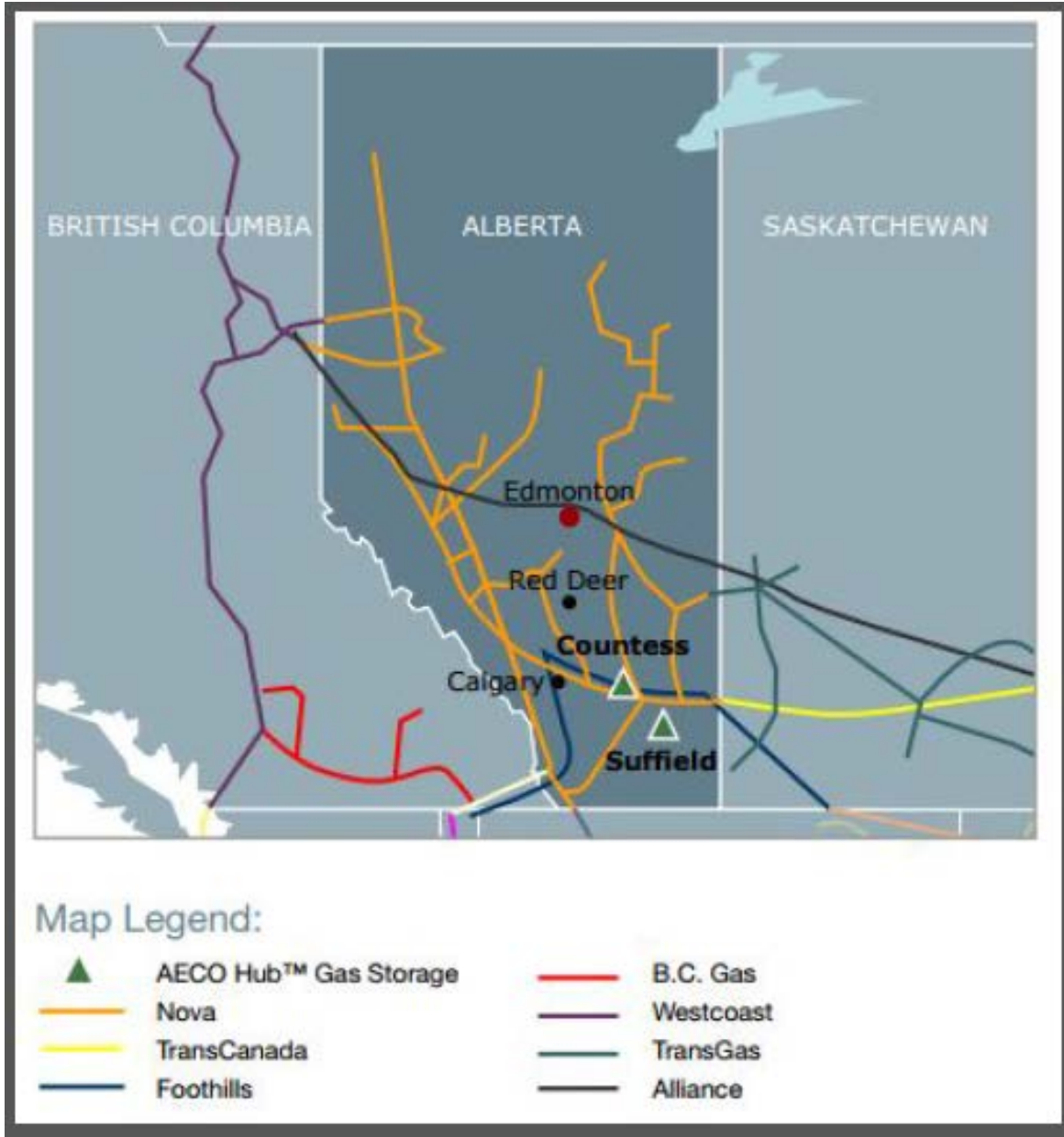


Figure 12-2: Map – California Storage Map



Figure 12-3: Map – Cascade Natural Gas Pipeline System

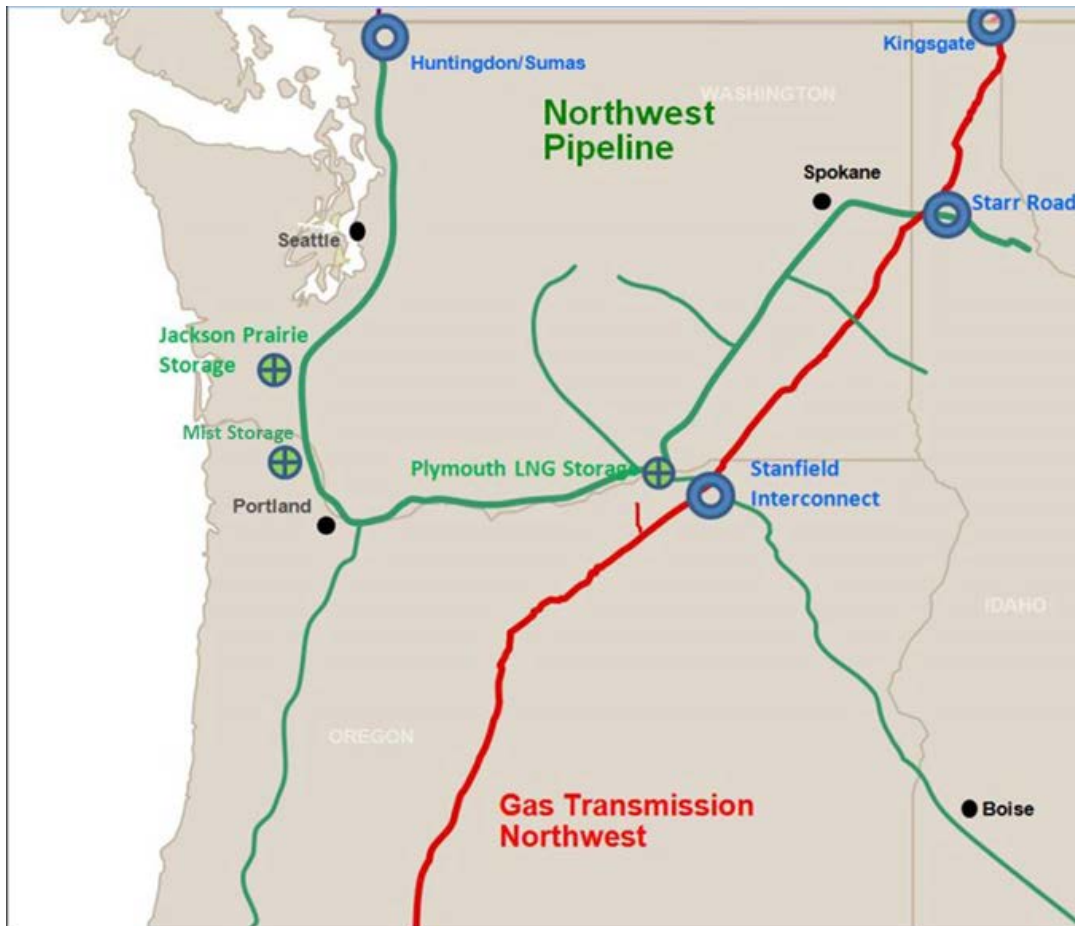


Figure 12-4: Map – Foothills-British Columbia Map

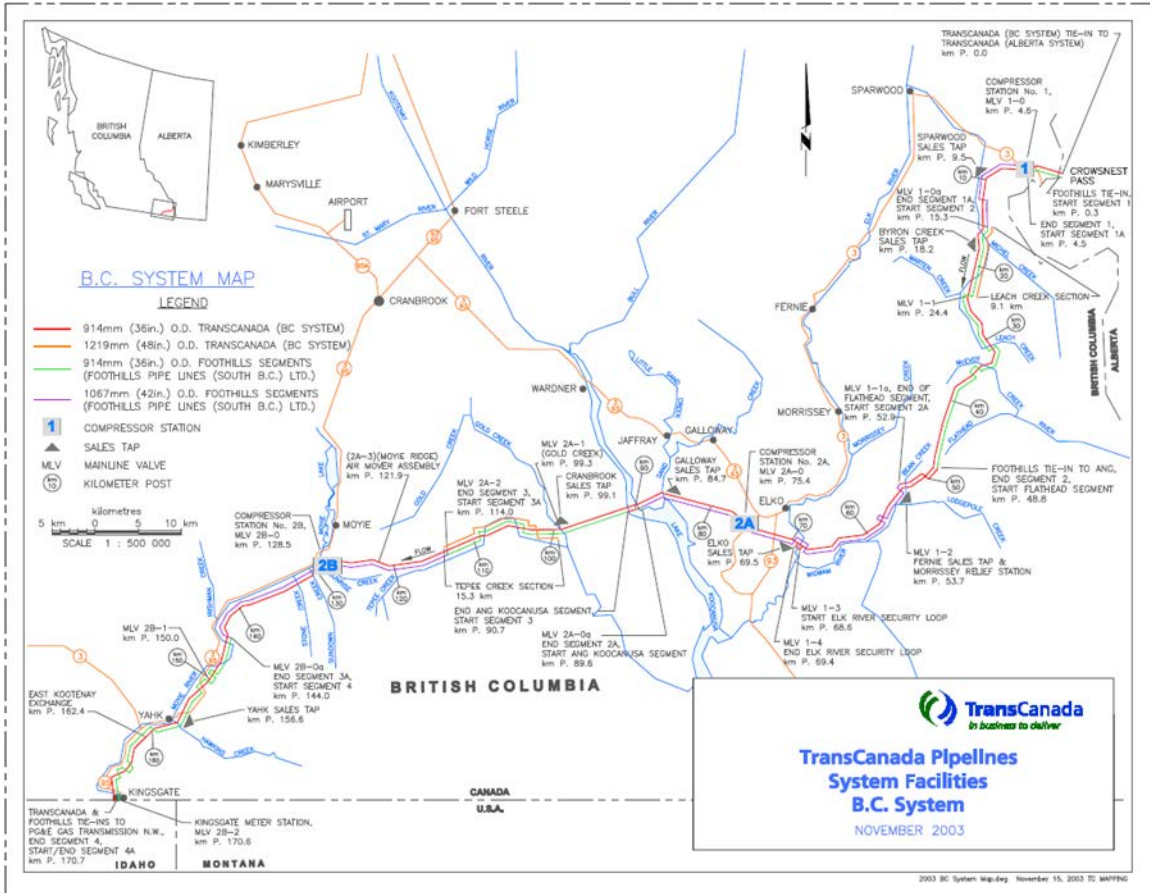


Figure 12-5: Map – Foothills-Full System

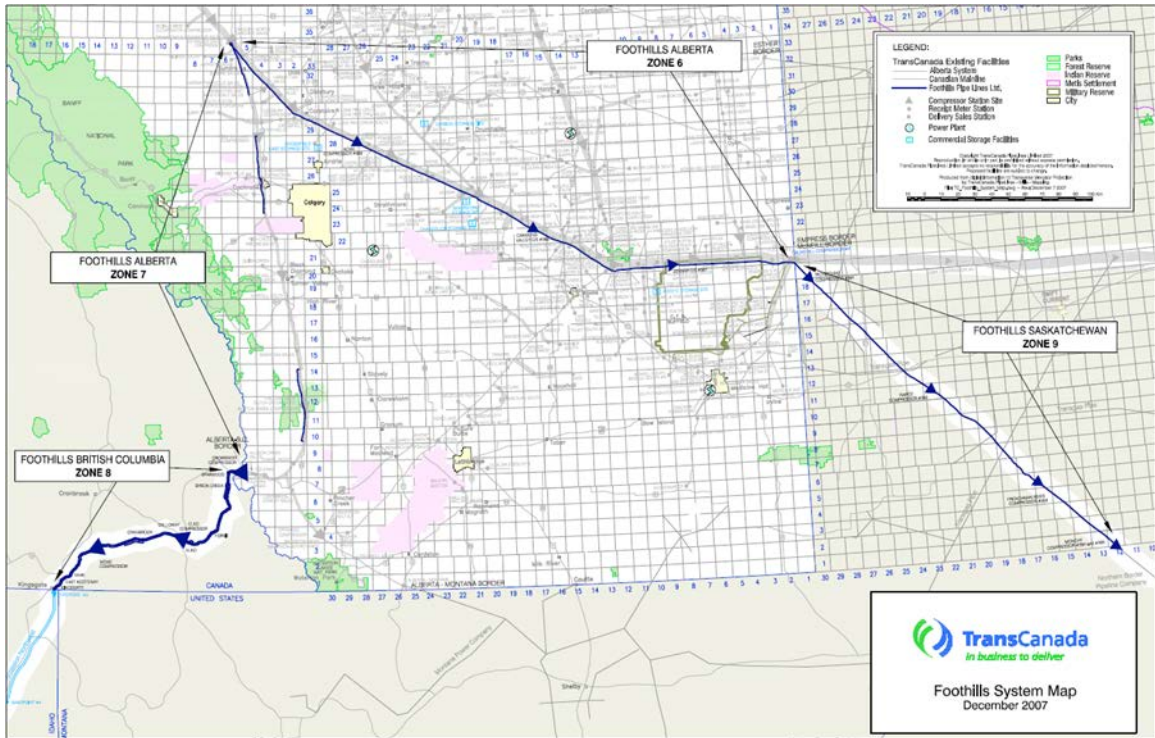




Figure 12-6: Map – GTN System Map

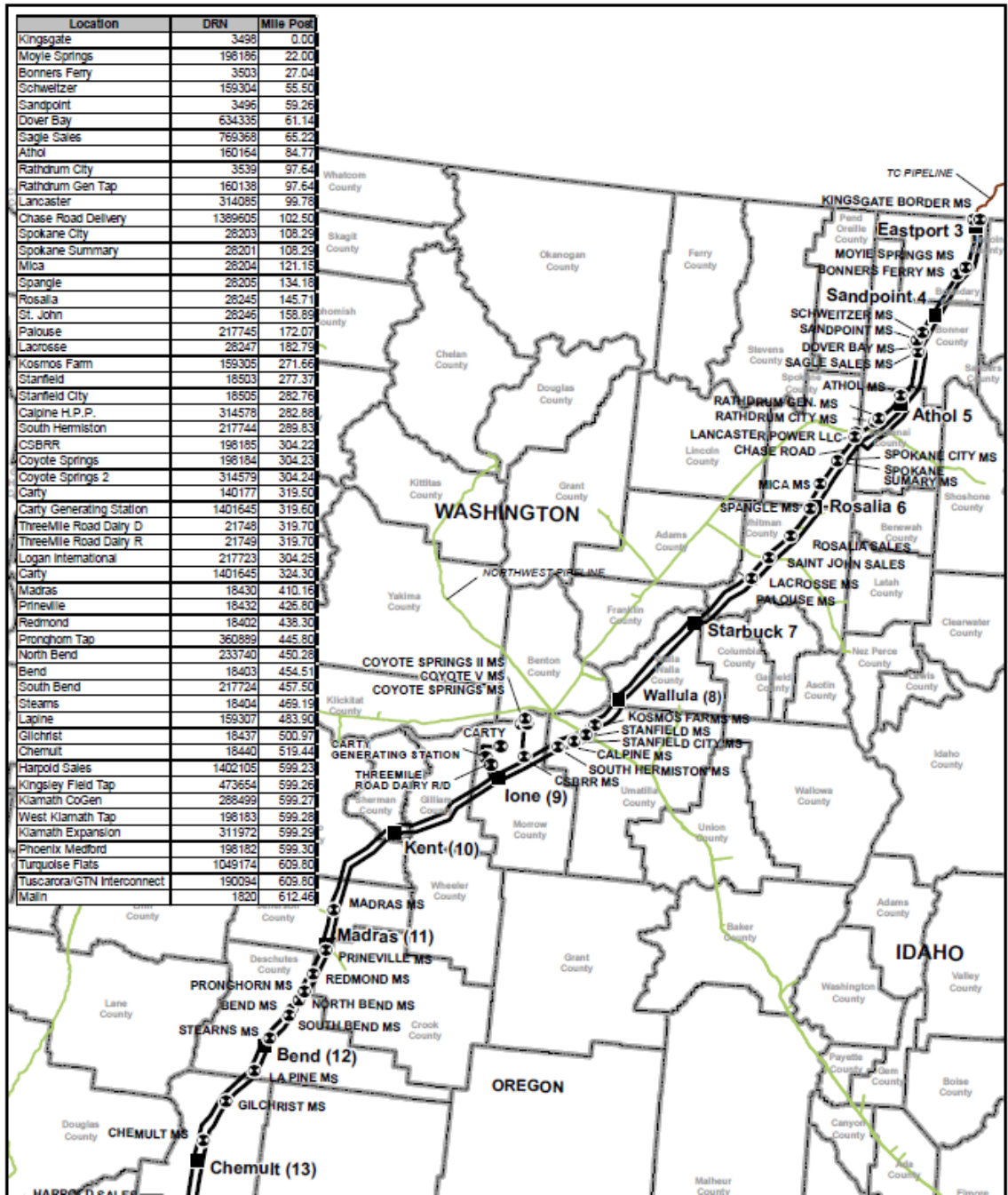
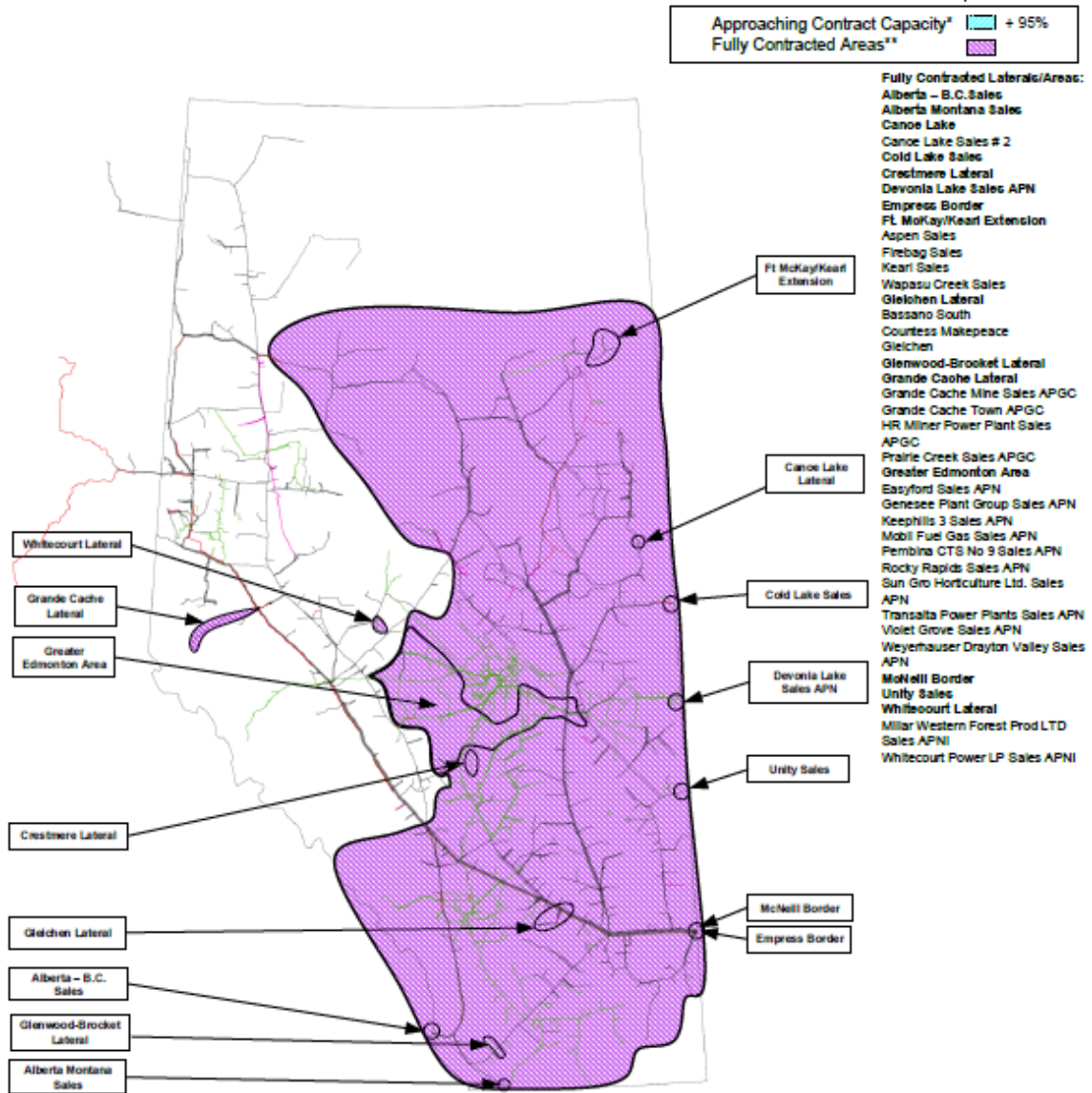


Figure 12-7: Map – NGTL Delivery System Map

### TC Energy's NGTL System FT-R Availability Map for May 2020

Note: The areas identified on this map are either Approaching Contract Capacity or Fully Contracted (see definitions below). This information is a snap shot as of May 4 2020 and is subject to change. Please contact your Customer Account Manager for clarification or additional information.

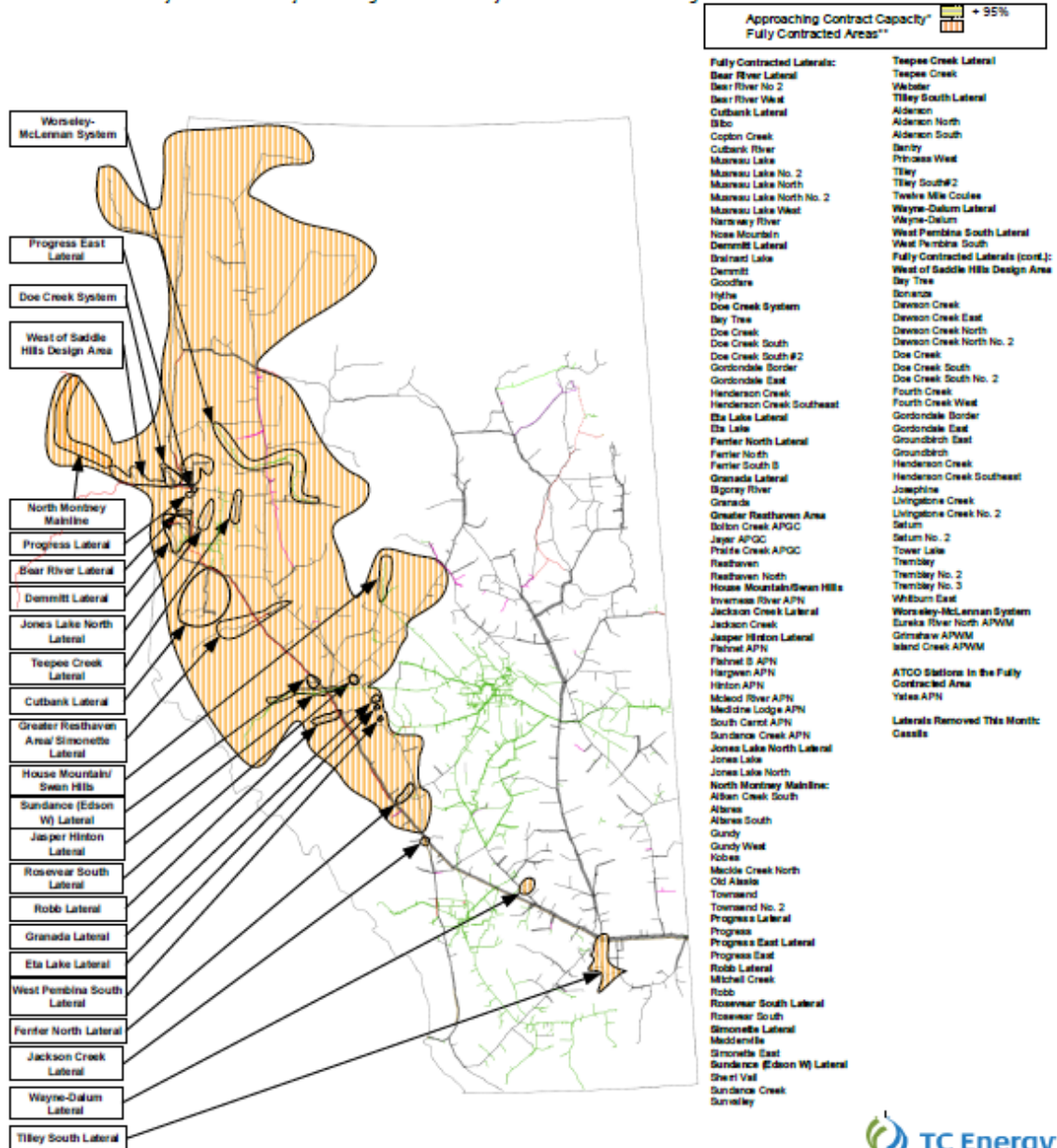


|  |   |
|--|---|
| Approaching Contract Capacity*   | Contracts are greater than 95% of the area or facility capability. It is recommended that Firm Transfers or New Firm Contracts be confirmed with TCPL Customer Sales.   |
| Fully Contracted**   | Area is fully contracted. Firm Transfers allowed within restricted area; upstream at 1 to 1 ratio and downstream at determined hydraulic equivalence. New requests for Firm Transportation service will be held pending availability of Area capacity. For additional information refer to the informational Postings on Customer Express, Project Area Receipt and Delivery Capacity Update. <b>Last Updated: May 4 2020</b> |
| Capacity within any portion of the NGTL System can become fully contracted at any time and without prior notice. NGTL encourages customers to review their FT-D requirements to ensure that their FT-D levels align with their expected flow requirements. |   |

Figure 12-8: Map – NGTL Receipt System Map

### TC Energy's NGTL System FT-R Availability Map for May 2020

Note: The areas identified on this map are either Approaching Contract Capacity or Fully Contracted (see definitions below). This information is a snap shot as of May 4 2020 and is subject to change. Please contact your Customer Account Manager for clarification or additional information.



|  |   |
|--|---|
| Approaching Contract Capacity*   | Contracts are greater than 95% of the area or facility capability. Firm Transfers or New Firm to be confirmed with TCPL Customer Sales.   |
| FTR Fully Contracted*  | Area is fully contracted. Firm Transfers allowed within restricted area; upstream at 1 to 1 ratio and downstream at determined hydraulic equivalence. New requests for Firm Transportation service will be held pending availability of Area capacity. For additional information refer to the informational Postings on Customer Express, Project Area Receipt and Delivery Capacity Update. <b>Last Updated: May 4 2020</b> |
| Capacity within any portion of the NGTL System can become fully contracted at any time and without prior notice. NGTL encourages customers to review their future FT-R requirements to ensure their FT-R levels align with their expected flow requirements. New changes to the fully contracted stations list this month are identified in red. |   |



Figure 12-9: Map – NWP North System Map

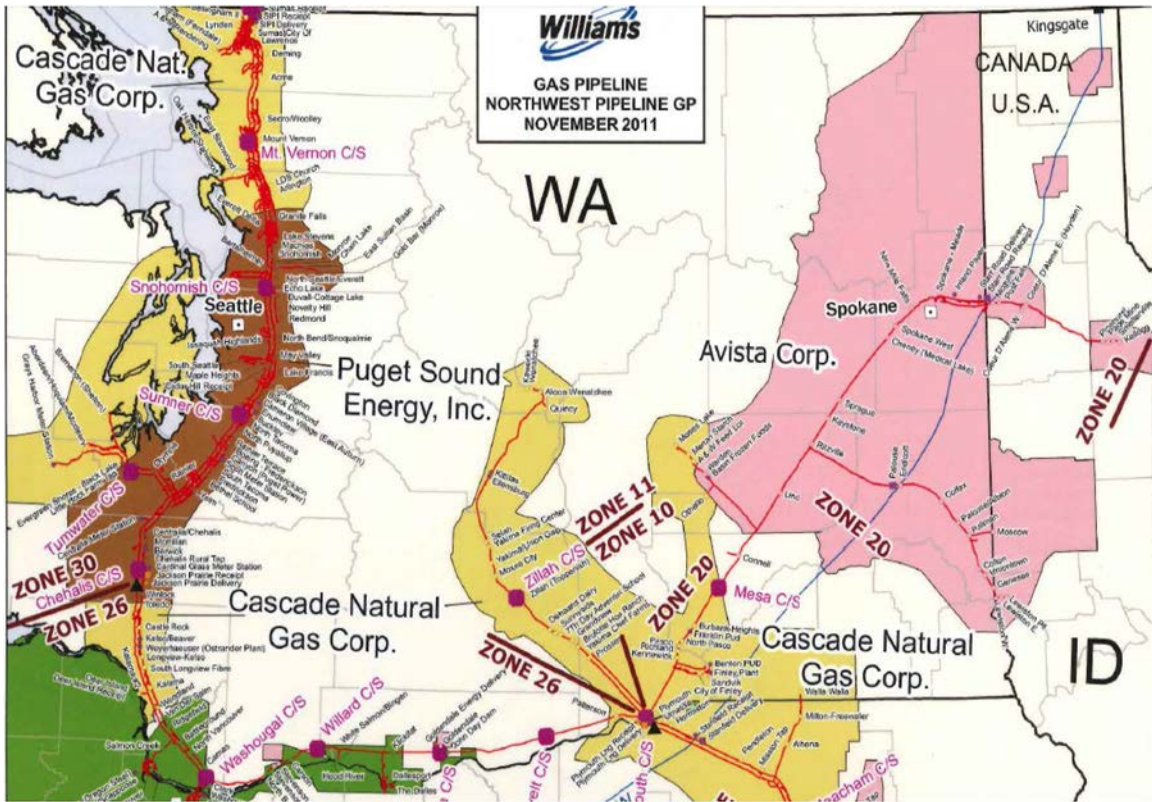


Figure 12-10: Map – NWP South System Map

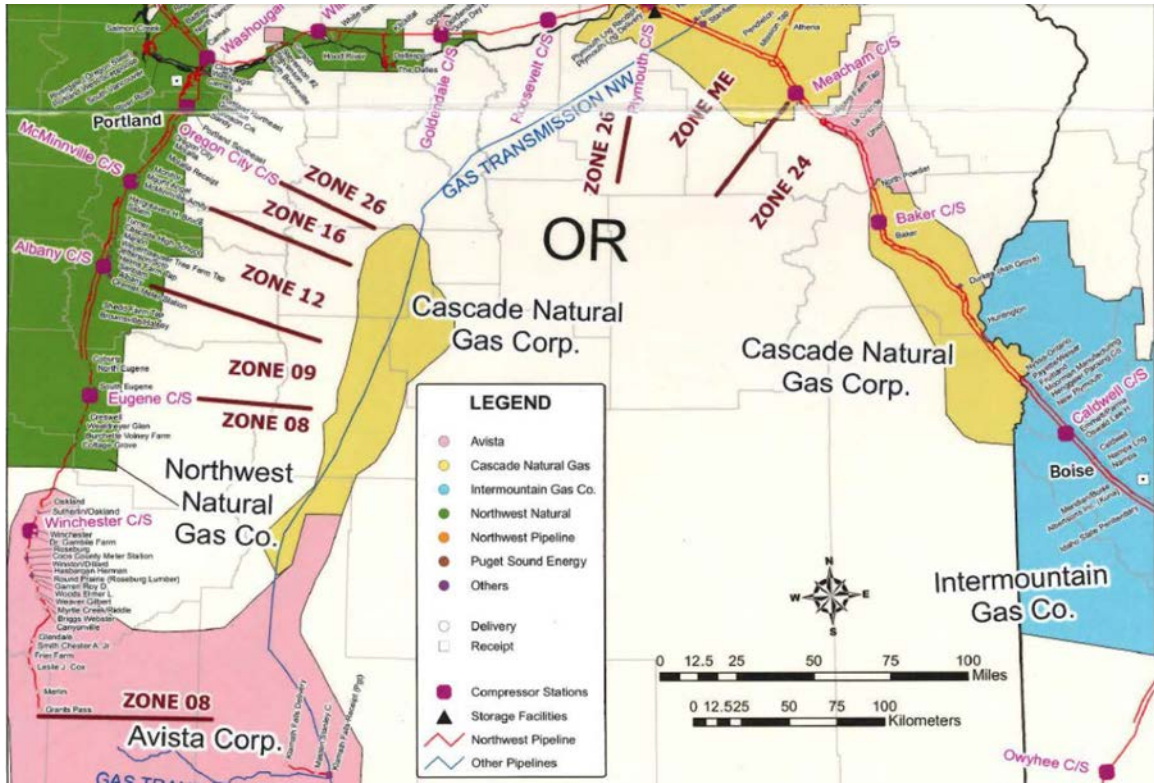


Figure 12-11: Map – Westcoast Sectional Map

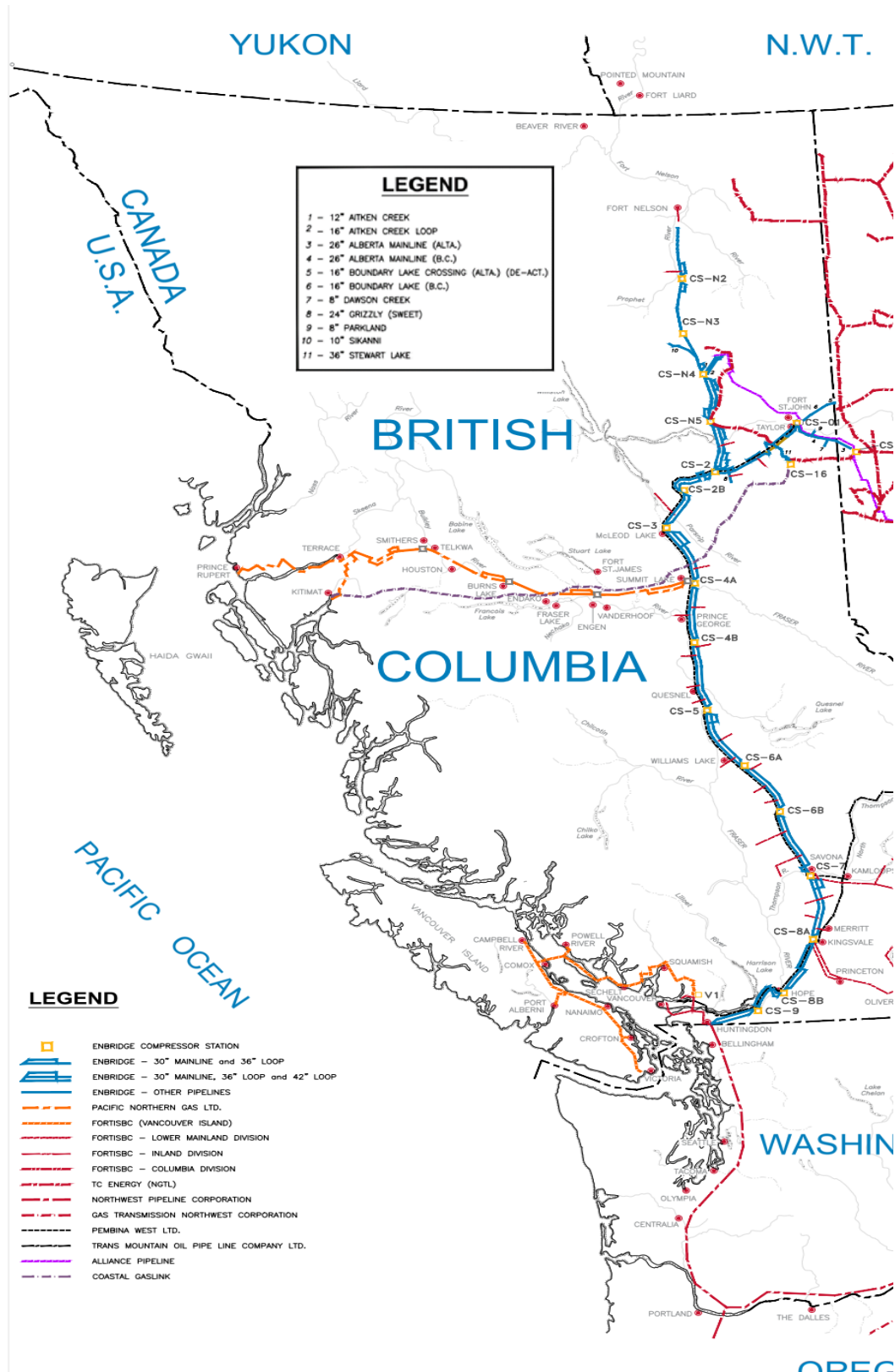


Figure 12-12: Map – Western U.S. and Canadian Pipeline Map

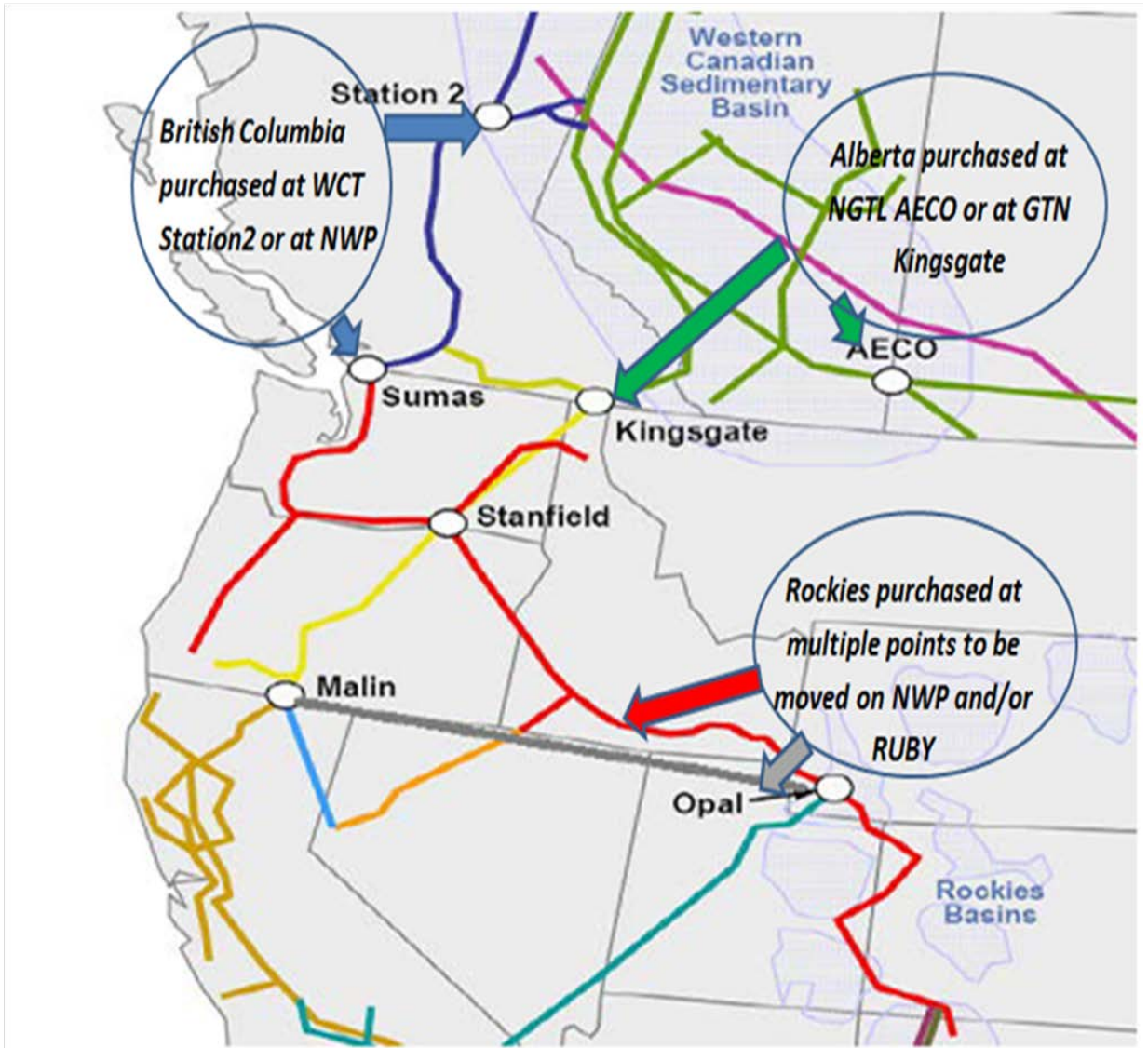
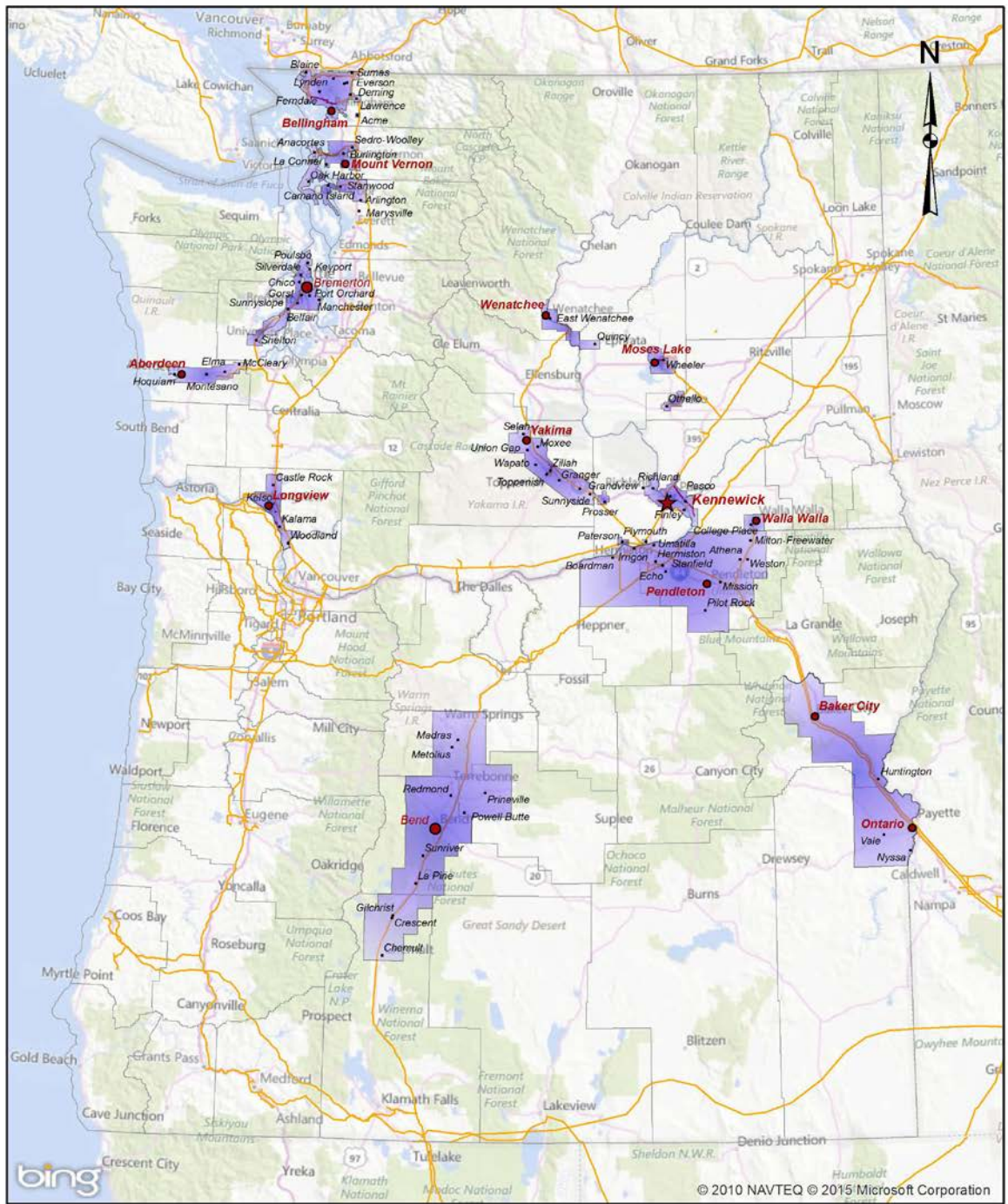


Figure 12-13: Map – Certificated Service Areas as Specified in RCW 80.28.190



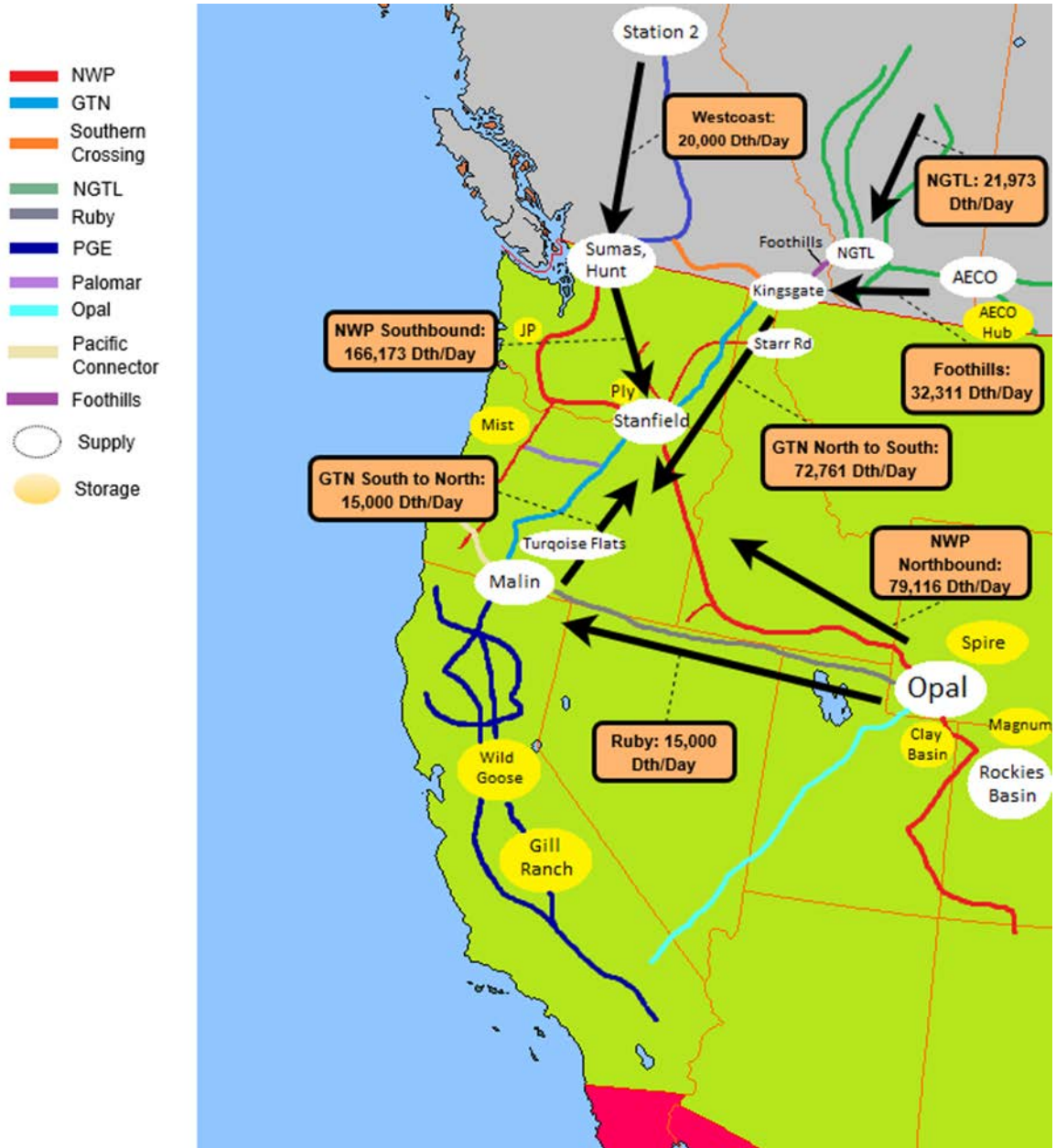
# Service Boundaries

- Communities**
- N
  - District Office
  - Region Office
  - ★ General Office

Document Path: G:\Dept\Mapping\SYSTEM MAPS\System Map.mxd/Date: 11/13/2015



Figure 12-14: Map – Pipeline Transportation Capacity Usage



Appendix A

IRP PROCESS

2020 OR IRP

Appendix A contains Cascade's Stakeholder Engagement document as well as Technical Advisory Group (TAG) presentations and the minutes. The purpose of the Stakeholder Engagement document is to lay out expectations that stakeholders can expect from the Company during the IRP process and vice versa. Cascade's TAG presentations and minutes can be found in this document as well as on the Company's website at: <https://www.cngc.com/rates-services/rates-tariffs/oregon-integrated-resource-plan/>



*In the Community to Serve®*

# CASCADE NATURAL GAS STAKEHOLDER ENGAGEMENT DESIGN DOCUMENT

## Abstract

This document contains the rational, assumptions, and explanation behind the Stakeholder Engagement process of Cascade's IRP Process

## Table of Contents

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| I. Introduction .....        | 1 |
| II. Purpose .....            | 1 |
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| V. Mutual Expectations ..... | 2 |
| VI. Desired End-Result.....  | 3 |
| VII. Conclusion .....        | 4 |

## Introduction

Cascade welcomes input from technical experts and the interested public in developing its Integrated Resource Plan (IRP). Cascade seeks to employ best industry practices and recognizes external participation can add incremental improvements.

Cascade recognizes stakeholders have a multitude of projects before them. This Design Document is intended to assist in optimizing participation by interested parties to yield a solid IRP to the benefit of customers and the Company.

## Purpose


The goal of the IRP process is to produce a plan that addresses meeting long-term load giving consideration to the best combination of expected costs and associated risks and uncertainties for the utility and its customers. Cascade strongly believes this process is best accomplished with input from all stakeholders.

The purpose of this document is to align perspectives for maximizing the effectiveness, influence, and amount of contributions from stakeholders in an environment of robust workloads by all parties. The stakeholder engagement process is summarized in Box #1.

### Box #1: From OPUC 5/15/18 Workshop

**Stakeholder Engagement Process**

- Input and feedback from Cascade’s Technical Advisory Group (TAG) is an important resource to help ensure the IRP includes perspectives external to the Company and responsive to stakeholders.
- Five Technical Advisory Group (TAG) meetings were held in Salem and Portland, OR, and Kennewick, WA.
- Informal workshops with various stakeholders were held as requested.
- Multiple opportunities for public participation were available.



## Principles

Cascade applies the following four principles throughout this Design Document and the overall IRP process.

- A quality stakeholder engagement process is an iterative activity that requires collaboration and commitment

- Input from diverse perspectives improves the resulting IRP
- Removing barriers to participation and communicating in clear language with solid data is critical
- Transparency, and availability of Cascade staff for associated discussions, is central to the IRP process

## Context

This Design Document is provided with the understanding that some organizations (e.g., Commission Staffs) may rotate its members through its various utility's IRP processes as well as onboard new Staff. Thus, beyond memorializing Cascade's commitments, this Document can be a primer for analyst-to-analyst mutual expectations.

Cascade's perspective is to capture the benefits of interested parties' knowledge by seeking to implement best-practices of stakeholder engagement, beyond this simply being a regulatory requirement.

## Mutual Expectations

The Company will commit to the following series of actions for an efficient process to enhance stakeholders' participation. In turn, Cascade hopes that participating stakeholders will agree to general expectations on their part.

### Cascade Commitments

- The Company will provide reasonable accommodations for people with disabilities. Additionally, the Company will reasonably accommodate items such as requests for meeting locations, audio and visual capabilities, and other items requested by external stakeholders
- Publishing an annual schedule of meetings, for calendaring and coordination purposes, to be included in the workplan
- Publish a brief section that lists the recommendations from the previous Commission IRP acknowledgement
- Providing meeting materials (agenda and PowerPoint) approximately 7 days in advance of meetings
- Responding to pre- or post-meeting communication going over information of interest to stakeholders
- Offering separate workshops (e.g., forecasting, Sendout®, DSM) as requested
- Recognize that some (e.g., Commission Staffs) organizational representatives cannot bind their organizations (i.e., Commissioners) but are making best efforts to provide relevant information
- Keeping a running list of items that need to be further addressed if not directly related to the then-meeting topic or if more time is required to respond
- Allowing for open, inclusive, and balanced participation and information sharing
- Recognizing that some parties may not have the industry knowledge or the resources to devote to analyzing all aspects of the IRP and that their interest may be one of breadth

- Understanding TAG members can and should speak up if they need more information or if the time for discussion is too short and merits further discussion
- Responding to questions in a reasonable time period
- Noting when confidential information has been requested (or provided) and associated treatment
- Seeking perspectives on inputs and results of the components of the IRP
- Present information in a clear and transparent manner

### Cascade Requests of Stakeholders

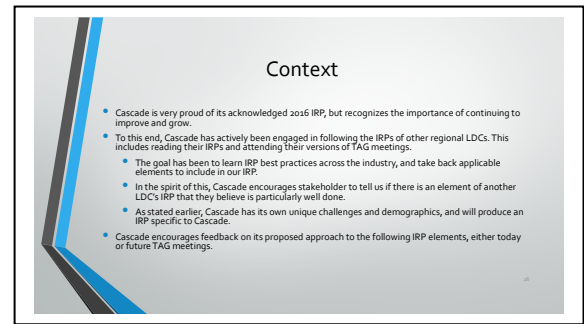
- Ask questions of the Company on technical and methodological aspects
- Be a point of contact within their organization so as to distribute information to peers unless specifically requested of Cascade to provide distribution to their peers. However, if the latter occurs, Cascade respectfully requests that the designated lead analyst or organization representative respond to all Cascade requests unless directed otherwise
- By sharing information among internal colleagues, provide organizational positions, opinions, or perspectives to all stakeholders. (This is particularly relevant for organizations that have different lead analysts assigned to different companies or who have relatively new Staff members participating in any given IRP process.)
- Recognize relative informality of the meetings and ability to interject for clarification and understanding
- These requests of stakeholders are not to say, “speak now or forever hold your peace” or to put undue pressure on others’ timelines and workload; rather these are ways to maximize the effectiveness of the stakeholders’ comments, which optimizes the process. Again, comments received earlier in the process can better influence the final draft document.
- When possible, provide feedback to meeting materials in advance of the meeting, to give Company representatives time to prepare information for an informed discussion.

## Desired End-Result

A well-planned and executed stakeholder engagement process would have all technical and methodological issues examined in meetings prior to parties later providing comments on the final draft document. This is the proverbial win-win-win situation. Commission Staffs and interested parties would have full understanding of the Company's data and analytical approaches. These studies can be refined through analyst-to-analyst discussions. Consideration of new approaches can be put to the forefront for current or future IRPs, based on budgets and benefit to customers. The Company benefits by gaining access to perspectives perhaps not otherwise known. Commission Staff and others may be aware of emerging policies and approaches given the breadth of their interactions with Commissioners and new issues. As Cascade strives to implement best planning practices, as depicted in Box #2, stakeholders can provide advice based on what they've seen in the industry.

The Company has and will continue to encourage stakeholder feedback, questions and suggestions to assist Cascade in producing an IRP that meets the regulatory requirements and Cascade's customers' needs. Cascade prefers to receive feedback as early as possible in the process (e.g., in the course of its technical advisory group meetings or soon thereafter) so that the Company has a better opportunity to address questions or analyze/apply more stakeholder suggestions. Cascade recognizes that all parties are extremely busy, but strongly believes that stakeholder participation is crucial from the outset.

### **Box #2: From WUTC 6/18/18 Workshop**



The above recognizes that key analytical components of the IRP—such as the demand forecast—need to be “locked down” at least midway through the process so that resource integration can be addressed. Interested parties can best influence these components earlier, rather than later, in the process.

## **Conclusion**

While Cascade "owns" and is responsible for the IRP, the Company desires to have involvement from stakeholders to provide a diversity of perspectives. A best practices IRP is informed by perspectives, analyses and access to concerns and approaches that the Company may not have considered. Some stakeholders participate in multiple IRP processes and have a line-of-sight that may not be available to Cascade, despite the Company monitoring other utilities' IRPs and associated processes.

Cascade recognizes parties will submit sometimes-detailed comments at the conclusion of the stakeholder involvement process in advance of Commission acknowledgement. The Company's hope is that the guidelines contained in this Document will allow stakeholders to demonstrate to the Commission their work in the final IRP while concurring with its conclusions given the parties' influence.



# Cascade Natural Gas Corporation

## Integrated Resource Plan Technical Advisory Group Meeting #1

August 15<sup>th</sup>, 2019  
Deschutes Room at Springhill Suites  
Bend, OR



# Appendix A IRP Process Agenda

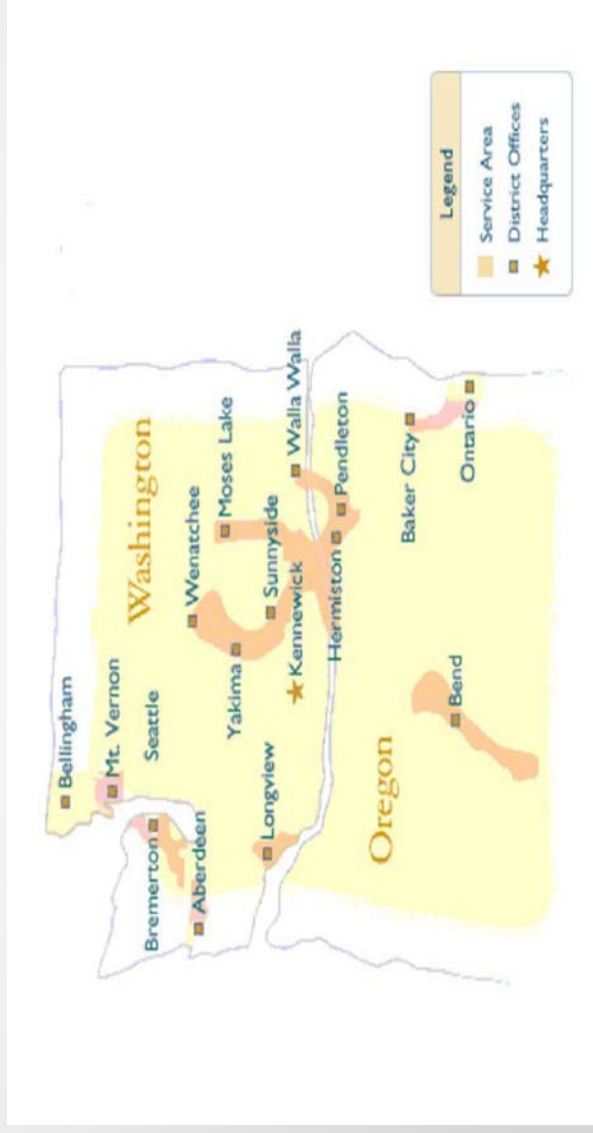
- Introductions
- Safety Moment
- About Cascade Natural Gas
- Purpose of the IRP
- IRP Process
- Best Practices Discussion
- IRP Team
- Regional Market Outlook
- Key IRP Discussions for Future IRP Meetings
  - Load Forecast
  - Hedging
  - Avoided Cost
  - Carbon
  - Energy Efficiency
  - Renewables
  - Distribution System Planning
  - Stochastic Analysis Techniques
- Additional Items
- 2020 OR IRP Timeline
- Next Steps

# A LITTLE HISTORY

## LESSON...

- Prior to 1955, natural gas was virtually unheard-of in the Pacific Northwest. Seeing an opportunity, Lester Pettit, Spencer Clark, and Stewart Matthews led a group of associates to form a company that would rise to the challenge. Cascade Natural Gas Corporation was incorporated January 2, 1953.
- In July 2007, Cascade was acquired by MDU Resources headquartered in Bismarck, ND.
  - Founded in 1924 as an electric utility in eastern Montana.
  - Core businesses are construction, utilities, and pipeline.
  - Approximately 9,600 employees, operating in 48 states.
  - Operates four utilities across eight states:
    - Montana-Dakota Utilities Co.
    - Great Plains Natural Gas Co.
    - Cascade Natural Gas Corporation
    - Intermountain Gas Co.

- Cascade Natural Gas Corp. serves approximately 293,000 customers in 96 communities – 68 of which are in Washington and 28 in Oregon. Cascade's service areas are concentrated in western and south central Washington, and south central and eastern Oregon.
- Today, Cascade serves a diverse service territory covering more than 32,000 square miles and 700 highway miles from one end of the system to the other. Interstate pipelines transmit Cascade's natural gas from production areas in the Rocky Mountains and western Canada.



# Purpose of the IRP





# Purpose of the IRP

- The purpose of an IRP is to depict the overall company plan more transparently....
- For immediately-contemplated actions (i.e., in the next two to four years);
- To characterize emerging issues and related approaches for mitigation, if necessary; and
- To outline the long-term direction a company is headed *vis-a-vis* the industry, including economic trends, industry structure (partners such as the pipeline(s) and their impact/actions), technology, customer usage, etc.



# IRP Objectives

- Present a transparent roadmap of the overall corporate plan per the previous slide.
- Promote internal coordination.
- Describe to key stakeholders and the public the complex utility system unique to the local distribution company (LDC) and management decision-making processes.
- Provide previews of future projects and issues which can lead to improved regulatory filings.
- Meet regulatory requirements.





# Benefits

- A company can describe its unique circumstances, opportunities and challenges over the planning horizon.
- More specifically, while commissions do not approve the IRP—and, hence future actions—the description of potential actions generally provides for an improved process of future filings, because stakeholders have a basis, in advance, for what is driving those decisions.





# In Conclusion

- An IRP provides an understanding of industry and utility-specific practices.
- That the Commission acknowledges the plans, rather than approve them, does not lessen the process's regulatory importance.
- The commitment from Cascade's senior leadership has been outstanding and recognized by stakeholders.

# IRP Process



# Overview of IRP Process

- Scoping
  - Work Plan, Outline, and Timeline
- Address Topical Areas
  - Studies, Analyses, and Narratives
- Gain input through iterative external engagement
- Integrate
- Draft Plan
- Final Plan

# TAG Meetings in the IRP Process

- Cascade believes the TAG meetings are of significant value to the IRP process, and encourages as much active stakeholder participation as possible.
- Feedback from stakeholders is critical to the production of a document that clearly and effectively communicates the Company's plan to acquire the reasonable lowest cost mix of natural gas supply and conservation resources to serve forecasted demand.
- Five TAG meetings will be held, with a potential sixth scheduled if needed.
- Multiple opportunities for public participation will be made available.

# Meeting Principles

- TAG meetings will be effective if...
- Start and end on time, with participants fully present.
- Allow for open, inclusive and balanced participation and discussions.
- Ask questions.
- Slides are disseminated to stakeholders in advance, and reviewed by stakeholders prior to the meeting.
- Be clear about next steps and action items.
- Deadlines to hit milestones are described and respected by all parties.

# Importance of Milestones

- The IRP team plays an internal coordination role, assisting many departments working as one.
- This can be challenging, as each department has its own core function beyond the IRP.
- Milestones allow the Company to achieve this task while being respectful of each other's individual challenges and workload.
- The Company has critical milestones related to the completion of its load forecast, price forecast, avoided cost, and other critical processes. These often inform other parts of the IRP process, and must be met on time.

# Best Practices Discussion





# Context

- Cascade is proud of its acknowledged 2018 IRP, but recognizes the importance of continuing to improve and grow.
- To this end, Cascade has actively been engaged in following the IRPs of other regional LDCs. This includes reading their IRPs and attending their versions of TAG meetings.
  - The goal has been to learn IRP best practices across the industry, and take back applicable elements to include in our IRP.
  - In the spirit of this, Cascade encourages stakeholder to tell us if there is an element of another LDC's IRP that they believe is particularly well done.
  - As stated earlier, Cascade has its own unique challenges and demographics, and will produce an IRP specific to Cascade.
- Cascade encourages feedback on its proposed approach to the following IRP elements, either today or future TAG meetings.

# Key Items for Best Practices

- Welcomes input from stakeholders.
- Recognize stakeholders are busy so, therefore, seek to optimize participation (See Stakeholder Engagement Document).
- Provide for iterative and collaborative process.
- Promote gaining all perspectives.
- Reduce barriers with clear communication and data.

# Key Items (Continued)

- Create transparency with availability of Cascade staff for analyst-to-analyst discussions throughout process.
- Memorialize Cascade’s commitments (per Stakeholder Engagement Document).
- Requests of stakeholders.
- Recognize important aspects, such as:
  - Cascade’s need to lock down certain components early in process.
  - Stakeholders as point of contact within organization and coordinate organizational positions (as best as possible).

# IRP Team



**INTERNAL TEAM MEMBERS OF CNGC'S INTEGRATED RESOURCE PLAN:**

| LAST NAME   | FIRST NAME | TITLE   | COMPANY                       |
|-------------|------------|---|-------------------------------|
| Archer      | Pam        | Supervisor, Regulatory Affairs                          | Cascade                       |
| Burin       | Kary       | Supervisor, Conservation                                | Cascade                       |
| Chiles      | Mark       | Vice President, Customer Service and Regulatory Affairs | Intermountain                 |
| Connell     | Kevin      | Director, Gas Supply Utility Group                      | MDU                           |
| Cooley      | John       | Manager, Industrial Services                            | Cascade                       |
| Cowlshaw    | Monica     | Manager, Energy Efficiency & Community Outreach         | Cascade                       |
| Cunnington  | Brian      | Manager, Industrial Services                            | Cascade                       |
| Davis       | Ashton     | Resource Planning Analyst, Gas Supply                   | Cascade                       |
| Folsom      | Bruce      | Consultant  | Bruce W Folsom Consulting LLC |
| Goodman     | Chad       | System Administrator                                    | Cascade                       |
| Hensyel     | Phillip    | Lead Economic Energy Efficiency Analyst II              | Cascade                       |
| Krebsbach   | Abbie      | Director, Environmental                                 | MDU                           |
| Martuscelli | Eric       | Vice President, Operations                              | Cascade                       |



**INTERNAL TEAM MEMBERS OF CNGC'S INTEGRATED RESOURCE PLAN:**

| LAST NAME      | FIRST NAME | TITLE  | COMPANY                   |
|----------------|------------|--|---------------------------|
| McGreal        | Devin      | Resource Planning Analyst, Gas Supply                              | Cascade                   |
| Mellinger      | Becky      | Financial Analyst  | Cascade                   |
| Myhrum         | Isaac      | Regulatory Analyst II, Regulatory Affairs                          | Cascade                   |
| Offerdahl      | Linda      | Engineering II, Engineering  | Cascade                   |
| Parvinen       | Mike       | Director, Regulatory Affairs                                       | Cascade                   |
| Robbins        | Chris      | Manager, Gas Supply and Control- CNGC/IGC                          | Cascade/<br>Intermountain |
| Robertson      | Brian      | Supervisor, Resource Planning, Gas Supply                          | Cascade                   |
| Sellers-Vaughn | Mark       | Manager, Supply Resource Planning                                  | Cascade                   |
| Senger         | Garret     | Executive Vice President, Regulatory, Customer Service, Gas Supply | MDU                       |
| Sorensen       | Renie      | Manager, Engineering   | Cascade                   |
| Spector        | Alyn       | Manager, Conservation Policy                                       | Cascade                   |
| Stone          | Carolyn    | Gas Supply Analyst III   | Cascade                   |
| Tyssen         | Nathan     | Network Administrator  | Cascade                   |
| Wood           | Eric       | Supervisor, Gas Supply   | Cascade/<br>Intermountain |

# Regional Market Outlook



# Regional Market Outlook

- Although the market expects the Enbridge pipeline to be fully repaired by November of 2019, uncertainty regarding the timing for completion of repairs is causing instability and uncertainty in the market out to 2022 and winter Sumas prices to trade at a premium.
- Cascade's 2019 Hedge Execution Plan was presented to Cascade's GSOC (Gas Supply Oversight Committee) on July 9<sup>th</sup>. GSOC decided on a hedge level of 60% with a 5% cap on financial transactions. According to a July 16<sup>th</sup> workshop with the OPUC, Avista plans to hedge 40% and NW Natural plans to hedge 55%.
- The gas futures market indicates a bullish outlook towards natural gas pricing with August Henry Hub gas prices remaining <\$2.40/MMBtu.



# Regional Market Outlook (Cont.)

- Due to the US economy's continued growth and resulting confidence in the market, a number of new industrial projects have been jumpstarted in the medium term. Analysts at Wood Mackenzie claim "Stronger structural demand in North America will protect Henry Hub from further downside risk.
- According to the reference case of the EIA 2018 Annual Energy Outlook, Natural Gas is projected to lead the power sector in gross energy consumption over the next 20+ years.
- Currently, the major Columbia Basin reservoirs range from a height of 918'-1570', while the five major Oregon River Basins range from 52%-87% (2018: 52%-81%) filled.

# Regional Market Outlook (Cont.)

- Jordan Cove LNG's final FERC review is due by October 11th. This final environmental impact statement will be followed by a final order set for January 9th, 2020.
- The 2019 U.S natural gas inventory injection season started at the lowest storage level since 2014 yet despite this, injections have outpaced the five-year average during the second quarter of 2019.
- GTN will potentially be having a Kingsgate south open season in the near future. Cascade has entered into a non-binding agreement to participate.

# Key IRP Discussions for Future IRP Meetings



# Load Forecast

- The Company currently utilizes an Autoregressive Integrated Moving Average (ARIMA) methodology with Fourier terms to predict customer count and usage.
- Cascade uses a 60 degree reference temperature to calculate HDDs.
- Multiple scenarios are analyzed such as high/low growth, warm/cold weather, peak day events, etc.
- Cascade has continued to evaluate other potential predictors such as housing starts, but have encountered the same problem as other regional LDCs related to the availability of data to accurately reflect its service area.

# Customer Forecast

$$\alpha_0 + \alpha_1 \text{Pop}^{\text{CG}} + \alpha_2 \text{Emp}^{\text{CG}} + \text{Fourier}(k) + \text{ARIMA} \in (p, d, q)$$

- C = Customers; CG = Citygate; Class = Residential, Commercial, Industrial, or Interruptible; ARIMA  $\in (p, d, q)$  = Indicates that the model has p autoregressive terms, d difference terms, and q moving average terms; Pop = Population; Emp = Employment; Fourier(k) = Captures seasonality of k number of seasons.

# Use Per Customer Forecast

- Therms/ $C^{CG,Class} = \alpha_0 + \alpha_1 HDD^{CG,D} + \alpha_2 Wind^{CG,D} + \alpha_3 I^w + ARIMA \in (p,d,q)$
- Model Notes:
  - Therms/C = Therms per customer; CG = Citygate; Class = Residential, Commercial, Industrial, or Interruptible; HDD = Heating Degree Days; Wind=Average Windspeed; D= Day;  $I_w$  = Indicator Variable set to 1 if it is a weekend;  $ARIMA \in (p,d,q)$  = Indicates that the model has p autoregressive terms, d difference terms, and q moving average terms.

# Hedging

- In the 2018 OR IRP, Cascade noted that the Company was actively participating in UM 1720, Investigation into Long-Term Hedging Policy.
  - On January 18, 2018 the docket was closed.
- Cascade is actively involved with Washington Utilities and Transportation Commission (WUTC) Docket UG 132019, Inquiry into Local Distribution Companies' Natural Gas Hedging Practices and Transaction Reporting.
  - Cascade filed the 2018 Annual Hedge Plan on September 28, 2018 and received an acknowledgement letter on April 29, 2019.
  - The 2019 Annual Hedging Plan will be filed on or before August 31, 2019.

# Avoided Cost

- Cascade has continued its active participation in UM 1893, Staff Investigation of Methodology and Process of EE Cost-Effectiveness.
  - Elements of Cascade’s 2019 avoided cost calculation, for use in the 2020 IRP, will be informed by the workbook provided by OPUC Staff during this docket.
- In the 2020 OR IRP, Cascade will be including values for distribution system costs and risk premium as part of the total avoided cost calculation, as well as a value for the impact of peak hour, to be used in conjunction with distribution system values.
- Based on stakeholder feedback from the 2018 OR IRP and UM 1893 proceedings, Cascade will ensure that all inputs to the avoided calculation are presented as transparently as possible.



# Avoided Cost Formula

$$AC_{nominal} = TC_f + TC_v + SC_f + SC_v + (CC * C_{tax} * E_{adder}) + (DSC * HM) + RP$$

Where

- $AC_{nominal}$  = The nominal avoided cost for a given year. To put this into real dollars you must apply the following:  $\text{Avoided Cost}/(1+\text{discount rate})^{\text{Years}}$  from the reference year.
- $TC_f$  = Incremental Fixed Transportation Costs
- $TC_v$  = Variable Transportation Costs
- $SC_f$  = Incremental Fixed Storage Costs
- $SC_v$  = Variable Storage Costs
- $CC$  = Commodity Costs
- $C_{tax}$  = Carbon Tax
- $E_{adder}$  = Environmental Adder, as recommended by the Northwest Power and Conservation Council
- $DSC$  = Distribution System Costs
- $HM$  = Hourly Modifier
- $RP$  = Risk Premium

# Energy Efficiency

- The IRP team is an active participant in Cascade’s Conservation Advisory Group (CAG).
- The Company will continue to integrate relevant aspects of the CAG meetings in its IRP process.
- Recently passed state law HB 1257, setting new conservation program targets and mandates, will impact many aspects of the Company’s energy efficiency and renewable energy efforts.
- Cascade is carefully following Docket U-190485, Investigation into Initiating Implementation Process for Energy Legislation Passed in the 2019 Legislative Session.

# Carbon

- The Company will continue to operate robust energy conservation programs under the new parameters determined by HB 1257, and will also implement offset programs in compliance with the new law.
- Cascade will continue to analyze various carbon reduction scenarios in its 2020 IRP.
- The Company will determine the impacts of regional carbon policy and will model the impacts of restrictions on the use of natural gas within local communities.

# Renewables

- Cascade is continuing to look at renewables as an option for long-term supplies.
- The Company has met with several biodigester developers who are trying to capture value in the current Renewable Identification Number (RIN) market. However, none of these have moved passed the discussion phase to date.
- In addition, Cascade has met with the City of Richland (WA) to discuss the possibility of capturing biogas from their landfill. They have hired a consultant to assess the feasibility of that project.
- Cascade does have a renewable tariff in Oregon. This tariff is designed for the producer, and not the end users or core customers.

# Distribution System Planning

- 2020 IRP includes a discussion of the elements utilized in distribution system planning to determine needed system enhancements.
- Cascade will provide all planned OR projects and costs under confidential treatment.
- Cascade encourages stakeholder feedback related to distribution system planning.
- Cascade will be monitoring/participating in UM 2005.

# Stochastic Analysis

- Cascade appreciated Staff feedback requesting further stochastic analysis in the Company's 2018 IRP.
- In the 2018 IRP, Cascade only ran stochastic analysis on the preferred deterministic portfolio.
- For the 2020 IRP, Cascade will perform Monte Carlo simulations on all potential portfolios before scenario and sensitivity testing.

# Resource Integration

- Cascade will stochastically test multiple portfolios in its 2020 IRP to capture the extrinsic value of all portfolios before selecting a candidate portfolio.
- This candidate portfolio will then be tested through stochastic scenario and sensitivity modeling.
- Cascade will compare the Value at Risk (VaR) of the candidate portfolio in each scenario/sensitivity to a VaR limit to ensure that the extrinsic risk of the portfolio is within tolerable levels.
- Cascade will detail its determination of future long-term resource needs, its analysis of the expected costs and associated risks of the alternatives to meet those needs, and its action plan to select the best portfolio of resources to meet those needs.

# 2020 IRP Schedule

| Date (Subject to change)    | State | Process Element   | Responsible Party        | Location                      | Notes  |
|-----------------------------|-------|---|--------------------------|-------------------------------|--|
| Thursday, August 8, 2019    | OR    | TAG 1 slides distributed to stakeholders  | RPT                      |                               |  |
| Thursday, August 15, 2019   | OR    | TAG 1: Process, Key Points, IRP Team, Timeline, Regional Market Outlook, Plan for dealing with issues raised in 2018 IRP  | RPT                      | Bend, OR - 9 am to 12 pm      | Deschutes Room Sprinhill Suites Bend, OR             |
| Wednesday, August 28, 2019  | OR    | TAG 2 slides distributed to stakeholders  | RPT                      |                               |  |
| Thursday, September 5, 2019 | OR    | TAG 2: Demand and Customer Forecast and Non-Core Outlook, Drilling down into segments of demand forecast. NWP/GTN Present Demand Taps.                                      | RPT, GTN/NWP             | Salem, OR - 9 am to 12 pm     | Meadow room at OPUC Offices                          |
| Wednesday, October 30, 2019 | OR    | TAG 3 slides distributed to stakeholders  | RPT                      |                               |  |
| Wednesday, November 6, 2019 | OR    | TAG 3: Distribution System Planning, Planned Scenarios and Sensitivities, Alternative Resources, Price Forecast, Avoided Costs, Current Supply Resources, Transport Issues. | RPT/Linda/Eric W         | Kennewick, WA - 9 am to 12 pm | Deschutes Room at Cascade's Kennewick General Office |
| Wednesday, January 8, 2020  | OR    | TAG 4 slides distributed to stakeholders  | RPT                      |                               |  |
| Wednesday, January 15, 2020 | OR    | TAG 4 Carbon Impacts, Conservation (Energy Trust of Oregon), Bio-Natural Gas, Preliminary Resource Integration Results.   | RPT/ETO/Al/Chris R/Abbie | Portland, OR - 9 am to 3 pm   | Multnomah Room at Portland International Airport     |
| Wednesday, March 4, 2020    | OR    | TAG 5 slides distributed to stakeholders  | RPT                      |                               |  |
| Wednesday, March 11, 2020   | OR    | TAG 5: Final Integration Results, finalization of plan components, Proposed new 4-year Action Plan.   | RPT                      | Salem, OR - 9 am to 12 pm     | Meadow room at OPUC Offices                          |
| Tuesday, May 12, 2020       | OR    | Draft of 2020 OR IRP distributed  | RPT                      |                               |  |
| Friday, June 12, 2020       | OR    | Comments due on draft from all stakeholders   | RPT                      |                               |  |
| Tuesday, June 30, 2020      | OR    | TAG 6, if needed  | RPT/Other Parties        | WebEx Only                    |  |
| Friday, July 31, 2020       | OR    | IRP filing in Oregon  | RPT                      |                               |  |



# Questions/Next Steps

- Review Plans for TAG 2 Discussion
  - Demand and Customer Forecast.
  - Non-Core Forecast.
  - Pipeline Capacity Overview.
- Next TAG is Thursday, September 5<sup>th</sup> in the Meadow room at OPUC Offices.

# Cascade Natural Gas Corporation

## Integrated Resource Plan Technical Advisory Group Meeting #1

August 15<sup>th</sup>, 2019  
Deschutes Room at Springhill Suites  
Bend, OR





## OPUC Tag Meeting 1

**Date & Time:** 8/15/2020, 09:00 AM – 11:15 AM

**Location:** Springhill Suites in Bend, OR – Deschutes Room

**In attendance:** Mark Sellers-Vaughn, Brian Robertson, Devin McGreal, Linda Offerdahl, Bruce Folsom, Chris Robbins, Eric Wood, William Gherke

**Called in:** Alyn Spector, Ashton Davis, Monica Cowlshaw, Mike Parvinen, Kevin Connell, Tammy Nygard, Chad Stokes (Cable Huston), Laura Johnson (NWP), Jim Cordaro (Ruby), Mark Iverson (Ruby), Mike Paruszkiewicz (NWN), Anna Kim (OPUC)

**Minutes by:** Brian Robertson

Mark Sellers-Vaughn kicked off the meeting by thanking everyone that showed up. Brian went over fire safety of the building, introductions and the agenda.

- Mark gave a quick background of the history of Cascade Natural Gas.
- Brian Robertson hit on the main points of the purpose of the IRP:
  - It is a regulatory rule.
  - Transparent road map of the company's 20-year plan.
  - Promotes internal coordination.
  - Serves as a tool for other filings such as a rate case.
- Bruce Folsom discussed the IRP Process:
  - TAG meetings are very important to receive feedback.
  - Receiving feedback in a timely manner will help the current IRP.
  - Milestones are important. Beginning parts of the IRP feed the end of the IRP, if milestones are missed then it pushes back other milestones.
- Brian went over the Best Practice Discussion:
  - Pointed out that Cascade created a Stakeholder Engagement Document to be used for the IRP process.
  - Noted again that receiving feedback on a timely manner will help serve the current IRP process.
- Brian introduced and showed all the members who are a part of the internal IRP team.
- Ashton Davis discussed the Regional Market Outlook:
  - Noted the Enbridge event and the future timeline of repairing Enbridge.
  - Noted the update on the hedge level moved to 60%. William Gherke asked what the previous hedge percentage was. Ashton responded with 40%.

- Ashton also noted other information regarding other items such as the US economy, natural gas projections, Jordan Cove, and upstream GTN open season.
- Cascade then discussed Key Items that will be heavily discussed and involved in the IRP:
  - Ashton discussed the forecast model. He also expressed the difficulty of getting housing start information in our rural cities/towns.
  - William questioned the usage of wind in the use per customer model and stated that he hasn't seen it elsewhere. Ashton responded that Cascade has found it to be significant in our models. He also noted that Northwest Natural Gas uses it.
  - Devin explained the hedging process that is currently going on in Washington.
  - Devin discussed the upcoming plans for the avoided cost. Specifically, adding distribution system cost, hourly modifier, and risk premium. Anna asked if that was too much in one IRP. Devin responded that most of this work has been done within UM 1893 so it shouldn't be that much additional work. William asked about the Environmental Adder. Devin responded that the 10% environmental adder is from NWPCC power plan.
  - Alyn Spector touched on the energy efficiency slides and that Cascade is working closely with ETO. He also noted that Cascade will be analyzing various carbon reduction scenarios.
  - Chris Robbins discussed renewable natural gas and the current plans Cascade is looking into.
  - Linda Offerdahl talked about distribution system planning. She noted that Cascade will provide analysis on the Company's future projects. She also mentioned Cascade will be following UM 2005.
  - Devin pontificated on stochastic analysis and how Cascade has expanded the analysis from past IRPs. He also mentioned that Cascade will be using the stochastic analysis on multiple portfolios to ultimately come up with a preferred portfolio.
- Brian wrapped up the meeting discussing the remaining schedule.

TAG 2 will take place on September 5<sup>th</sup>, 2019 in Salem, OR at the OPUC offices – Meadow room.

**The meeting was adjourned at 11:15 AM.**

# Cascade Natural Gas Corporation

## 2020 OR Integrated Resource Plan Technical Advisory Group Meeting # 2

Thursday, September 5th, 2020

Public Utility Commission of Oregon

Salem, OR



# Agenda

- **Introductions**
- **Demand Forecast**
- **Customer Forecast**
- **Forecast Results**
- **Non-Core Outlook**
- **Market Outlook and Long Range Price Forecast**
- **2020 IRP Remaining Schedule**

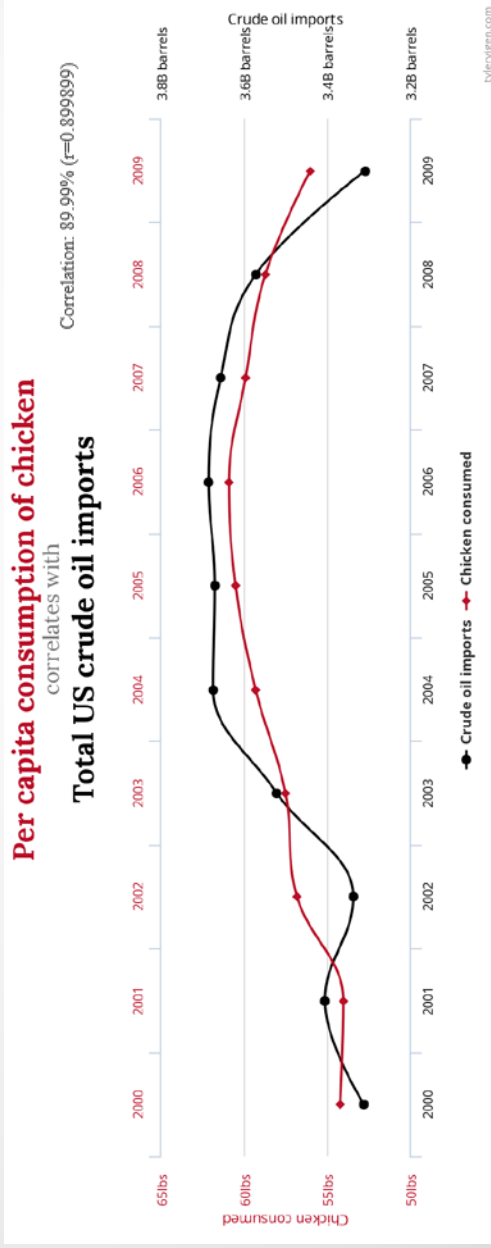
# Demand Forecast







# A Little Fun with Spurious Correlations...



# Demand Forecast

- The Cascade demand forecast developed for the IRP is a forecast of customers, core natural gas demand, and core peak demand for the next 20 years.
- Demand is forecasted at:
  - the citygate and citygate loop level;
  - the rate schedule level; and
  - the daily level.

# Key Definitions

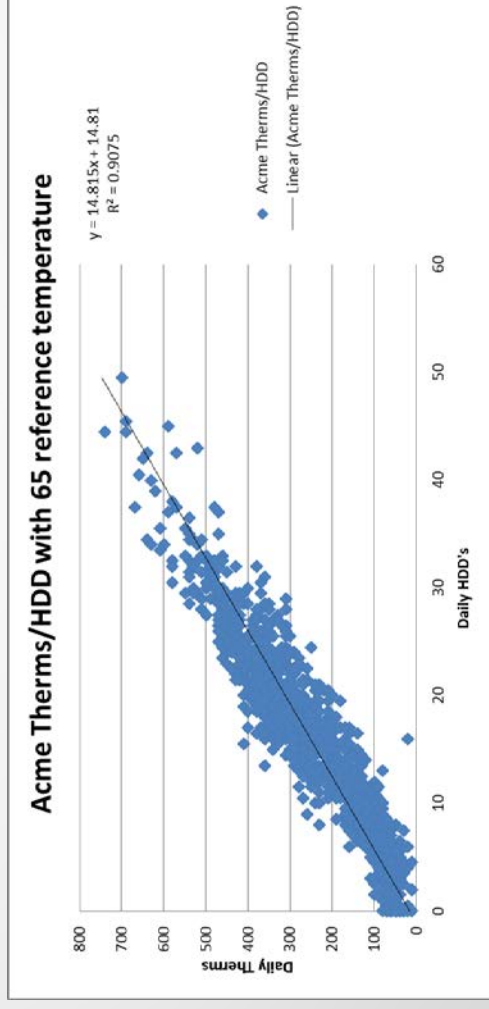
- **AIC: The Akaike information criterion (AIC)**
  - A measure of the relative quality of statistical models for a given set of data. Given a collection of models for the data, AIC estimates the quality of each model, relative to each of the other models. Hence, AIC provides a means for model selection.
- **ARIMA: Auto-Regressive Integrated Moving Average**
  - Type of model that is fitted to time series data.
  - When doing regressions using time series variables, it is common for the errors (or residuals) to have a time series structure. This could mean there is a predictable structure to the errors, meaning they can also be modeled. This is where the ARIMA term comes in.
- Define weather in terms of HDDs (Heating Degree Day).
- Citygate loops are a group of citygates that service a similar area that are forecasted together due to pipeline operations.

# Key Assumptions

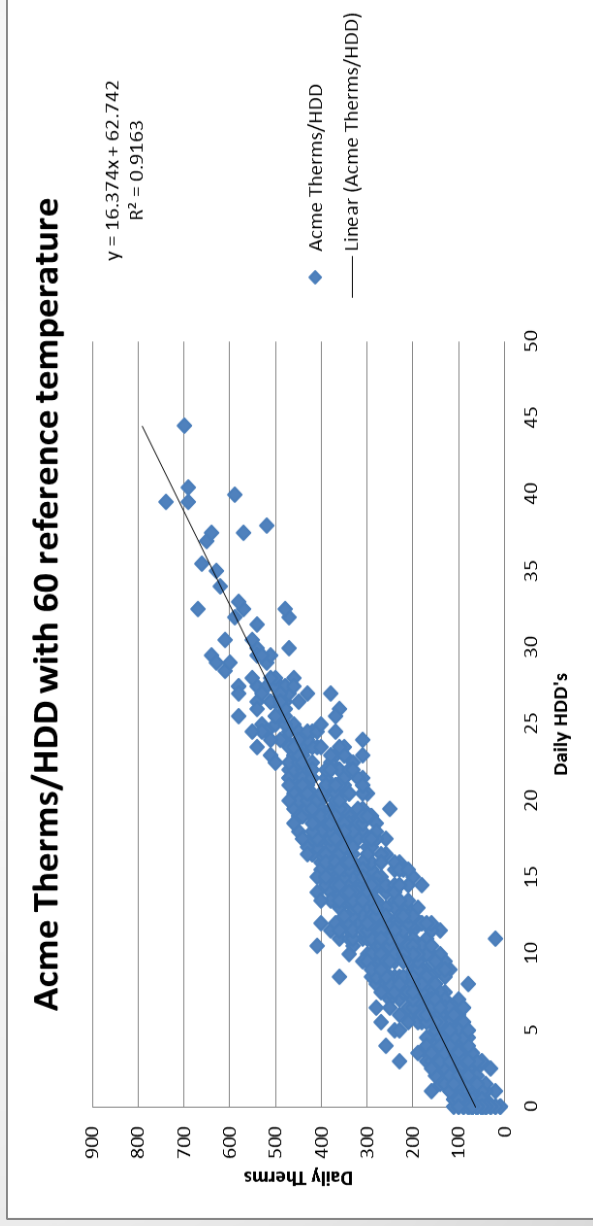
- Seven weather locations effectively cover Cascade’s service territory.
- This forecast uses 30 years of recent weather history as the “normal” temperatures.
- Heating demand does not appreciatively start until average temps dip below 60° F, therefore a 60° F threshold is used to calculate heating degree days.

# 65 vs 60 HDD Threshold

- The historical threshold for calculating HDD has been 65°F .
- It was determined that lowering the threshold to 60°F produces better results for Cascade’s service territory.
- The graph shows that heating demand does not begin to increase until an HDD of five if the traditional 65°F is utilized.



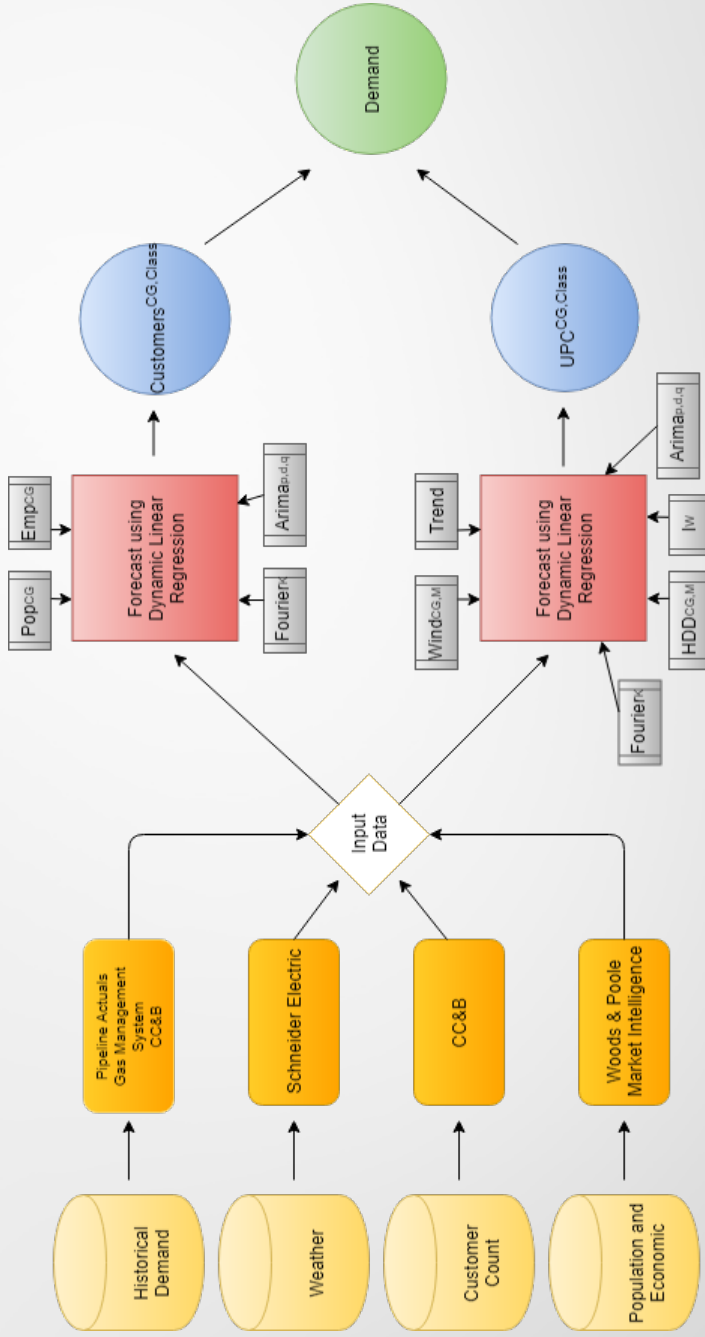
# Acme Therms/HDD with 60 degree reference temperature



# Weather Stations

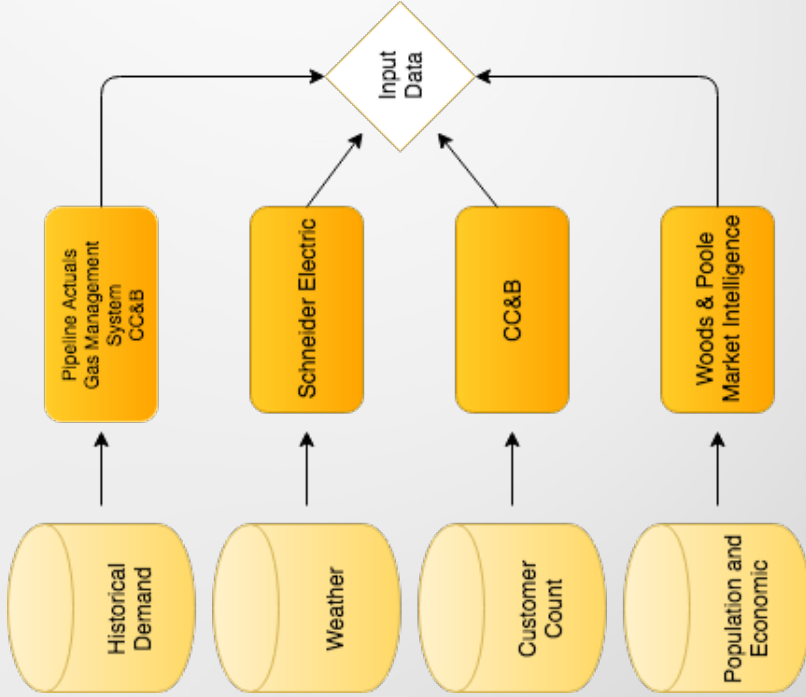


# Process





# Inputs



- Pipeline actuals at Citygate level.
- Woods & Poole at county level.
- CC&B citygate allocations

# Customer Forecast





# Customer Forecast

- $$C_{CG,Class} = \alpha_0 + \alpha_1 Pop^{CG} + \alpha_2 Emp^{CG} + Fourier(k) + ARIMA \in (p, d, q)$$

- Model Notes:**

- C = Customers; CG = Citygate; Class = Residential, Commercial, Industrial, or Interruptible; ARIMA  $\in (p, d, q)$  = Indicates that the model has p autoregressive terms, d difference terms, and q moving average terms; Pop = Population; Emp = Employment; Fourier(k) = Captures seasonality of k number of seasons.

# Customer Forecast Inputs

| County          |    | Population | Employment |
|-----------------|----|------------|------------|
| ALBANY-LEBANON  | OR | 70,221     | 29,329     |
| ASTORIA         | OR | 27,905     | 12,293     |
| BAKER           | OR | 15,219     | 6,517      |
| BEND            | OR | 29,726     | 12,947     |
| BEND-PRINEVILLE | OR | 39,554     | 17,551     |
| BENTON          | OR | 51,491     | 19,344     |
| BROOKINGS       | OR | 13,18      | 4,988      |
| CLACKAMAS       | OR | 156,015    | 47,703     |

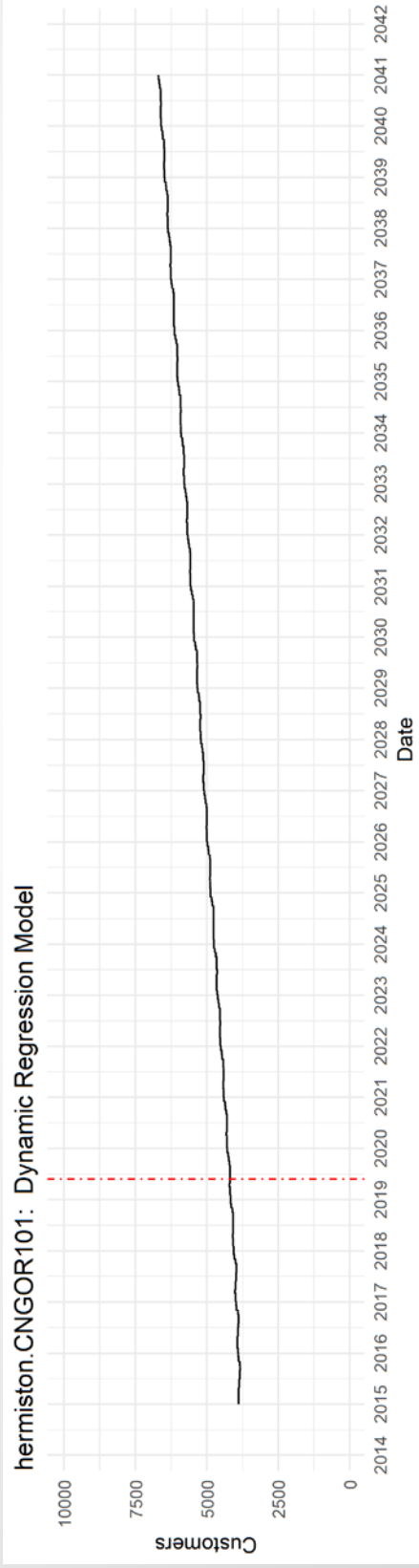
| Acctg Year | Acctg Mon | Gate (Loop)          | Rate     | Number of Prem |
|------------|-----------|----------------------|----------|----------------|
| 2019       | 2         | Bend/South Bend      | CNGOR104 | 144            |
| 2015       | 2         | Pendleton/Pilot Rock | CNGOR104 | 64             |
| 2018       | 8         | Ontario/NYSSA/Vale   | CNGOR101 | 5              |
| 2015       | 7         | Hermiston            | CNGOR101 | 4              |
| 2018       | 5         | Mission              | CNGOR104 | 18             |
| 2018       | 8         | Gilchrist Crescent   | CNGOR101 | 78             |
| 2016       | 5         | Ontario/NYSSA/Vale   | CNGOR104 | 19             |

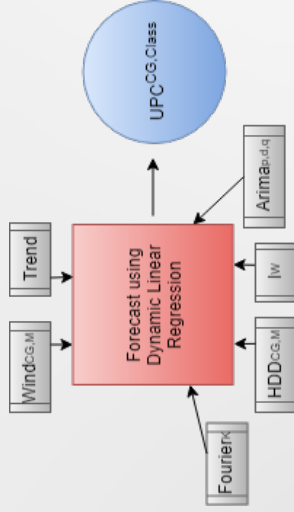
## CC&B Data

|                                   |          |
|-----------------------------------|----------|
| Xregs                             | AICc     |
| Fourier                           | 1505.389 |
| Population + Fourier              | 1506.871 |
| Employment + Fourier              | 1507.519 |
| Employment                        | 1562.932 |
| Population                        | 1566.24  |
| Employment + Population + Fourier | 1568.108 |
| Arima Only                        | 1597.354 |

## Model Selection

# Customer Forecast





# Use Per Customer Forecast

- Therms/ $C^{CG,Class} = \alpha_0 + \alpha_1 HDD^{CG,M} + \alpha_2 I_w + \alpha_4 WIND^{CG,M} + Trend + Fourier(k) + ARIMA \in (p,d,q)$
- Model Notes:
  - Therms/C = Therms per customer; CG = Citygate; Class = Residential, Commercial, Industrial, or Interruptible; HDD = Heating Degree Days; M= Month;  $I_w$  = Indicator Variable set to 1 if it is a weekend; T = Trend Variable increasing by 1 for each day forecasted; WIND = Daily average wind speed.

Bend Loop 101:  $\text{Bend Loop } 101 = \alpha_0 + \alpha_1 \text{HDD}^M + \alpha_2 I_w + \alpha_4 \text{WIND}^M + \text{Fourier} + \text{ARIMA}$

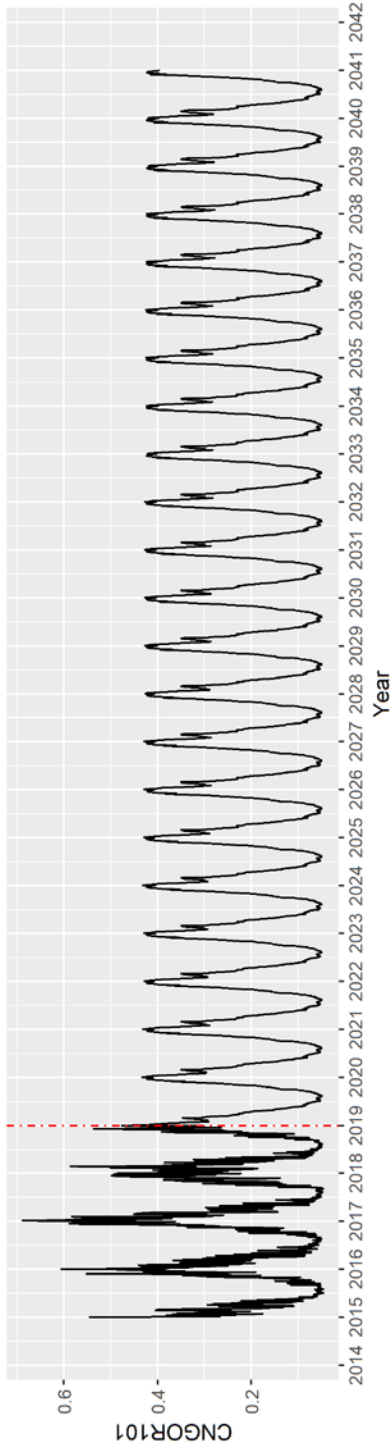
| Aggregated.Locations | Year.Month.Day | CNGOR101    | weekend | jan.hdd | feb.hdd | nov.hdd | dec.hdd | jan.wind | feb.wind | nov.wind | dec.wind |
|----------------------|----------------|-------------|---------|---------|---------|---------|---------|----------|----------|----------|----------|
| bend loop            | 1/1/2015       | 0.31838107  | 0       | 41.5    | 0       | 0       | 0       | 3        | 0        | 0        | 0        |
| bend loop            | 1/2/2015       | 0.380307614 | 0       | 39      | 0       | 0       | 0       | 2        | 0        | 0        | 0        |
| bend loop            | 1/3/2015       | 0.266972209 | 1       | 38.5    | 0       | 0       | 0       | 2        | 0        | 0        | 0        |
| bend loop            | 1/4/2015       | 0.263826734 | 1       | 31      | 0       | 0       | 0       | 2        | 0        | 0        | 0        |
| bend loop            | 1/5/2015       | 0.27680182  | 0       | 16      | 0       | 0       | 0       | 4        | 0        | 0        | 0        |
| bend loop            | 1/6/2015       | 0.276113747 | 0       | 18.5    | 0       | 0       | 0       | 4        | 0        | 0        | 0        |
| bend loop            | 1/7/2015       | 0.326048166 | 0       | 24      | 0       | 0       | 0       | 2        | 0        | 0        | 0        |

# UPC Forecast Results

|        |        |        |         |         |           |         |         |         |         |         |         |         |         |         |         |
|--------|--------|--------|---------|---------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| ar1    | ar2    | ma1    | ma2     | ma3     | intercept | weekend | jan.hdd | feb.hdd | mar.hdd | apr.hdd | may.hdd | jun.hdd | jul.hdd | aug.hdd | sep.hdd |
| 0.3960 | 0.5076 | 0.0884 | -0.4618 | -0.2056 | 0.1107    | -0.0061 | 0.0068  | 0.0075  | 0.0071  | 0.0063  | 0.0056  | 0.0036  | 0.0027  | 0.0021  | 0.0027  |

|         |         |         |          |          |          |          |          |          |          |          |          |          |          |          |        |        |        |         |        |
|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------|--------|--------|---------|--------|
| oct.hdd | nov.hdd | dec.hdd | jan.wind | feb.wind | mar.wind | apr.wind | may.wind | jun.wind | jul.wind | aug.wind | sep.wind | oct.wind | nov.wind | dec.wind | S1-365 | C1-365 | S2-365 | C2-365  |        |
| 0.0046  | 0.0065  | 0.0066  | 0.0024   | 0.0034   | 0.0028   | 0.0035   | 0.0035   | 0.0013   | 0.0007   | 0.0002   | 0.0005   | 0.0006   | 0.0014   | 0.0003   | 0.0005 | 0.0052 | 0.0686 | -0.0089 | 0.0233 |

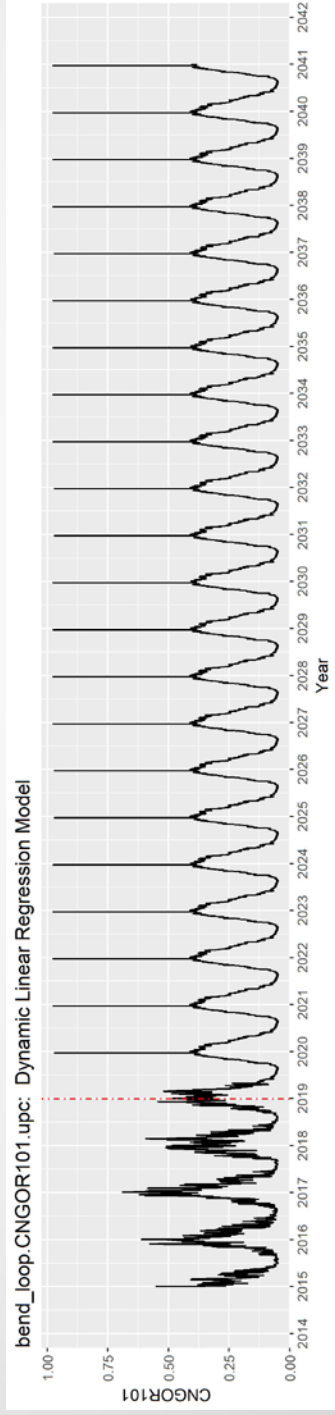
bend\_loop.CNGOR101.upc: Dynamic Linear Regression Model





# Peak Day Use-Per-Customer

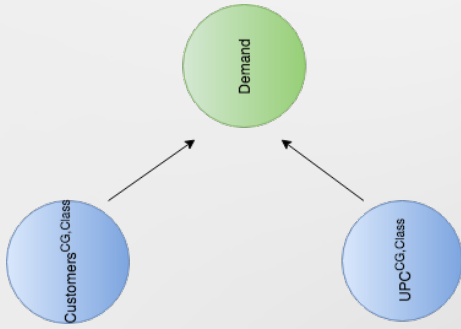
- Peak HDD: Coldest in past 30 years for each weather zone
- Peak Scenarios: Plan on running other scenarios such as 5-day peak event, 3-day peak event, coldest in 20 years, and various Monte Carlo percentiles.



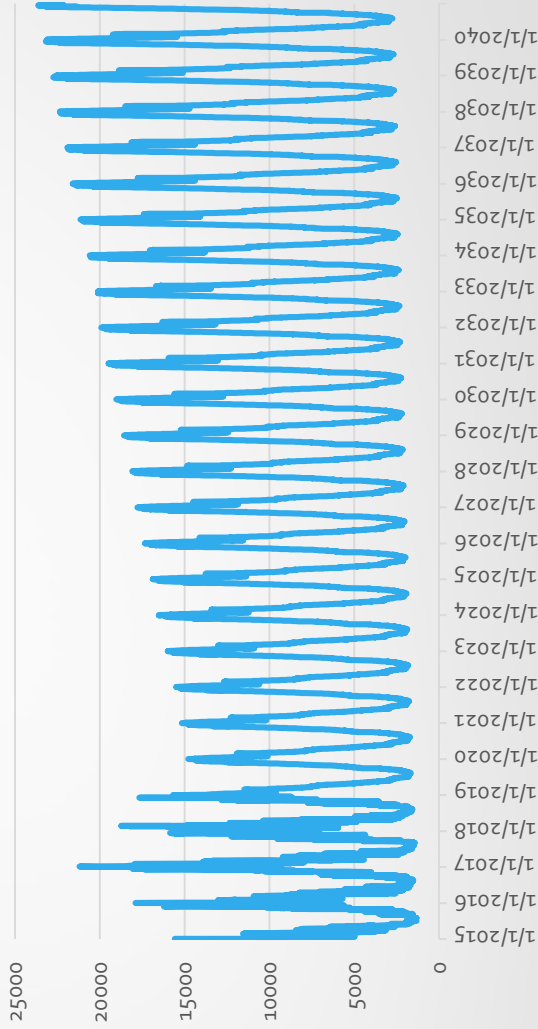
# Forecast Results



# Final Demand Calculation



Bend Loop 101



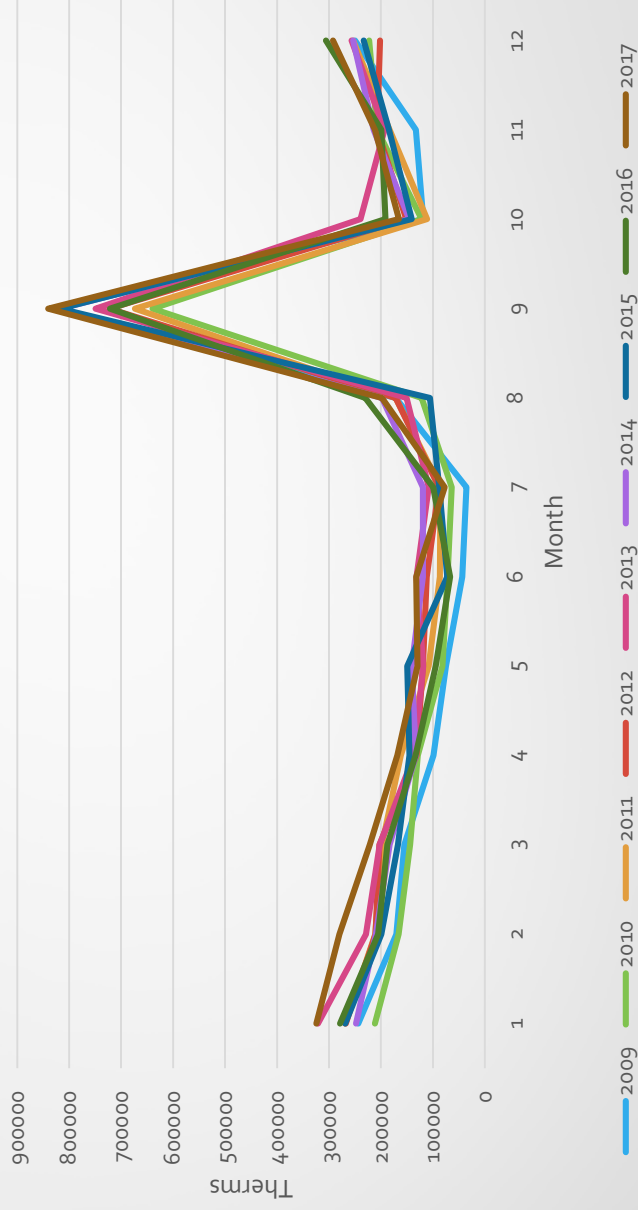
| Gate      | Date     | UPC         | Customers | Demand      |
|-----------|----------|-------------|-----------|-------------|
| Bend Loop | 1/1/2020 | 0.434164028 | 34044     | 14780.68017 |
| Bend Loop | 1/2/2020 | 0.432175189 | 34044     | 14712.97213 |
| Bend Loop | 1/3/2020 | 0.430100149 | 34044     | 14642.32947 |
| Bend Loop | 1/4/2020 | 0.424571854 | 34044     | 14454.12419 |
| Bend Loop | 1/5/2020 | 0.42228356  | 34044     | 14376.22153 |
| Bend Loop | 1/6/2020 | 0.423215137 | 34044     | 14407.93612 |
| Bend Loop | 1/7/2020 | 0.420633918 | 34044     | 14320.0611  |

# Non-Weather Dependent Demand

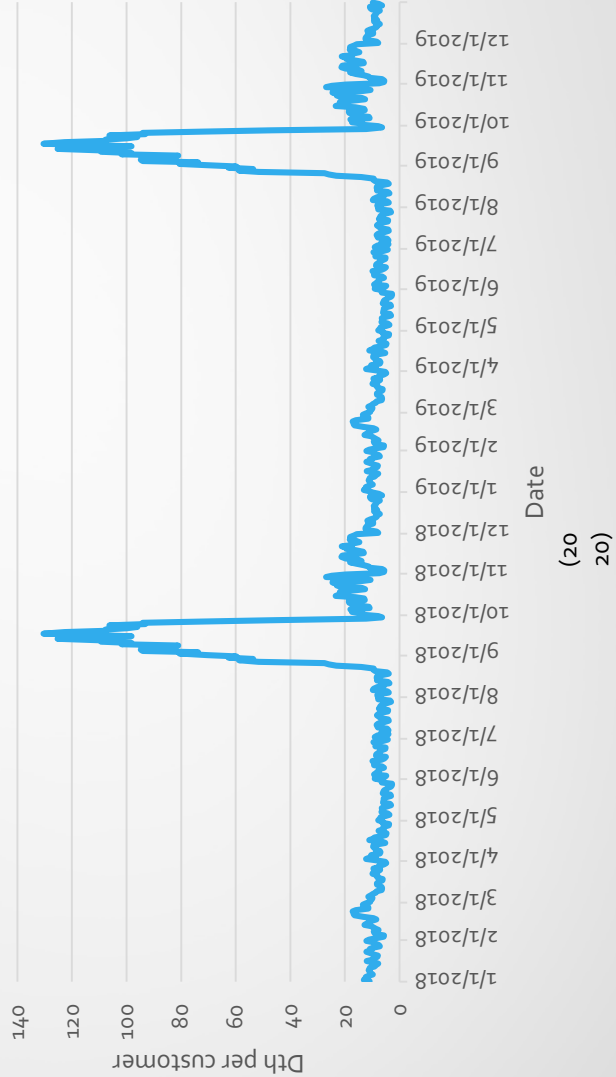
- Demand that is not influenced by weather.
- Typically caused by a customer who ramps up production based on the time of season.
- Previously, demand was removed prior to running the use per customer vs. weather analysis.
- Now using monthly coefficients, Cascade can run the analysis while leaving the non-weather demand in.

# Moxee (Beauchene)

Moxee (Beauchene)



### Moxee City CNGWA505



# Low Customer Growth Areas

| Citygate         | Growth |
|------------------|--------|
| milton-freewater | 0.00%  |
| mission          | 0.00%  |
| chemult          | 0.03%  |
| huntington       | 0.03%  |

- Milton-Freewater is a city in Northcentral Oregon. The city has a recent job growth of -0.2%.<sup>1</sup> The city only has 0.3% working in the real estate profession, while the US is at 1.9%. The city has approximately the same number of customers today that it had in 2004.
- Mission is a census designated place in Northcentral Oregon near Pendleton. The area has a recent job growth of -0.18%.<sup>1</sup> The area only has 0% working in the real estate profession, while the US is at 1.9%. The area has seen a growth of .3% over the past 5 years.

<sup>1</sup> According to bestplaces.net

# Low Customer Growth Areas (Cont.)

| Citygate          | Growth |
|-------------------|--------|
| milton-free water | 0.00%  |
| mission           | 0.00%  |
| chemult           | 0.03%  |
| huntington        | 0.03%  |

- Chemult is a city in Central Oregon approximately 65 miles south of Bend. The area has a recent job growth of -0.36%.<sup>1</sup> The area only has 0% working in the real estate profession, while the US is at 1.9%. Cascade’s Chemult customers have fluctuated between 43 and 49 customers since 2004 and currently has the same number of customers as it did in 2005.
- Huntington is a city in Eastern Oregon near Baker City. The city has a recent job growth of -0.64%.<sup>1</sup> The city only has 0% working in the real estate profession, while the US is at 1.9%. Huntington has had a growth rate of 0% since 2007.



# High Customer Growth Areas

- Bend recently approved an urban growth plan that is projected to allow for the development of 2,380 acres of land. In October 2018, four developers on Bend’s westside successfully negotiated a development agreement for the planning and development of more than 1,000 homes on 383 acres.
- The city of Umatilla, in conjunction with the cities of Echo and Stanfield, are in the process of executing the recommendations of their 2019 West Umatilla County Housing Study. During its August 13<sup>th</sup> Planning Commission meeting, the city discussed amending its zoning ordinances to address current future housing needs, as discussed in the Study. In 2018 the city experience a spike in permits for new homes from 17 in 2017 to 56 in 2018, a 329% increase.
- Redmond continues to be one of the strongest housing markets in Central Oregon. Home sales volume in Redmond increased by over 12% in the second quarter of 2019 year over year, while 85 new homes were built in the second quarter. The City’s Planning Commission recently completed a Housing Grant Project for the Redmond Housing Needs Analysis and Buildable Lands Inventory. According to the analysis, approximately 7,000 housing units are needed over the next 20 years.

| Citygate   | Growth |
|------------|--------|
| Pronghorn  | 4.35%  |
| Umatilla   | 3.53%  |
| North Bend | 3.41%  |
| Redmond    | 2.88%  |
| Primeville | 2.45%  |
| Bend Loop  | 2.27%  |
| La Pine    | 2.26%  |

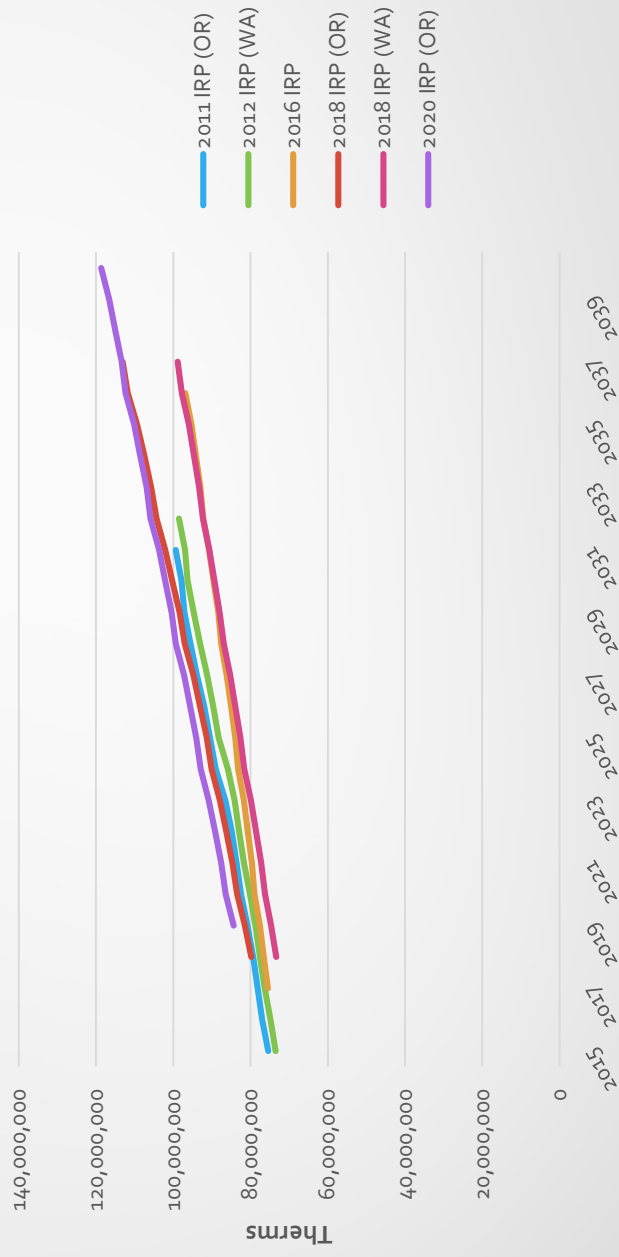
## High Customer Growth Areas (Cont.)

- Prineville is a major tech hub within central Oregon. In a recent ranking of the top 10 metropolitan areas, Prineville ranked 4<sup>th</sup> with 3.5% growth year over year. Additionally, in late September 2018, Facebook announced it will be spending \$750 million to build two more data centers on the outskirts of Prineville. This will add as many as 100 jobs to the city, increasing Facebook’s investment in Prineville to around \$2 billion.
- Much of the growth around La Pine is centered around the fact that it has only recently become incorporated as an actual city. After incorporation in late 2007, the region added 400 new jobs from 2010-2017, and approximately 20 to 25 new businesses during the first half of 2018 alone

| Citygate   | Growth |
|------------|--------|
| Pronghorn  | 4.35%  |
| Umatilla   | 3.53%  |
| North Bend | 3.41%  |
| Redmond    | 2.88%  |
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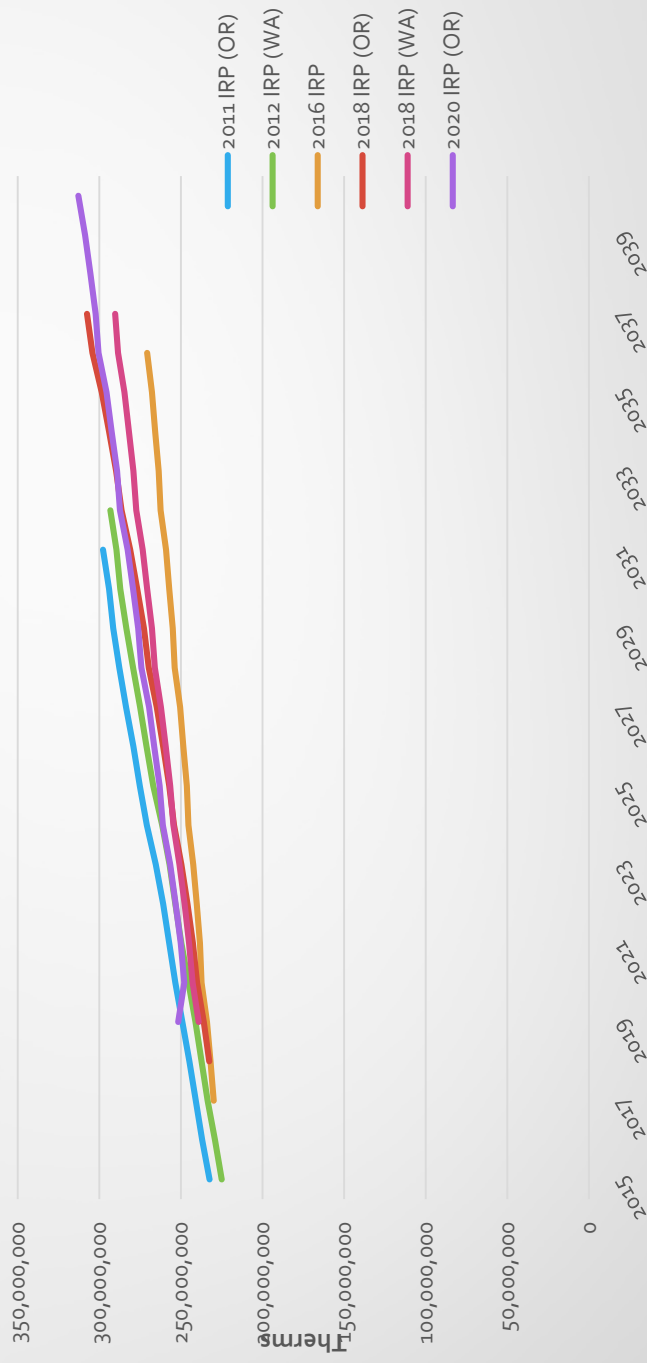
# Oregon Demand

## Oregon Annual Therm Usage



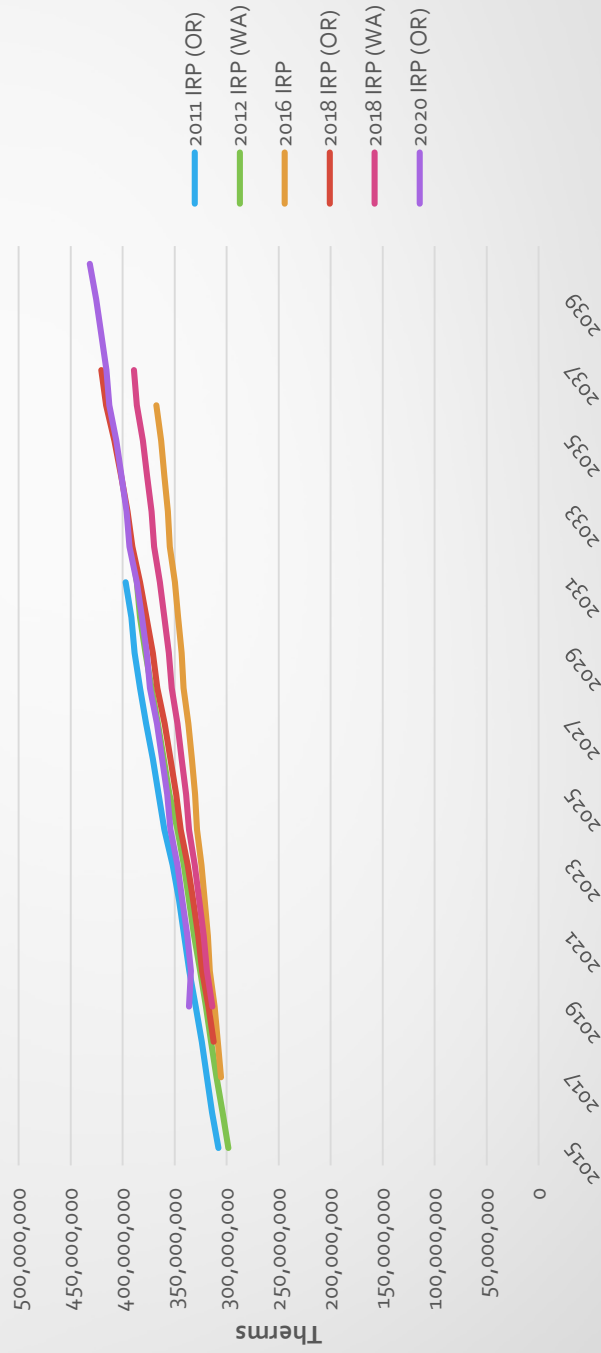
# Washington Demand

## Washington Annual Therm Usage



# Total System Demand

## Total System Annual Therm Usage



# Non-Core Outlook



# Non-Core Outlook

- Cascade forecasts the non-core for five years.
- Unlike the core, non-core (or transportation) customers are customers who schedule and purchase their own gas, generally through a marketer, to get gas to the citygate. The customer then uses Cascade's distribution system to receive the gas.
- Cascade's transportation customers include all types of industrial customers. It includes farms that may not use any gas during the winter to food manufacturers that average 800,00 therms per month throughout the year.
- Cascade also serves an electric generation customer in Oregon. Since there is only one customer, the forecast must remain confidential.

# Transportation Customers

- Cascade's transportation customer forecast increased by three from the previous forecast. The current forecast projects the customer count to be 40 in 2020 with plans to bring on 5-8 new customers over the next five years. Cascade's industrial managers are working closely with potential industrial customers.
- Cascade's projection increased by 2.5 million therms from the previous forecast. The increase is mainly a direct result from the new customers added.
- Cascade projects the transportation customers in Oregon to consume approximately 60 million therms in 2020.



# Electric Generation

- Cascade also serves an electric generation customer in Oregon. Since there is only one customer, the forecast must remain confidential.
- Cascade doesn't anticipate bringing on additional electric generation over the next five years.
- Washington passed SB 5116 which would require that non-emitting electric generation and electricity from renewable resources supply one hundred percent of all sales of electricity to Washington retail electric customers by January 1, 2045. Essentially, this would phase out Washington electric generation customers that Cascade would serve.

# Non-Core Forecast

- Transportation customers in Oregon forecast to use 63.5 million therms in 2020.
- Transportation customers in Washington forecast to use 498 million therms in 2020.
- Electric Generation customers forecast to use 390 million therms in 2020.
- Non-Core total forecast for 2020 is approximately 951 million therms.

# Market Outlook and Long Range Price Forecast

# Long Range Market Outlook

- Natural gas consumption in the residential and commercial sectors remains largely flat because of efficiency gains and population shifts that counterbalance demand growth.<sup>1</sup>
- Natural gas prices that are relatively low compared with historical prices lead to growing use of natural gas across most end-use sectors.<sup>1</sup>

# Long Range Market Outlook (Cont.)

- Natural gas production from shale gas and tight oil plays as a share of total U.S. natural gas production continues to grow in both share and absolute volume because of the sheer size of the associated resources, which extend over nearly 500,000 square miles, and because of improvements in technology that allow for the development of these resources at lower costs.<sup>1</sup>
- Natural gas prices in the AEO2019 Reference case remain lower than \$4 per million British thermal units (Btu) through 2035 and lower than \$5 per million Btu through 2050 because of an increase in lower-cost resources, primarily in tight oil plays in the Permian Basin, which allows higher production levels at lower prices during the projection period.<sup>1</sup>

# Long Range Price Forecast

- Cascade's long-term planning price forecast is based on a blend of current market pricing along with long-term fundamental price forecasts.
- The fundamental forecasts include sources such as Wood Mackenzie, EIA, the Northwest Power and Conservation Council (NWPCC), Bentek and the Financial Forecast Center's long-term price forecasts.
- While not a guarantee of where the market will ultimately finish, Henry Hub NYMEX is the most current information that provides some direction as to future market prices.
- Wood Mackenzie's long-term forecast is at a monthly level by basin. Cascade uses this to help shape the forecast's monthly basis pricing.
- The Company also relies on EIA's forecast; however, it has its limitations since it is not always as current as the most recent market activity. Further, the EIA forecast provides monthly breakdowns in the short-term, but longer-term forecasts are only by year.

# Long Range Price Forecast (Cont.)

- CNGC assigns a weight to each source to develop the monthly Henry Hub price forecast for the 20-year planning horizon.
- Although it is impossible to accurately estimate the future, for trading purposes the most recent period has been the best indicator of the direction of the market. However, Cascade also considers other factors (historical constraints) which can lead to minor adjustments to the final long-range forecast.

# Price Forecast Weights

- Considerations in weight assignments:
  - Cascade has modified its weighting system based on an analysis of the symmetric mean absolute percentage error (SMAPE) of its sources since 2010;
    - Wood Mackenzie (monthly, covers all basins)
    - EIA (industry barometer, annual long term)
    - NPPC (regional perspective, but recognize it is also a blend)
    - NYMEX Henry Hub
  - EIA is the only source who produces a forecast after 2037.
  - Some sources produce forecasts daily, while others are far less frequent.
    - Cascade uses an age dampening mechanism to account for this in its price forecast, reducing the impact of forecasts that do not account for more current market information.



# SMAPE to Weights

- $SMAPE = \frac{|(Actual - Forecast)|}{((Actual + Forecast)/2)}$
- Cascade calculates the weight of the inverse of the SMAPEs of each source, which are then smoothed using Holt-Winters smoothing.

| Rank (order of severity) | Weight      |             | Interval    |
|--------------------------|-------------|-------------|-------------|
|                          | Source 1    | Source 2    |             |
| MSE                      | 0.605111033 | 0.394888967 | 0.210222067 |
| MAE                      | 0.563119545 | 0.436880455 | 0.12623909  |
| MAPE                     | 0.562986465 | 0.437013535 | 0.12597293  |
| RMSE                     | 0.553149363 | 0.446850637 | 0.106298727 |
| MAAPE                    | 0.546818641 | 0.453181359 | 0.093637282 |
| SMAPE                    | 0.546045931 | 0.453954069 | 0.092091861 |

# Example of SMAPE Calculations by Source

|      | Source 1    | Source 2    | Source 3    | Source 4 |             |
|------|-------------|-------------|-------------|----------|-------------|
| T+1  | 0.11476063  | 0.217300759 | 0.100303147 |          | 0.150149419 |
| T+2  | 0.155600954 | 0.208054622 | 0.210782631 |          | 0.183031285 |
| T+3  | 0.180080034 | 0.159751563 | 0.211083367 |          | 0.188603149 |
| T+4  | 0.180885987 | 0.216499212 | 0.116823262 |          | 0.205636302 |
| T+5  | 0.204540958 | 0.17058102  | 0.13103414  |          | 0.227583943 |
| T+6  | 0.205116131 | 0.158629542 | 0.123911318 |          | 0.235010724 |
| T+7  | 0.193435025 | 0.017802511 | 0.087262544 |          | 0.218316379 |
| T+8  | 0.153245566 | 0.108208036 | 0.125836311 |          | 0.150703308 |
| T+9  | 0.19521638  | 0.182278012 | 0.083976291 |          | 0.212140322 |
| T+10 | 0.173129437 | 0.171413928 | 0.100741558 |          | 0.172400617 |
| T+11 | 0.209019609 | 0.19815898  | 0.159935388 |          | 0.180704729 |
| T+12 | 0.206179306 | 0.064646764 | 0.09191201  |          | 0.176900657 |

# Price Forecast Weights

- In Months T+1 to T+15, Cascade uses NYMEX Forward pricing for all locations exclusively;
  - For short term forecasting, the marketplace is ideal because forward prices should reflect all current events that impact the forecast (weather, storage, etc.)
  - Long term forecasting is more concerned about the fundamental market intelligence, which is reflected in the analysis of Cascade's sources.
- Months T+16 to T+40 are used to interpolate the weights from exclusively NYMEX to the weights calculated from each source's SMAPE.
- Months T+41 onward use the age dampened weights of each source.

# Example Weights Price Forecast For 2020 IRP (Not Interpolated)

|        | Source 1 | Source 2 | Source 3 | Source 4 |
|--------|----------|----------|----------|----------|
| Nov-20 | 100.000% | 0.000%   | 0.000%   | 0.000%   |
| Dec-20 | 48.519%  | 10.056%  | 30.541%  | 10.884%  |
| Jan-21 | 45.422%  | 8.696%   | 35.080%  | 10.803%  |
| Feb-21 | 41.871%  | 6.459%   | 40.277%  | 11.393%  |
| Mar-21 | 42.306%  | 6.147%   | 38.331%  | 13.216%  |
| Apr-21 | 43.894%  | 6.873%   | 35.403%  | 13.830%  |
| May-21 | 46.037%  | 7.801%   | 31.618%  | 14.543%  |
| Jun-21 | 46.341%  | 7.786%   | 30.066%  | 15.808%  |
| Jul-21 | 47.217%  | 7.910%   | 28.157%  | 16.716%  |
| Aug-21 | 47.463%  | 7.852%   | 28.039%  | 16.646%  |
| Sep-21 | 43.274%  | 5.700%   | 33.440%  | 17.585%  |
| Oct-21 | 42.655%  | 5.209%   | 35.035%  | 17.101%  |

# Example Weights Price Forecast For 2020 IRP (Interpolated)

|        | Source 1 | Source 2 | Source 3 | Source 4 |
|--------|----------|----------|----------|----------|
| Nov-20 | 100.000% | 0.000%   | 0.000%   | 0.000%   |
| Dec-20 | 97.695%  | 0.450%   | 1.367%   | 0.487%   |
| Jan-21 | 95.407%  | 0.732%   | 2.952%   | 0.909%   |
| Feb-21 | 93.118%  | 0.765%   | 4.768%   | 1.349%   |
| Mar-21 | 90.829%  | 0.977%   | 6.093%   | 2.101%   |
| Apr-21 | 88.541%  | 1.404%   | 7.231%   | 2.825%   |
| May-21 | 86.252%  | 1.988%   | 8.055%   | 3.705%   |
| Jun-21 | 83.963%  | 2.327%   | 8.986%   | 4.724%   |
| Jul-21 | 81.675%  | 2.746%   | 9.776%   | 5.804%   |
| Aug-21 | 79.386%  | 3.081%   | 11.002%  | 6.532%   |
| Sep-21 | 77.097%  | 2.301%   | 13.501%  | 7.100%   |
| Oct-21 | 74.808%  | 2.288%   | 15.391%  | 7.512%   |

# 2020 IRP Remaining Schedule

|                             |    |   |                          |                               |  |
|-----------------------------|----|---|--------------------------|-------------------------------|--|
| Wednesday, October 30, 2019 | OR | TAG 3 slides distributed to stakeholders  | RPT                      |                               |  |
| Wednesday, November 6, 2019 | OR | TAG 3: Distribution System Planning, Planned Scenarios and Sensitivities, Alternative Resources, Price Forecast, Avoided Costs, Current Supply Resources, Transport Issues. | RPT/Linda/Eric W         | Kennewick, WA - 9 am to 12 pm | Deschutes Room at Cascade's Kennewick General Office |
| Wednesday, January 8, 2020  | OR | TAG 4 slides distributed to stakeholders  | RPT                      |                               |  |
| Wednesday, January 15, 2020 | OR | TAG 4 Carbon Impacts, Conservation (Energy Trust of Oregon), Bio-Natural Gas, Preliminary Resource Integration Results.   | RPT/ETO/Al/Chris R/Abbie | Portland, OR - 9 am to 3 pm   | Multnomah Room at Portland International Airport     |
| Wednesday, March 4, 2020    | OR | TAG 5 slides distributed to stakeholders  | RPT                      |                               |  |
| Wednesday, March 11, 2020   | OR | TAG 5: Final Integration Results, finalization of plan components, Proposed new 4-year Action Plan.   | RPT                      | Salem, OR - 9 am to 12 pm     | Meadow room at OPUC Offices                          |
| Tuesday, May 12, 2020       | OR | Draft of 2020 OR IRP distributed  | RPT                      |                               |  |
| Friday, June 12, 2020       | OR | Comments due on draft from all stakeholders   | RPT                      |                               |  |
| Tuesday, June 30, 2020      | OR | TAG 6, if needed  | RPT/Other Parties        | WebEx Only                    |  |
| Friday, July 31, 2020       | OR | IRP filing in Oregon  | RPT                      |                               |  |

## ADDITIONAL QUESTIONS?

Mark Sellers-Vaughn – Manager, Supply Resource Planning: (509) 734-4589  
[mark.sellers-vaughn@cngc.com](mailto:mark.sellers-vaughn@cngc.com)

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[brian.robertson@cngc.com](mailto:brian.robertson@cngc.com)

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Ashton Davis – Resource Planning Analyst I: (509) 734-4520  
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Bruce Folsom - Consultant

# Cascade Natural Gas Corporation

## 2020 OR Integrated Resource Plan Technical Advisory Group Meeting # 2

Thursday, September 5th, 2020

Public Utility Commission of Oregon

Salem, OR







## OPUC Tag Meeting 2

**Date & Time:** 9/5/2020, 09:00 AM – 10:45 AM

**Location:** OPUC Offices in Salem, OR – Meadow Room

**In attendance:** Mark Sellers-Vaughn, Brian Robertson, Devin McGreal, Ashton Davis, Anna Kim (OPUC), Dan Kirschner (NWGA), Connor Reiten (NWGA), Teresa Hagins (NWP)

**Called in:** Eric Wood, Kevin Connell, Carolyn Stone, Monica Cowlshaw, Bruce Folsom, Linda Offerdahl, Mike Paruszkiewicz (NWN)

**Minutes by:** Brian Robertson

Mark kicked off the meeting by thanking everyone that showed up. Brian asked Anna to explain fire safety of their building.

- Brian went through introductions and the agenda.
- Brian shared a map of Cascade's service territory and explained how spread out the service territory was.
- Ashton discussed the demand forecast and key assumptions regarding the demand forecast.
  - Explained different statistics used to measure the accuracy of each model.
  - Explained how Cascade calculates HDDs.
  - Shared the seven different weather locations.
- Ashton then explained Cascade's process for the use per customer and the customer forecasts with multiple flow charts.
- Ashton then described the customer forecast process further.
  - Anna asked if we were able to explain each Fourier term and Ashton responded saying yes.
- Ashton then described the use per customer forecast process further.
- Ashton talked about how Cascade, in the past, has used the coldest day in past 30-year history. Cascade mentioned looking at monte carlo scenarios for replacing the 30-year history methodology. Other stakeholders discussed using longer duration for cold weather modeling. Cascade has agreed to take a further look at long duration cold events.
- Brian discussed the forecast results as well as a non-weather dependent model and the result of those as well.
- Brian then went through some of the city's experiencing low growth as well as city's experiencing high growth.

- Brian shared the results of the forecast compared to past forecasts.
- Anna asked how new customer usage is modeled compared to older customers since newer customers usually have lower usages (more efficient houses). Brian explained the difficulties of determining the exact amount but it's definitely something on Cascade's radar.
- Brian gave an overview of the non-core outlook for Cascade. He explained how the non-core could impact the core through rate schedule changes.
- Devin discussed the market outlook and long-range price forecast.
- Devin explained how Cascade weights the different forecast sources and how we age dampen some of the forecasts.
- Brian asked if there were any questions regarding Cascade's LC-69 2018 IRP Update filing. Anna said she did not have any questions.
- Brian also asked if there were questions regarding the stakeholder engagement document and there were no questions.
- Brian then explained that Cascade needs to lock down the forecast model so any issues with the forecast model need to be brought up as soon as possible. Anna asked Cascade to discuss with ETO to ensure they understand what they are receiving when we send out forecast model.
- Brian wrapped up the meeting discussing the remaining schedule.

TAG 3 will take place on November 6<sup>th</sup>, 2019 in Kennewick, WA at Cascade's General Office Deschutes room.

**The meeting was adjourned at 10:45 AM.**

# Cascade Natural Gas Corporation

## 2020 Integrated Resource Plan Technical Advisory Group Meeting #3

Wednesday, November 6<sup>th</sup>, 2019

Cascade's Offices in Deschutes Room

Kennewick, WA



# Agenda

- **Introductions**
- **Ruby Presentation**
- **Distribution System Planning**
- **Cascade Gas Supply Overview**
- **Planned Scenarios and Sensitivities**
- **Alternative Resources**
- **Price Forecast Results**
- **Avoided Cost Methodology and Calculation**
- **2020 IRP Remaining Schedule**

# Ruby Pipeline Overview



# Distribution System Planning

Linda Offerdahl, PE – Engineer II

Technical Advisory Group  
November 6<sup>th</sup>, 2019



# Summary

- System Overview
- Software Tools
- Data Gathering
- Synergi System Model
- Distribution Enhancement Options
- Project Process Flow
- Future Projects



# System Overview

## Pipelines:

- Diameter – 1/2" to 20"
- Material – Polyethylene and Steel
- Operating Pressure – 20 psi to 900 psi
- Washington – approx. 4,744 miles of distribution main
- Oregon – approx. 1,604 miles of distribution main



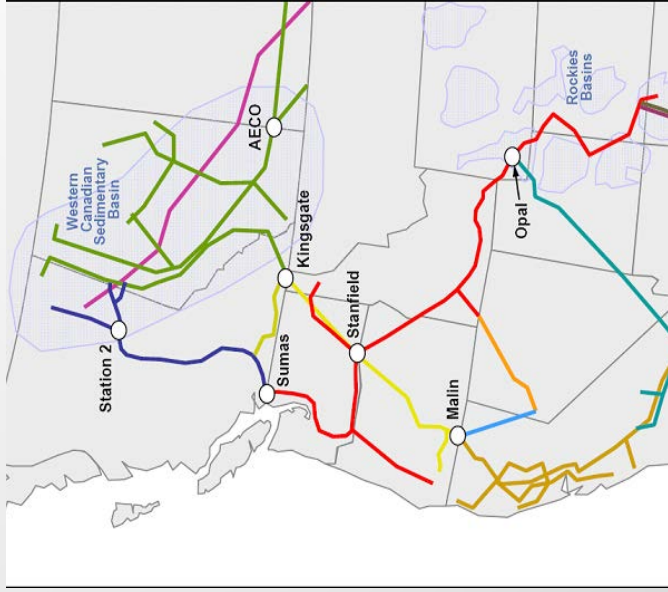
# System Overview

## Facilities:

- Regulator stations – Over 700
- Valves – Over 1,600
- Other equipment such as heaters, odorizers and compressors

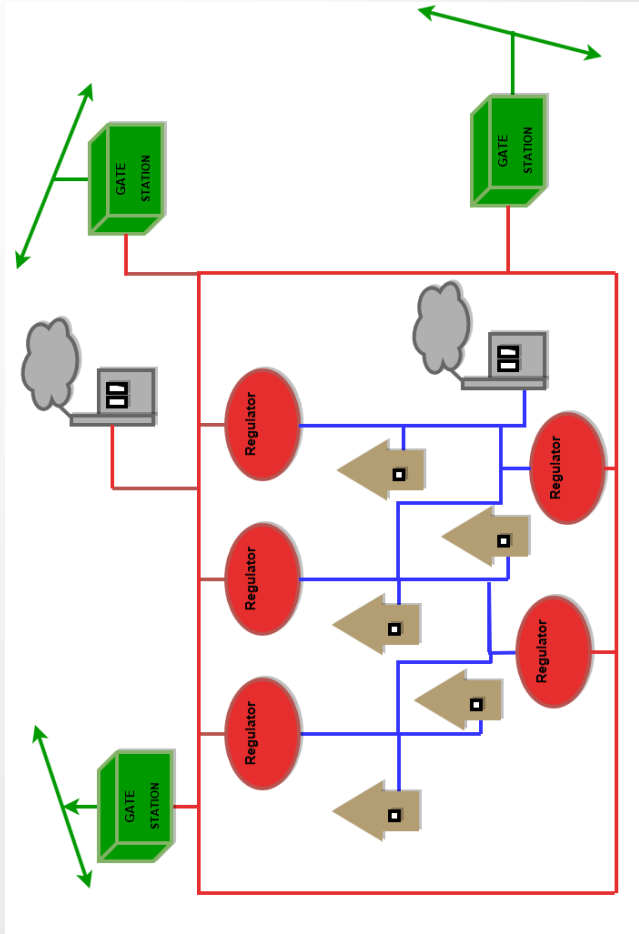


# Where do we get our gas?



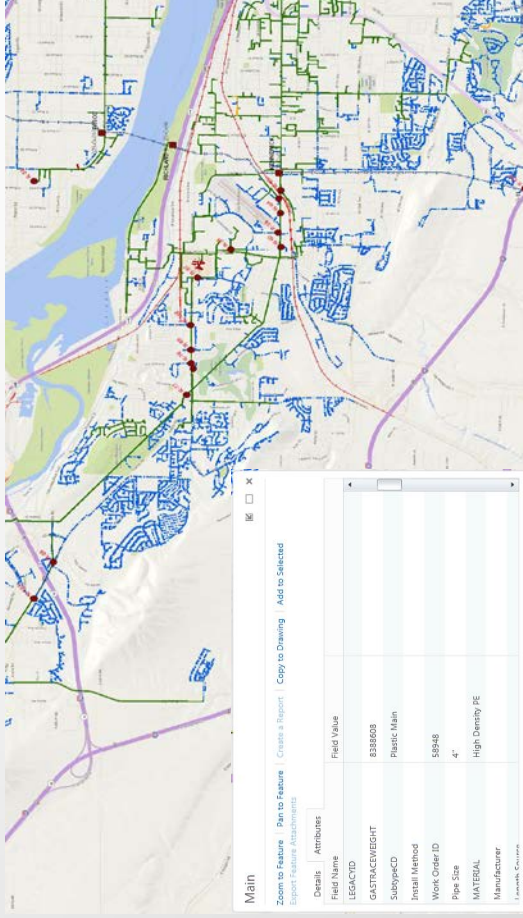
- Many interstate pipeline companies
- Williams Northwest Pipeline (red)
- TransCanada Pipelines (yellow)

# Network Design Fundamentals



# GIS – Geographic Information System

- GIS System keeps an up to date record of pipe and facilities complete with all system attributes.



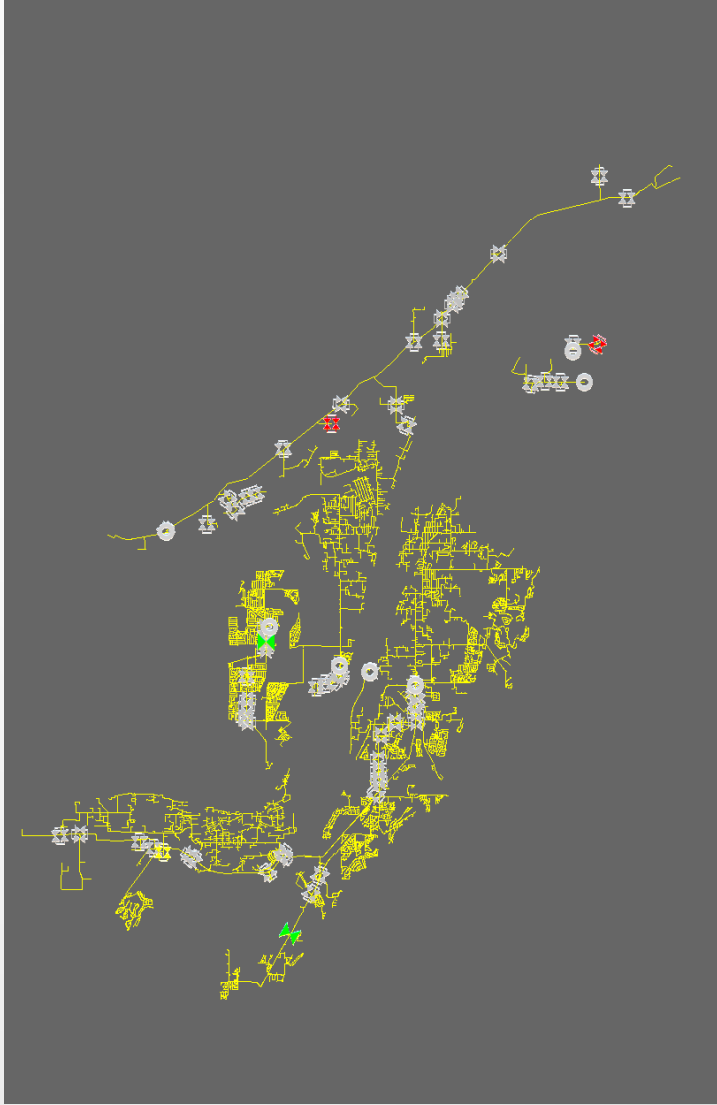
# System Modeling

- Using internal GIS environment and other input data, CNG is able to create system models through the software – Synergi.

## What is Synergi?

- Software to model piping and facilities to represent current pressure and flow conditions while also predicting future events and growth.

# Synergi Model Example





# Data Gathering

- SCADA Data
- Real time and historical flow characteristics at specific locations in the system

**MDU SCADA View** | Pressures | Usage | Odorizers | Other Systems

**CNGC Southwest Washington Usage**

The data on this page is automatically refreshed every 5 minutes. Reloading the page before the timer expires will not necessarily result in newer data.

**Data View Mode**  
Generated: 09/01/2016 04:41:40 PM PDT  
Refreshed: 09/01/2016 03:46:06 PM PDT  
Next Refresh: 0600457

| Monitored Area            | Flow Rate (Mcf/HR) | Previous Hour (DekaTherms) | Current Gas Day (DekaTherms) | Previous Gas Day (DekaTherms) |
|---------------------------|--------------------|----------------------------|------------------------------|-------------------------------|
| Puget Sound NS Run1       | 56.5               | 61                         | 538                          | 1652                          |
| Bremerton Gate Run1       | 90.5               | 99                         | 906                          | 2454                          |
| Shelton Gate Total        | 232.1              | 259                        | 2399                         | 5829                          |
| Mc Cleary Gate Run1       | 207.7              | 216                        | 1837                         | 4884                          |
| South Longview Gate Total | 1620.9             | 1569                       | 11624                        | 21984                         |
| Kelso Gate Total          | 787.1              | 816                        | 6508                         | 15172                         |
| Kalama Gate Total         | 199.8              | 225                        | 1914                         | 5435                          |
| Co Gen Run1               | 0.0                | 0                          | 0                            | 0                             |
| Fibre Mill Run1           | 448.4              | 475                        | 4271                         | 7952                          |
| Mint Farm Run1            | 1912.2             | 1923                       | 13754                        | 28647                         |

**Data Legend**



# Data Gathering

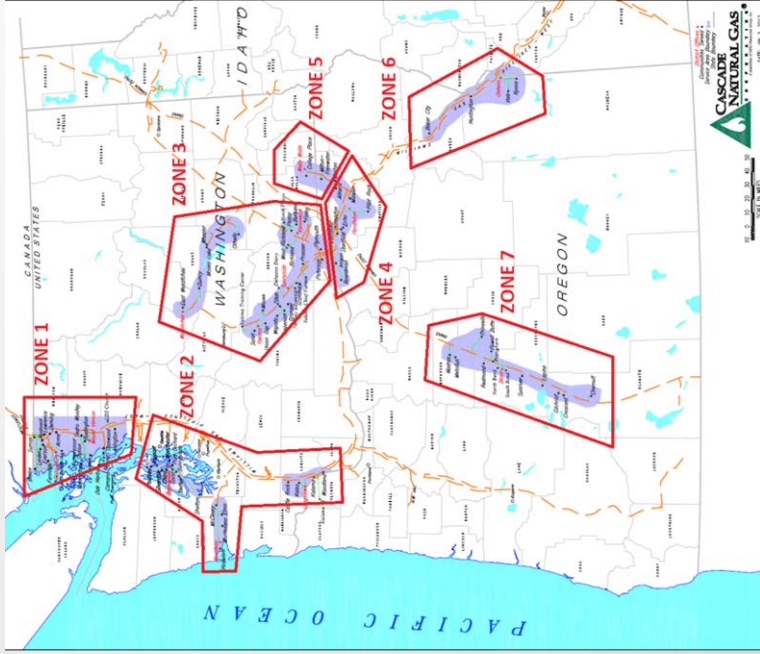
- IRP Customer Growth

|      | Bend Loop |        | Madras    |        | Stearns   |        |
|------|-----------|--------|-----------|--------|-----------|--------|
|      | Customers | Growth | Customers | Growth | Customers | Growth |
| 2020 | 38,727    | -      | 1,669     | -      | 3,960     | -      |
| 2021 | 39,808    | 2.79%  | 1,702     | 1.98%  | 4,003     | 1.09%  |
| 2022 | 40,888    | 2.71%  | 1,735     | 1.94%  | 4,046     | 1.08%  |
| 2023 | 41,968    | 2.64%  | 1,768     | 1.90%  | 4,089     | 1.07%  |
| 2024 | 43,048    | 2.57%  | 1,801     | 1.87%  | 4,133     | 1.06%  |
| 2025 | 44,128    | 2.51%  | 1,834     | 1.83%  | 4,176     | 1.04%  |
| 2026 | 45,208    | 2.45%  | 1,867     | 1.80%  | 4,219     | 1.03%  |
| 2027 | 46,288    | 2.39%  | 1,900     | 1.77%  | 4,262     | 1.02%  |
| 2028 | 47,368    | 2.33%  | 1,933     | 1.74%  | 4,305     | 1.01%  |

# Data Gathering

- Peak Heating Degree Day (HDD) modeled by CNG weather zone based on historical weather data

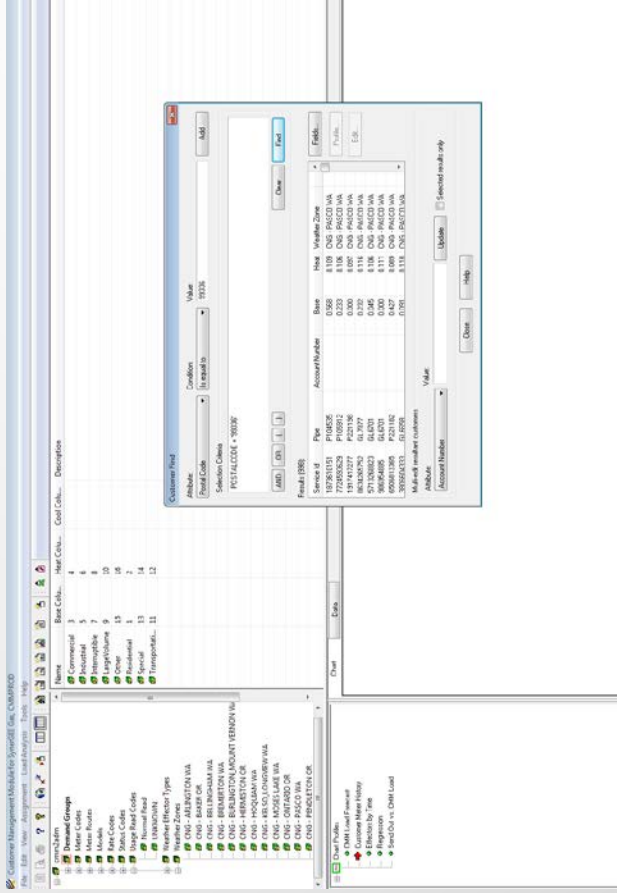
Peak HDD = 60 – Average Daily Temp



|                 |          |
|-----------------|----------|
| System Peak Day | 12/21/90 |
| System Peak HDD | 56       |
| Zone 1          | 46       |
| Zone 2          | 46       |
| Zone 3          | 58       |
| Zone 4          | 67       |
| Zone 5          | 65       |
| Zone 6          | 70.5     |
| Zone 7          | 70.5     |

# Customer Management Module (CMM)

- Software that compiles data from CC&B and HDD to manage customer loads
- Works directly with Synergi to input customer data and represent pressures and flows in the model

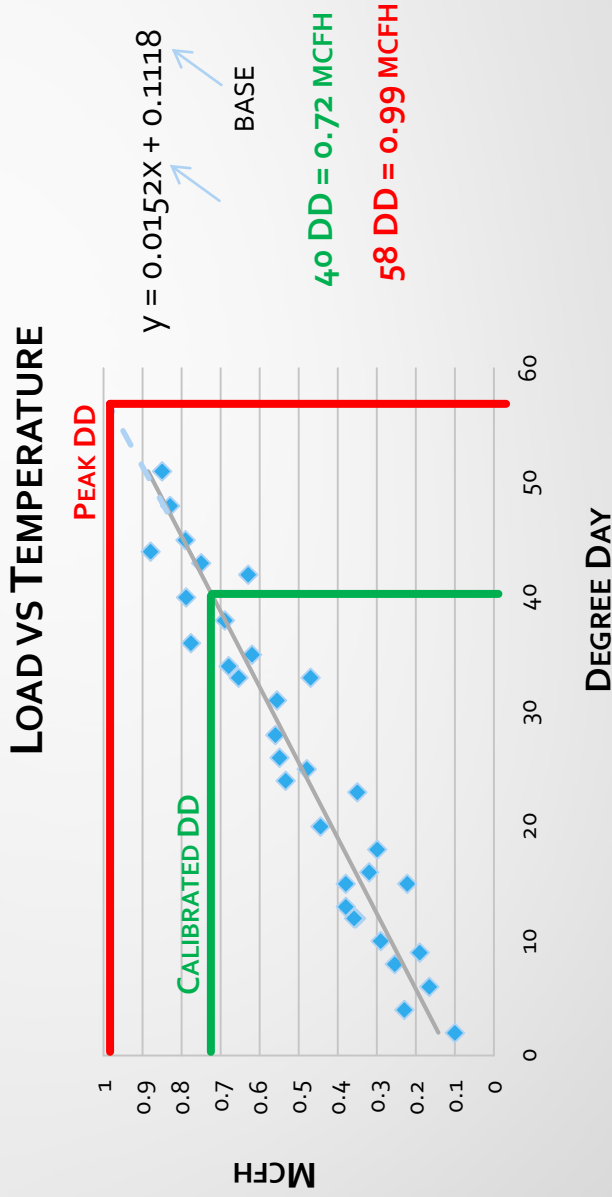


# CMM → Synergi System Model

- Conversion can result in 3 model types:
  - Calibrated Model – Model to represent a specific date and time.
  - Design Day Model – Uses the peak HDD for selected areas to simulate a cold weather event (worst case scenario).
  - Growth Model – Uses design day model along with growth data to predict future projects.

# Calibrated vs Peak Degree Day

- Different loads will be applied to each customer



# Synergi System Model

- All customers are loaded based upon base and heat trend.
- Growth model – works with design day model and customer growth numbers to simulate pressures and flows in the future.
- Benefits of the models:
  - Customer requests
  - Future planning
  - System reliability
  - Optimizing distribution enhancement options

# Distribution Enhancement Options

- Pipeline:
  - Replacements
  - Reinforcements
  - Loops
- Regulator Stations
- Compressors

# Pipeline Enhancements

## Pros

- Reliable capacity
- Low maintenance
- Permanent

## Cons

- Can be expensive
- Potential land acquisition and/or permitting issues



# Reg Station Upgrades/Installs

## Pros

- Adds source pressure to alternate system location
- Increases flow control
- Increases pressure control

## Cons

- Long term regulator and valve maintenance
- High installation/fabrication costs
- Potential land acquisition issues

# Compressor Stations

## Pros

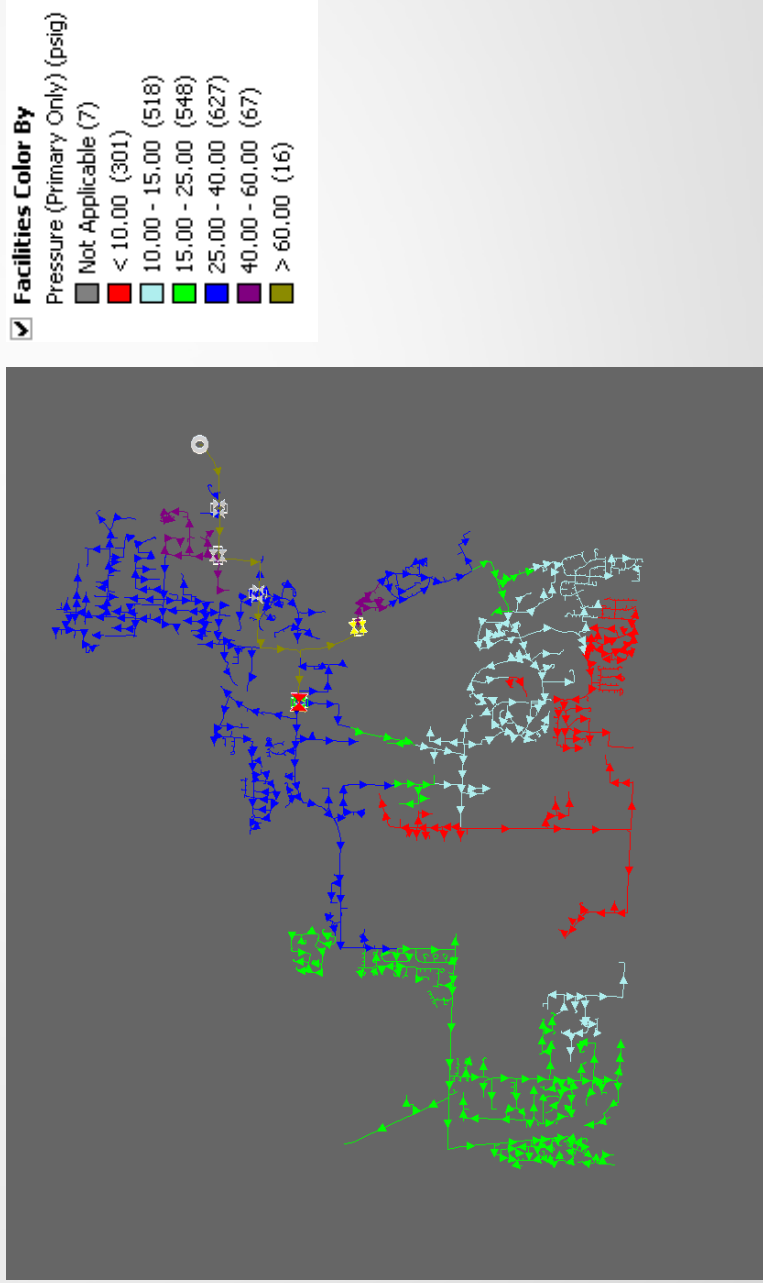
- Adding capacity at lower initial cost
- Less land required
- Situational operation

## Cons

- Continuous maintenance/training
- Cost of fuel consumption
- Emissions/permitting
- Beneficial only on transmission/HP lines

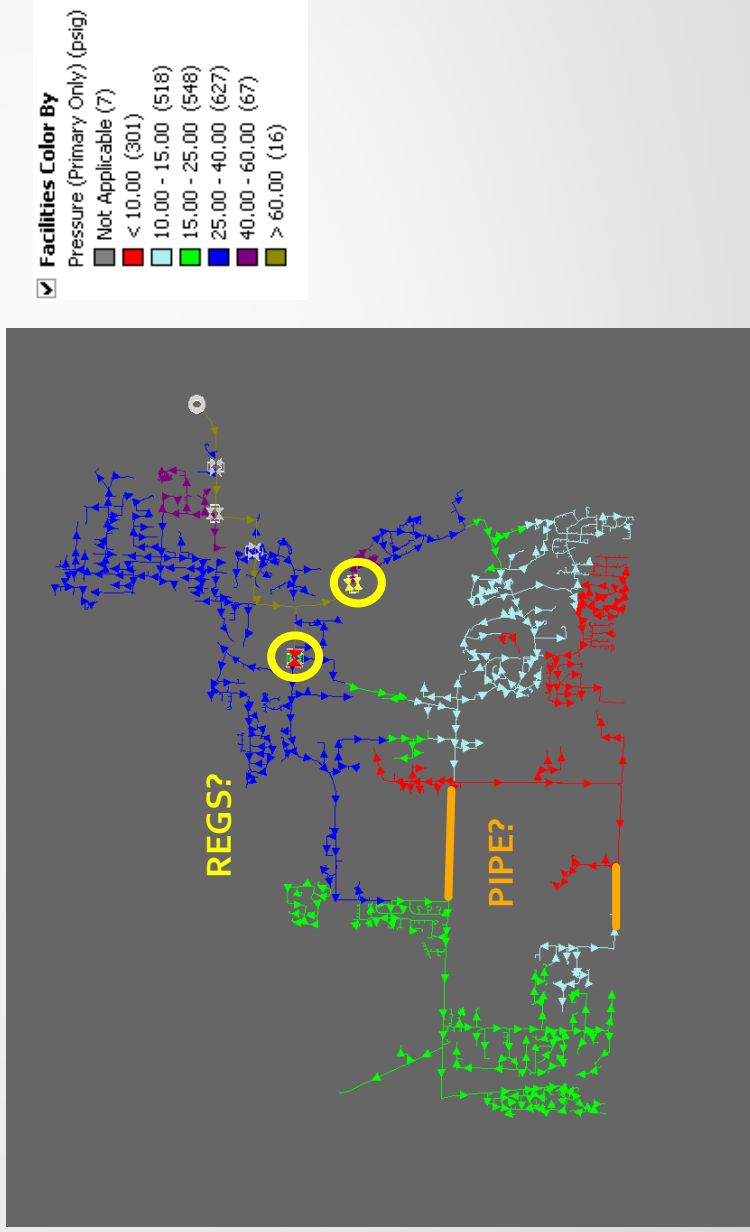
# Distribution Enhancement Options

- Theoretical low pressure scenario



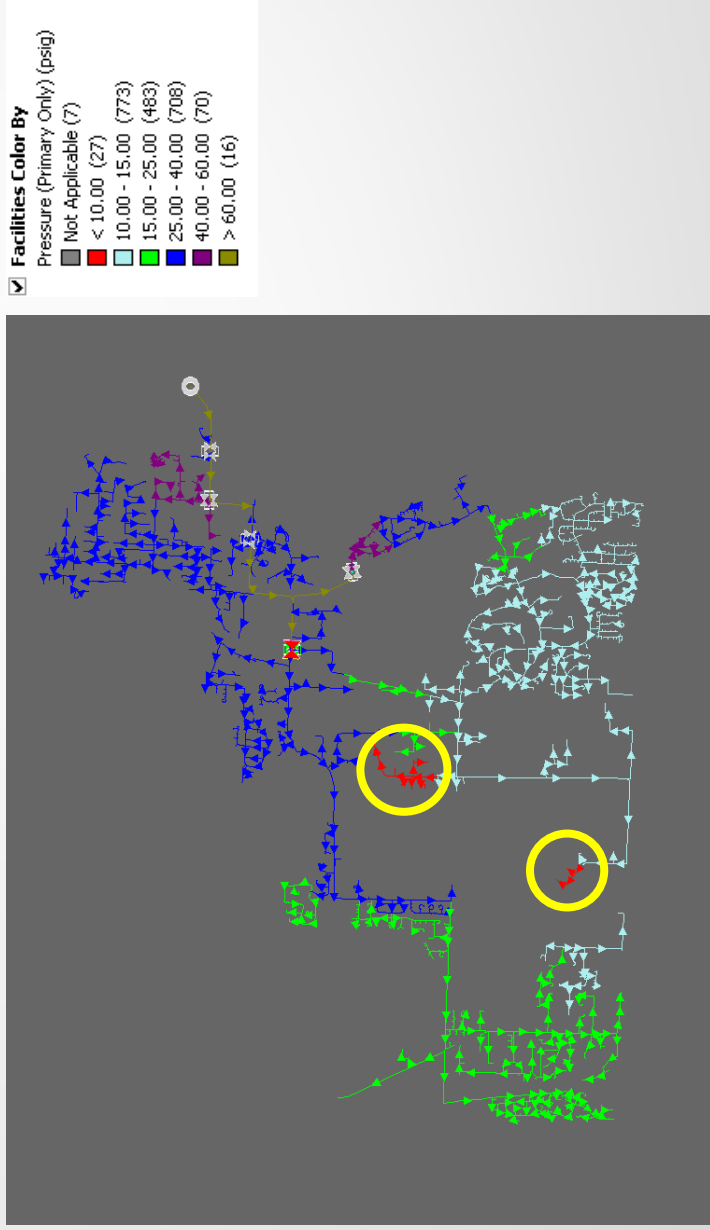
# Distribution Enhancement Options

- Low pressure scenario



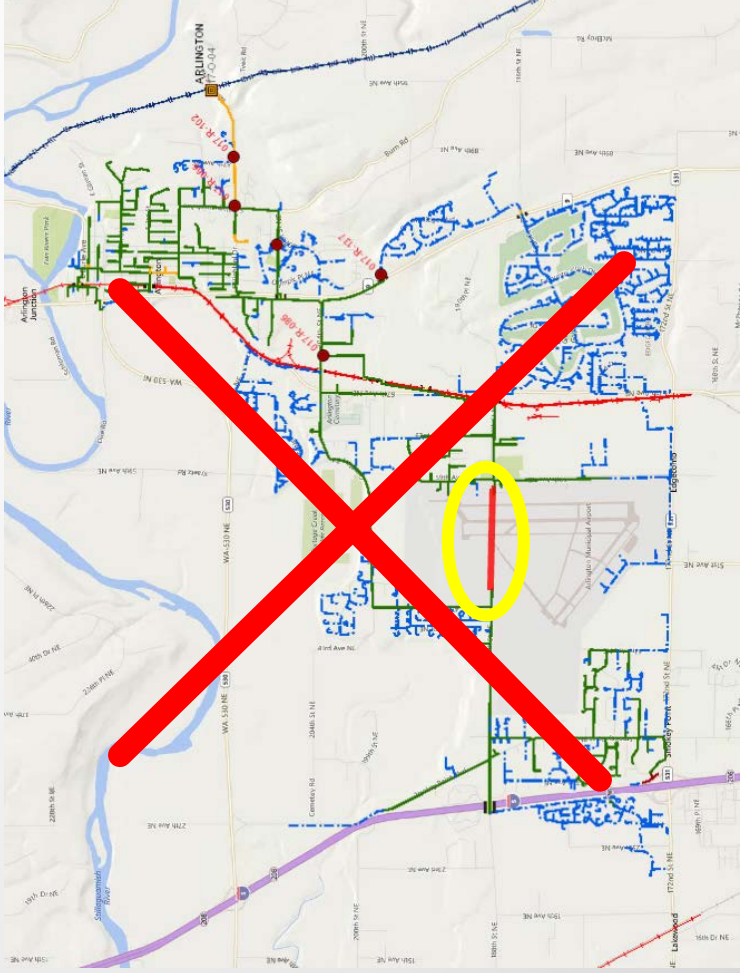
# Distribution Enhancement Options

- Possible solutions – raising reg station set points



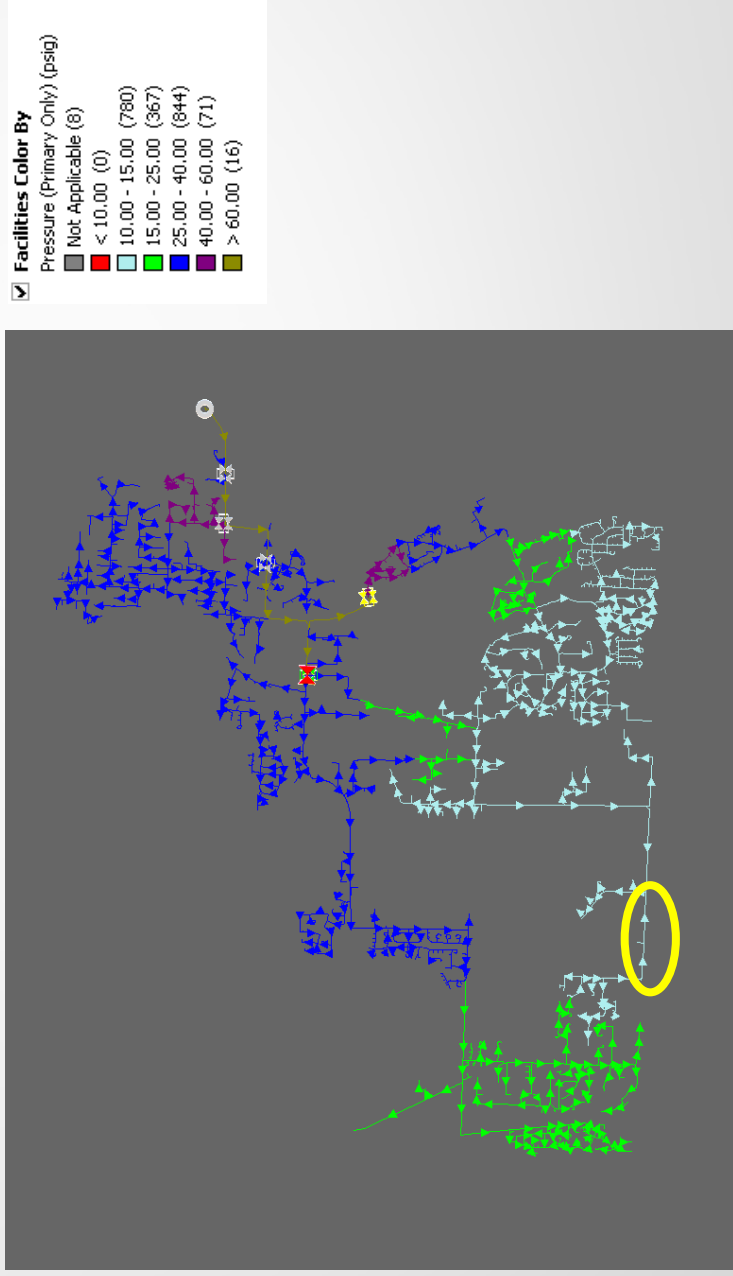
# Distribution Enhancement Options

- Reinforcement option #1

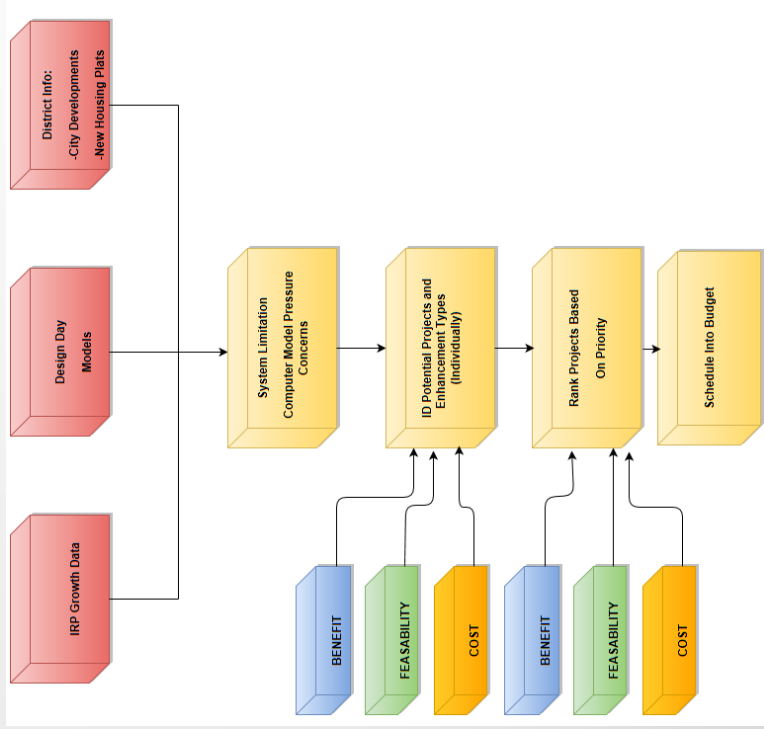


# Distribution Enhancement Options

- Reinforcement option #2



# Project Process Flow



Project & Schedules



# Future Projects

- Planned distribution enhancement projects in Oregon for next 4 years:
  - Pendleton 4" IP & HP Reinforcements Ladow Rd
  - Pendleton 4" IP Reinforcement Korvola Rd
  - South Hermiston HP Reinforcement Feedville Rd
  - Bend 8" HP Reinforcement Bear Ck Rd
  - Bend Gate Station Rebuild
  - Redmond 6" HP Reinforcement Veterans Way
  - Bend 6" HP Reinforcement Shevlin Pk
  - Bend 6" IP Reinforcement Ponderosa St
  - Baker Gate Station Rebuild
  - Prineville Gate Station Rebuild

# Conclusion

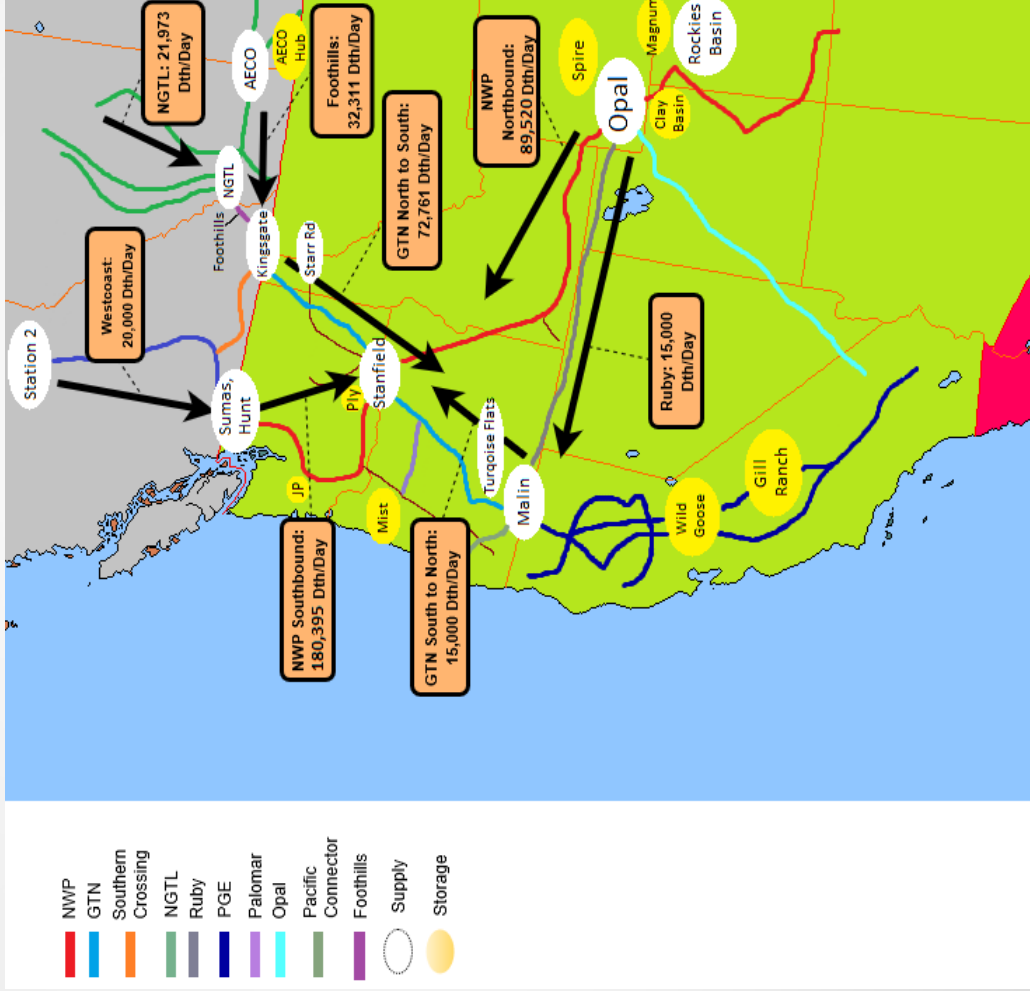
- CNG strives to use technology to gather data, analyze, plan, and design a reliable, safe, and economical distribution system.

# Questions ?

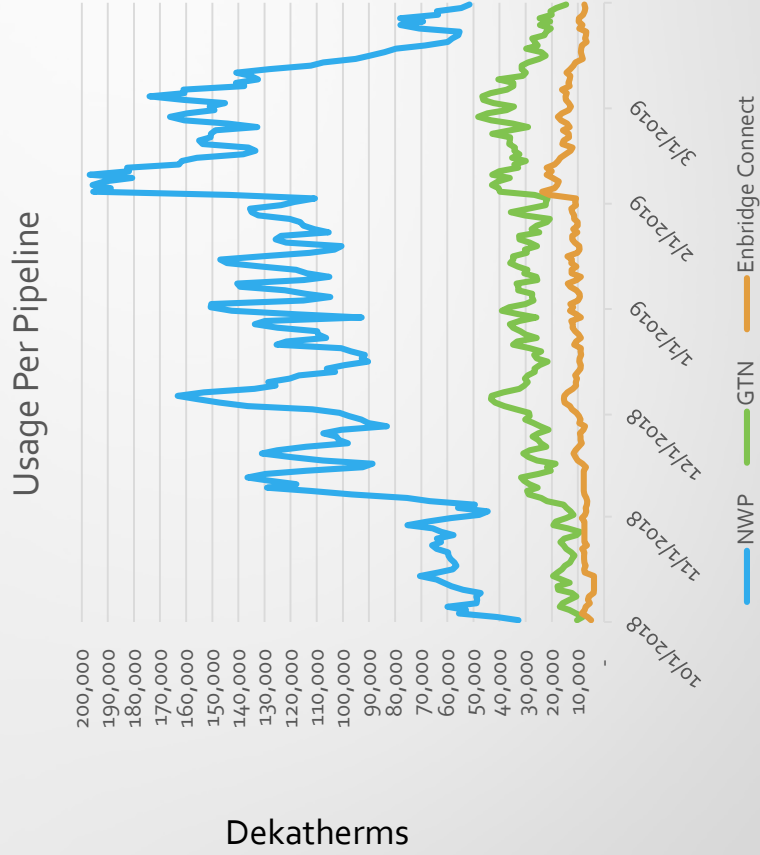
# Cascade Gas Supply Overview



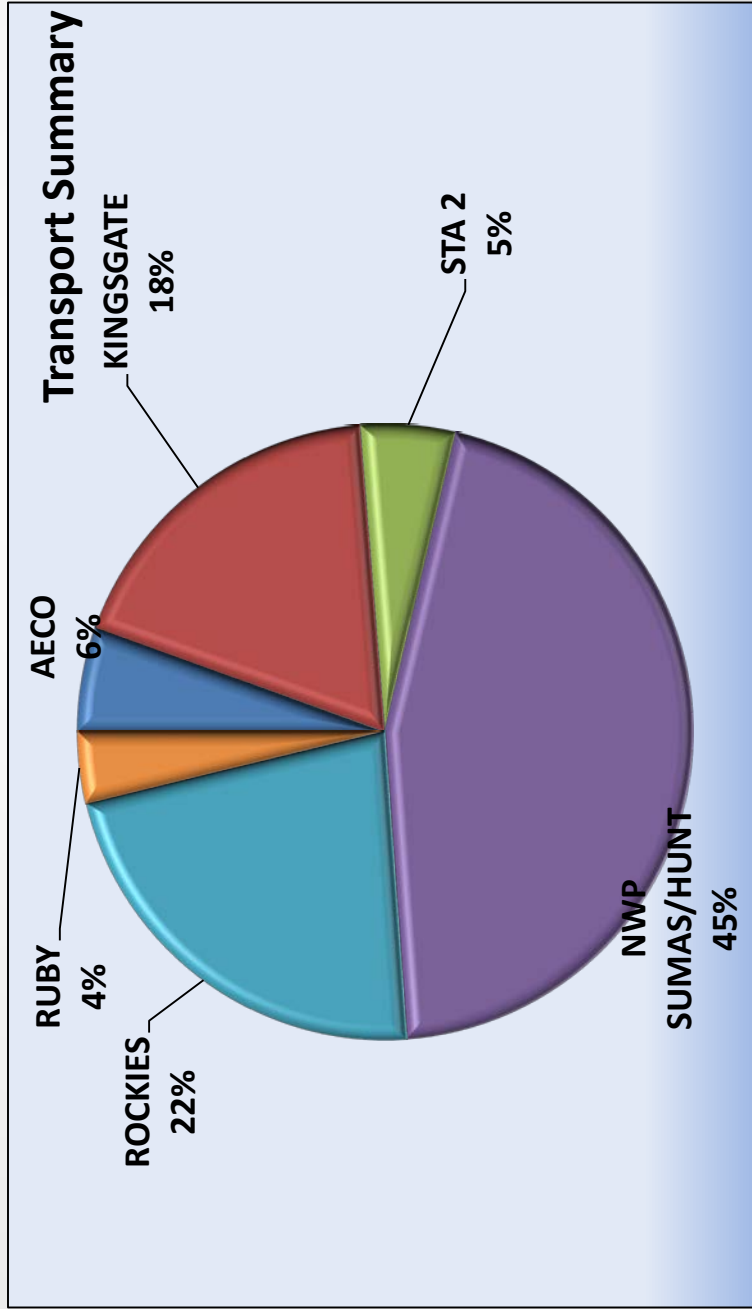
# Pipeline transport flow



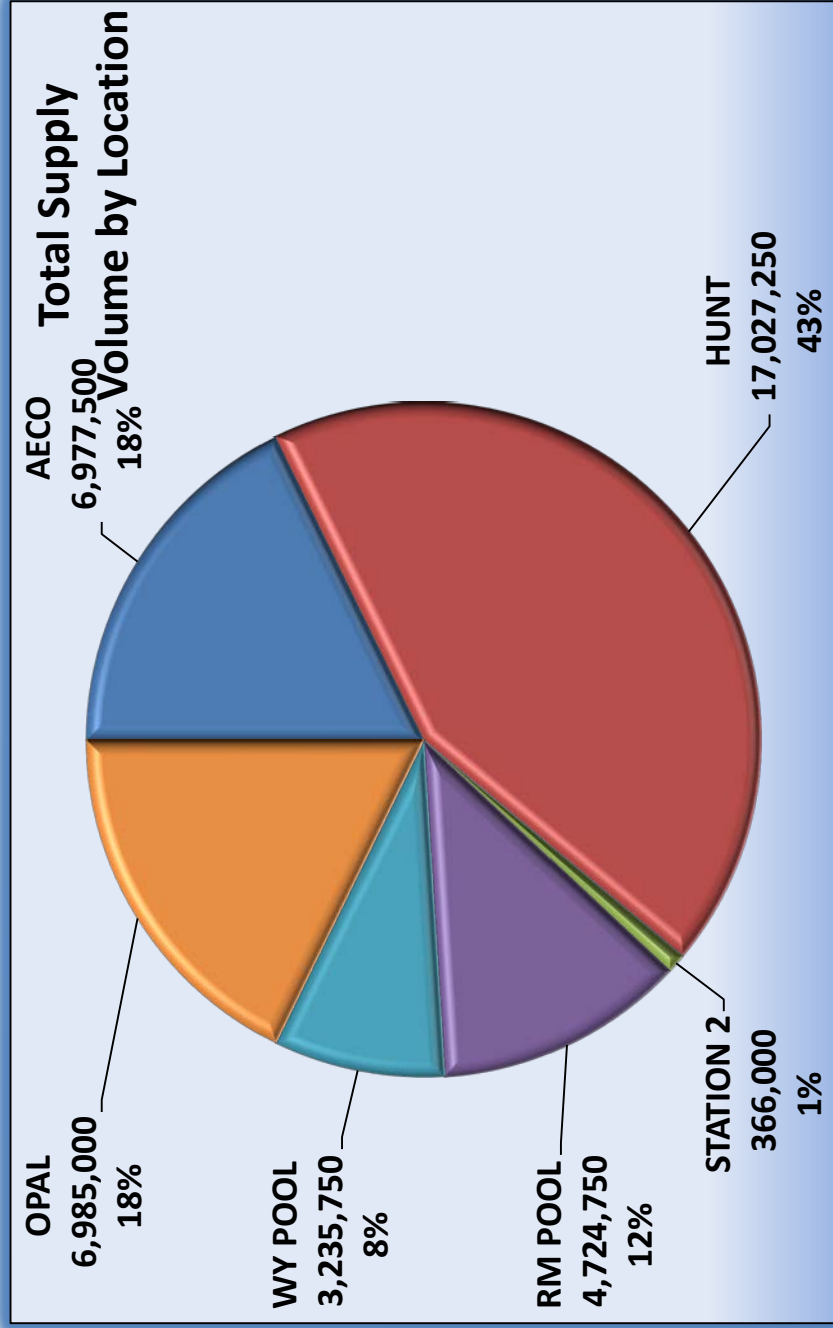
# Winter Usage



# Transport Summary



# Supply Summary

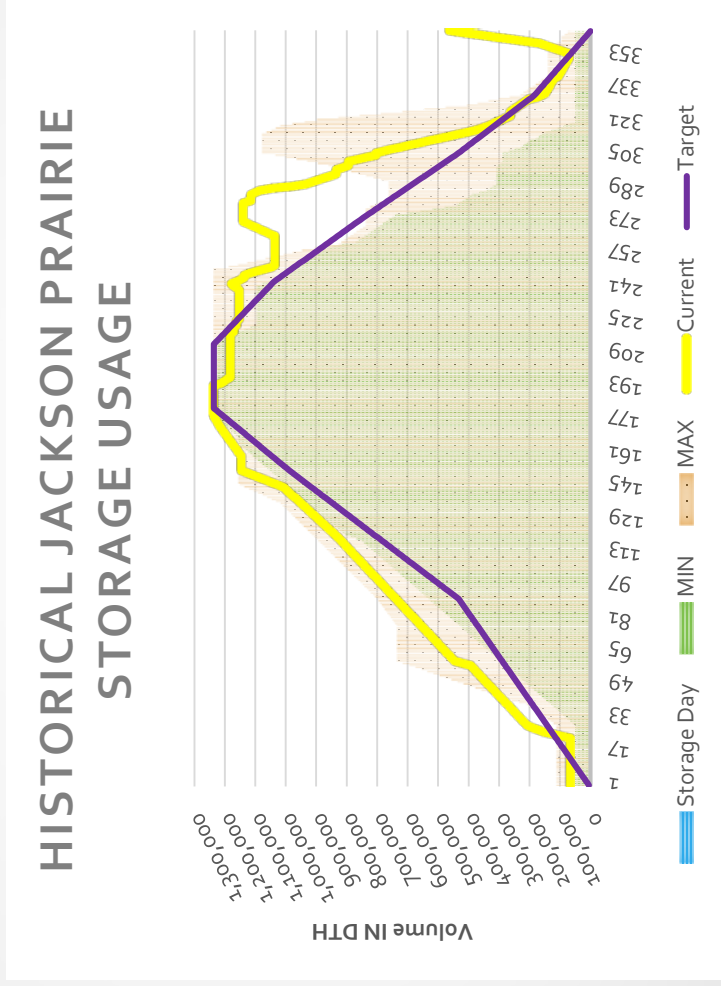


## Storage Resources

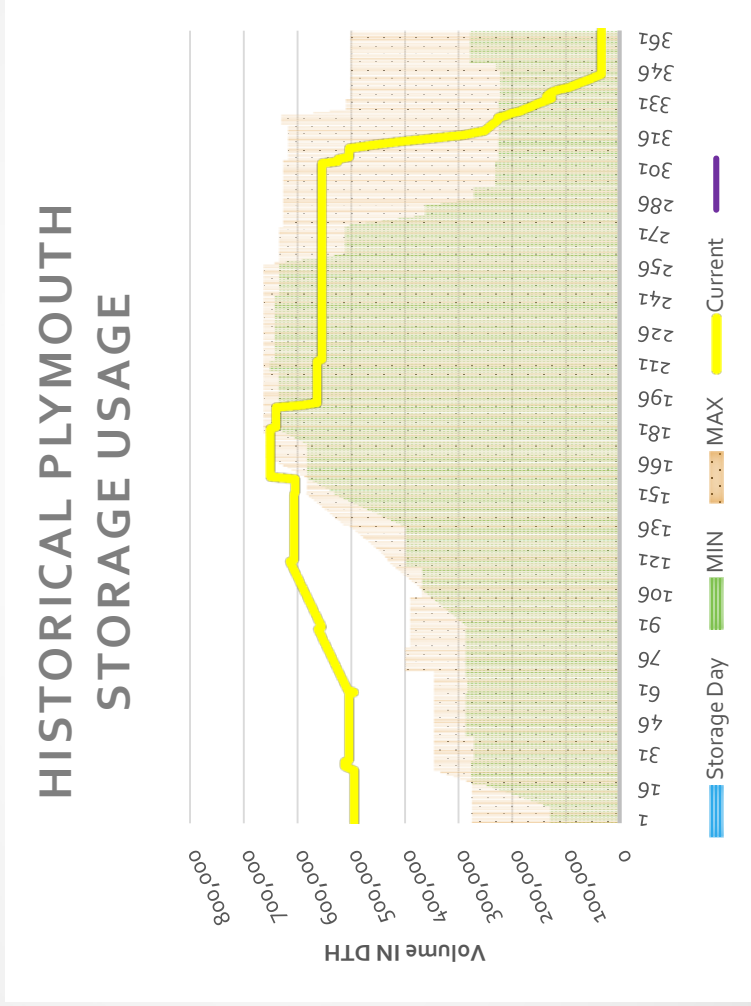
- Jackson Prairie
  - 4 accounts with 1,235,593 dth capacity, 56,366 dth of demand
  - CNGC cycled approximately 95% of Jackson Prairie storage over the past winter season
  - CNGC targets cycling Jackson Prairie
- Plymouth
  - 2 accounts with 662,200 dths capacity, 78,125 dth of demand
  - In addition to above we have TF-2 (Firm Redelivery Transportation) of 10,675 dths
  - CNGC remains committed to using Plymouth as a peaking resource
- MIST
  - Added in the spring of 2019
  - 600,000 dth of capacity, 30,000 dth of demand



# 2018/2019 JP Storage Utilization



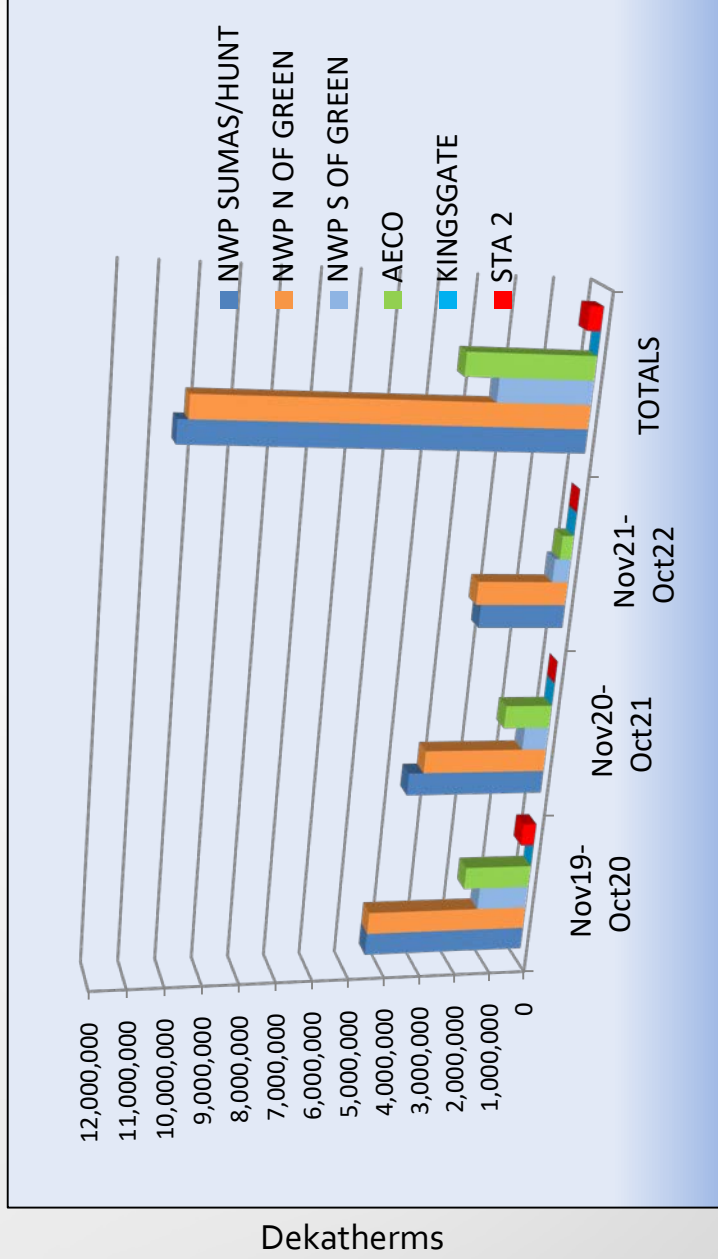
# 2018/2019 Plymouth Storage Utilization



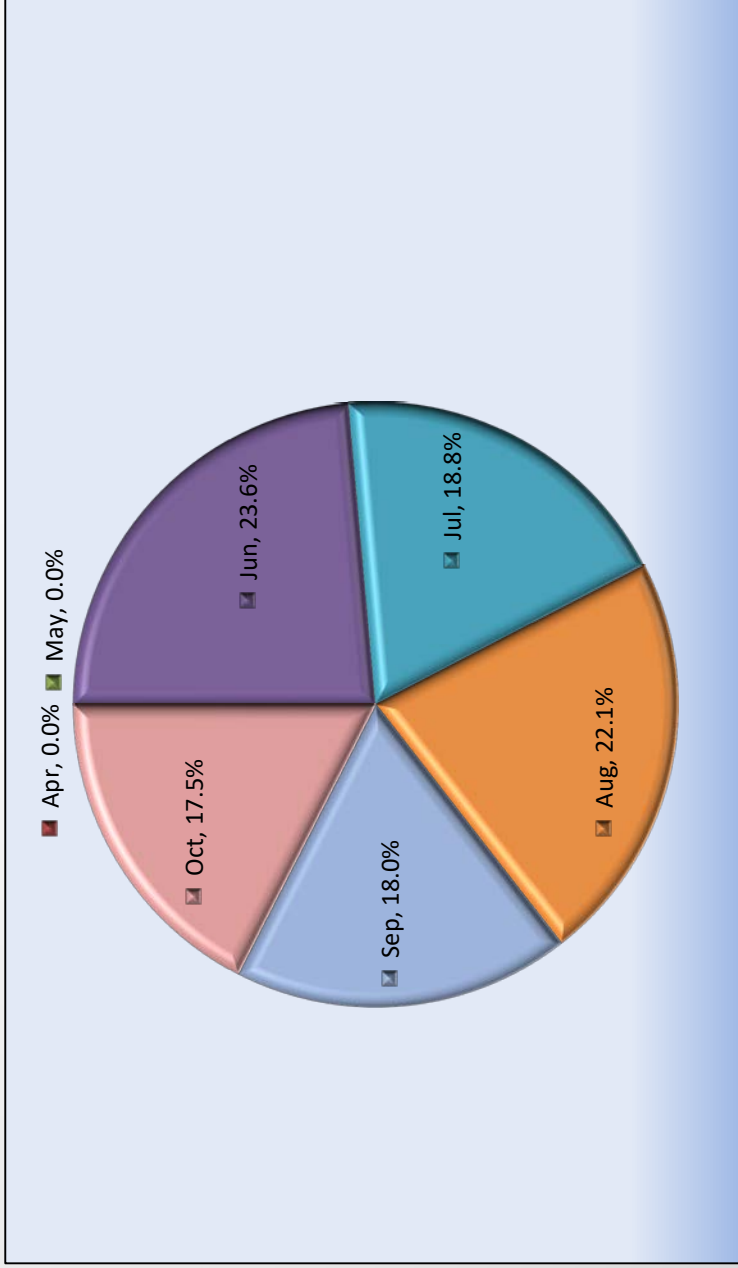
## HIGHLIGHTS FOR THE 2019 PORTFOLIO DESIGN

- PORTFOLIO PROCUREMENT DESIGN BASED ON A DECLINING PERCENTAGE EACH YEAR, ACCORDINGLY: Year 1: Approximately 80% of annual requirements; Year 2: 40%, Year 3: 20%.
  - 80% allows more flexibility operationally
  - Allows us to be in the market monthly through FOM purchase or Day Gas purchases
- Hedged Percentages (fixed-price physical) Currently max 60% of annual requirements. Second year max is set at 40%, and 20% hedged volumes for year three. GSOB bumped up the 1<sup>st</sup> year percentage to mitigate upside risk at Sumas/Hunt .
  - Cascade has executed on one Financial Swap in Year 2.
  - Hedging may need to be more flexible as policy develops
- CNGC's Gas Supply Oversight Committee (GSOB) would consider a modification of this plan if the outer year 3 year forward price is 20% higher/lower than the front month over a reasonably sustained period.
- Annual load expectation (Nov-Oct) is approximately 34,000,000 dths, consistent with recent load history.

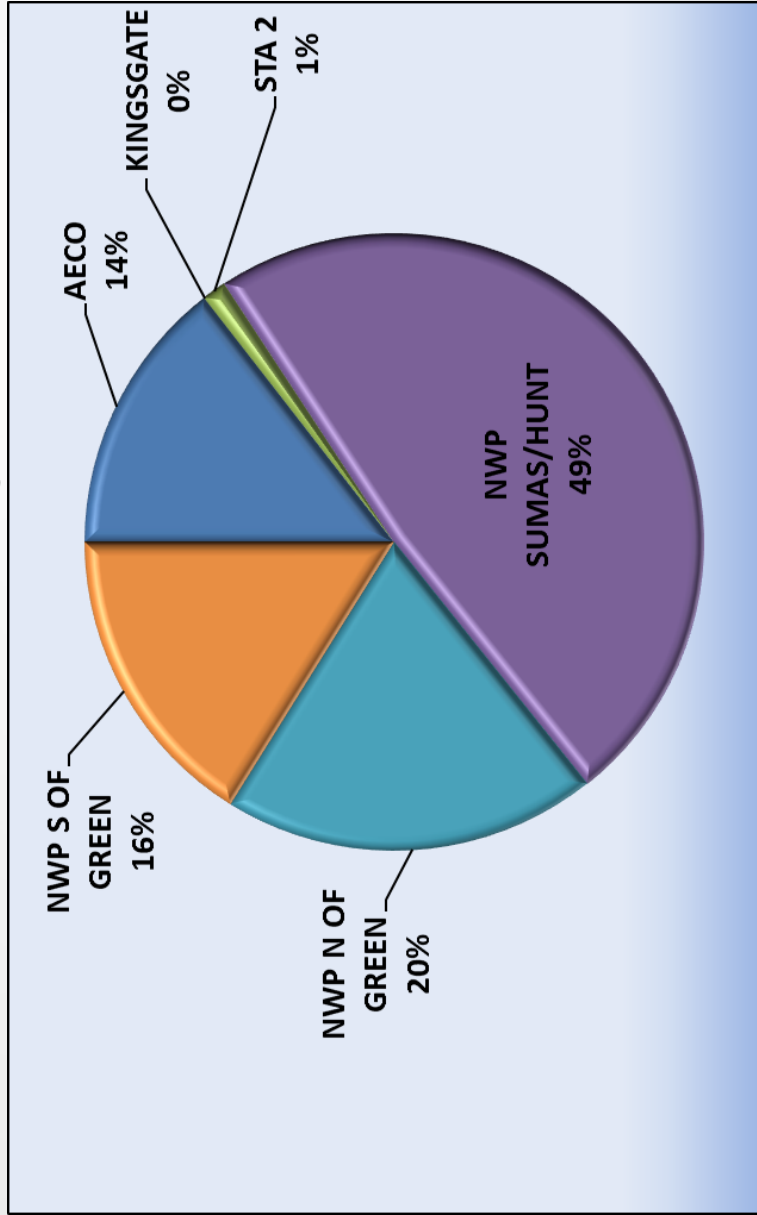
# Total RFPs



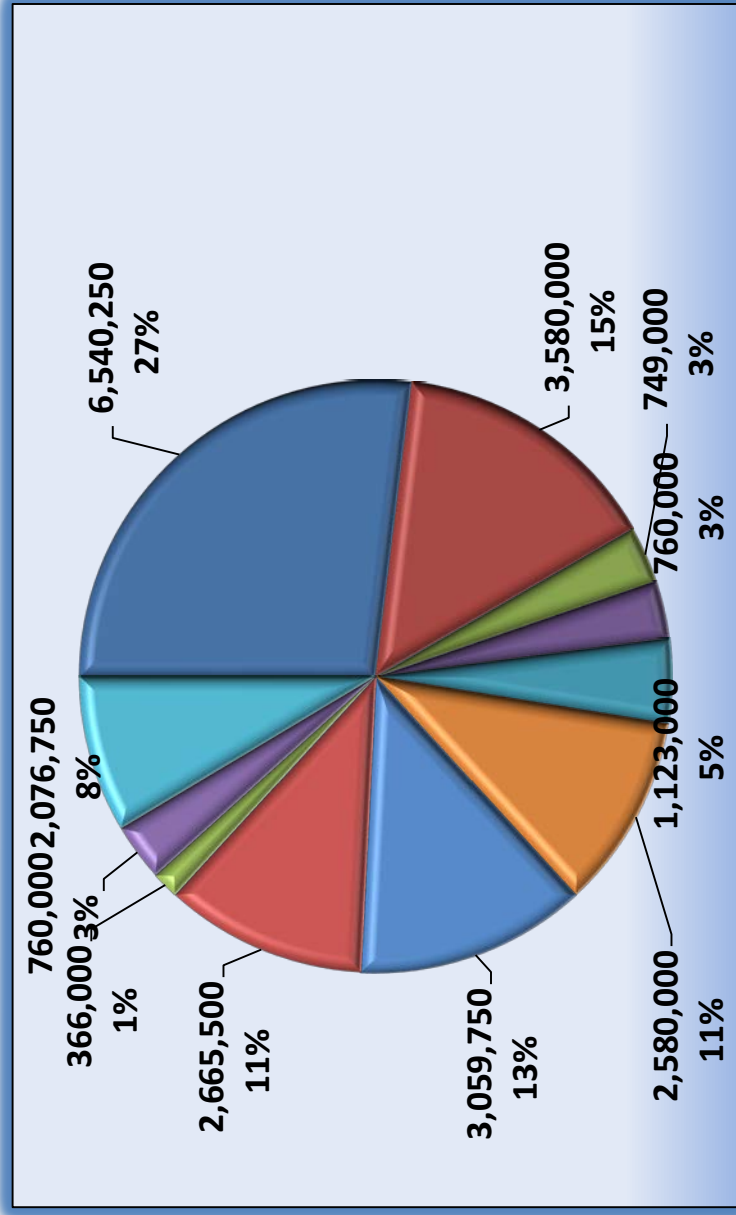
# RFP Percentage by Month



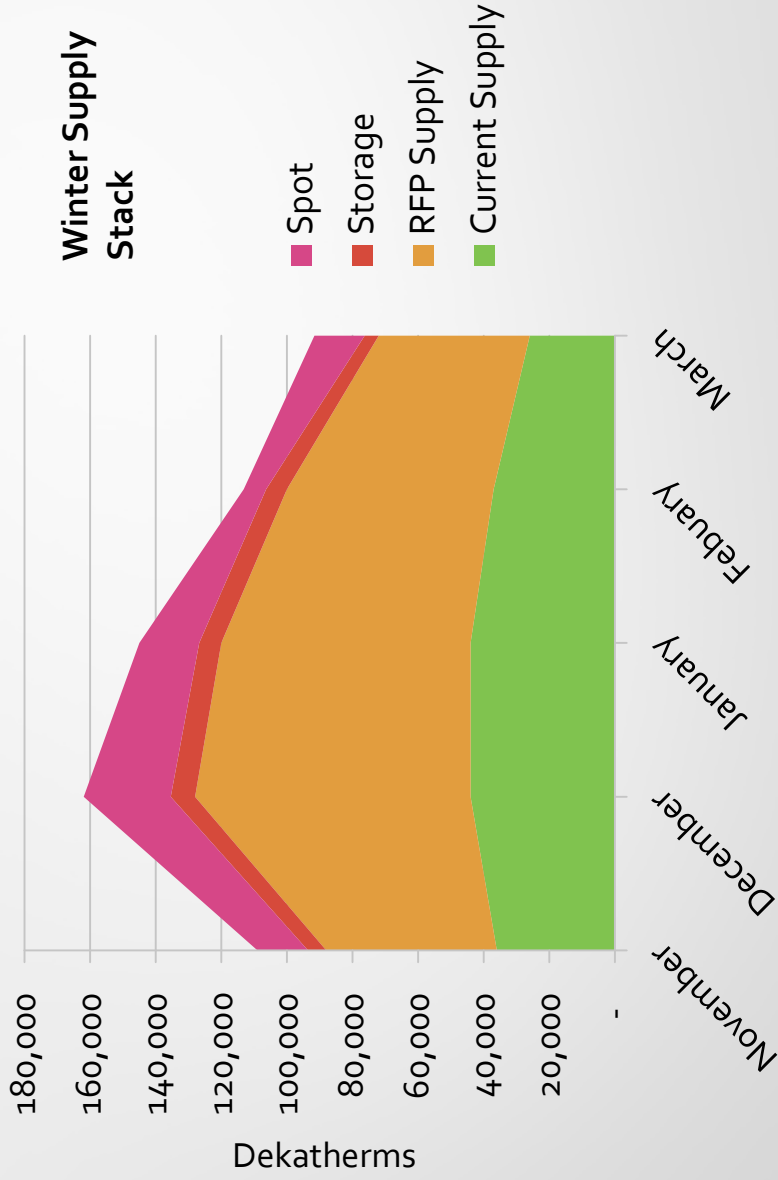
# RFP Percentage By Basin



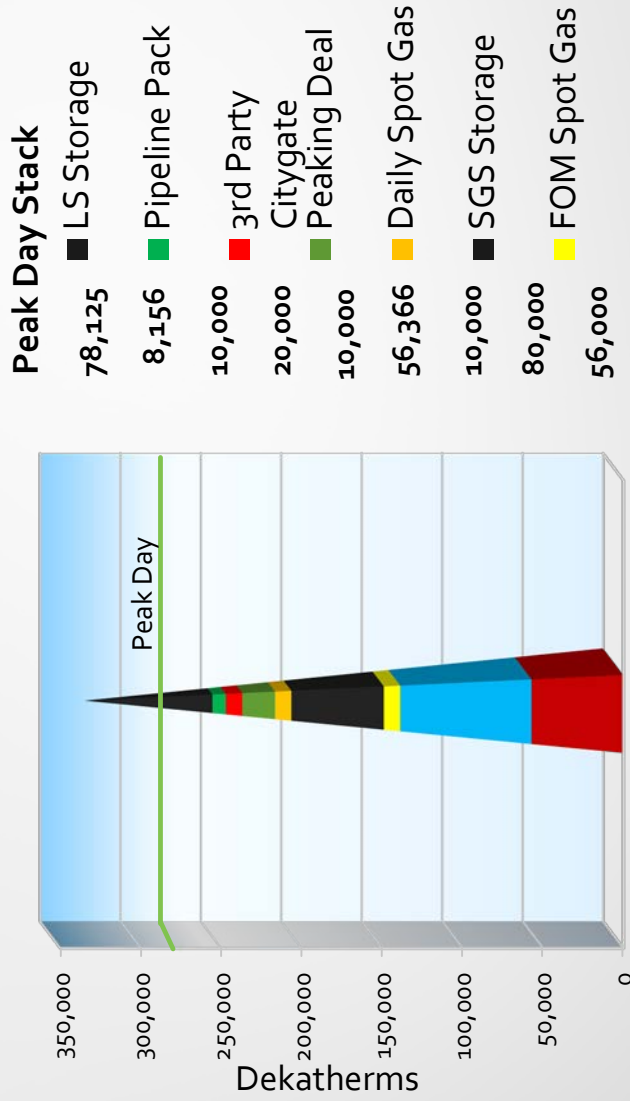
# Current Supply Percentage by Supplier



# Winter Supply Stack







# Planned Scenarios and Sensitivities



# SENDOUT® Model

- Cascade utilizes SENDOUT® for resource optimization.
- This model permits the Company to develop and analyze a variety of resource portfolios to help determine the type, size, and timing of resources best matched to forecast requirements.
- SENDOUT® is very powerful and complex. It operates by combining a series of existing and potential demand side and supply side resources, and optimizes their utilization at the lowest net present cost over the entire planning period for a given demand forecast.

# SENDOUT® Model Cont'd

- SENDOUT® utilizes a linear programming approach.
- The model knows the exact load and price for every day of the planning period based on the analyst's input and can therefore minimize costs in a way that would not be possible in the real world.
- Therefore, it is important to acknowledge that linear programming analysis provides helpful but not perfect information to guide decisions.

# Modeling Challenges

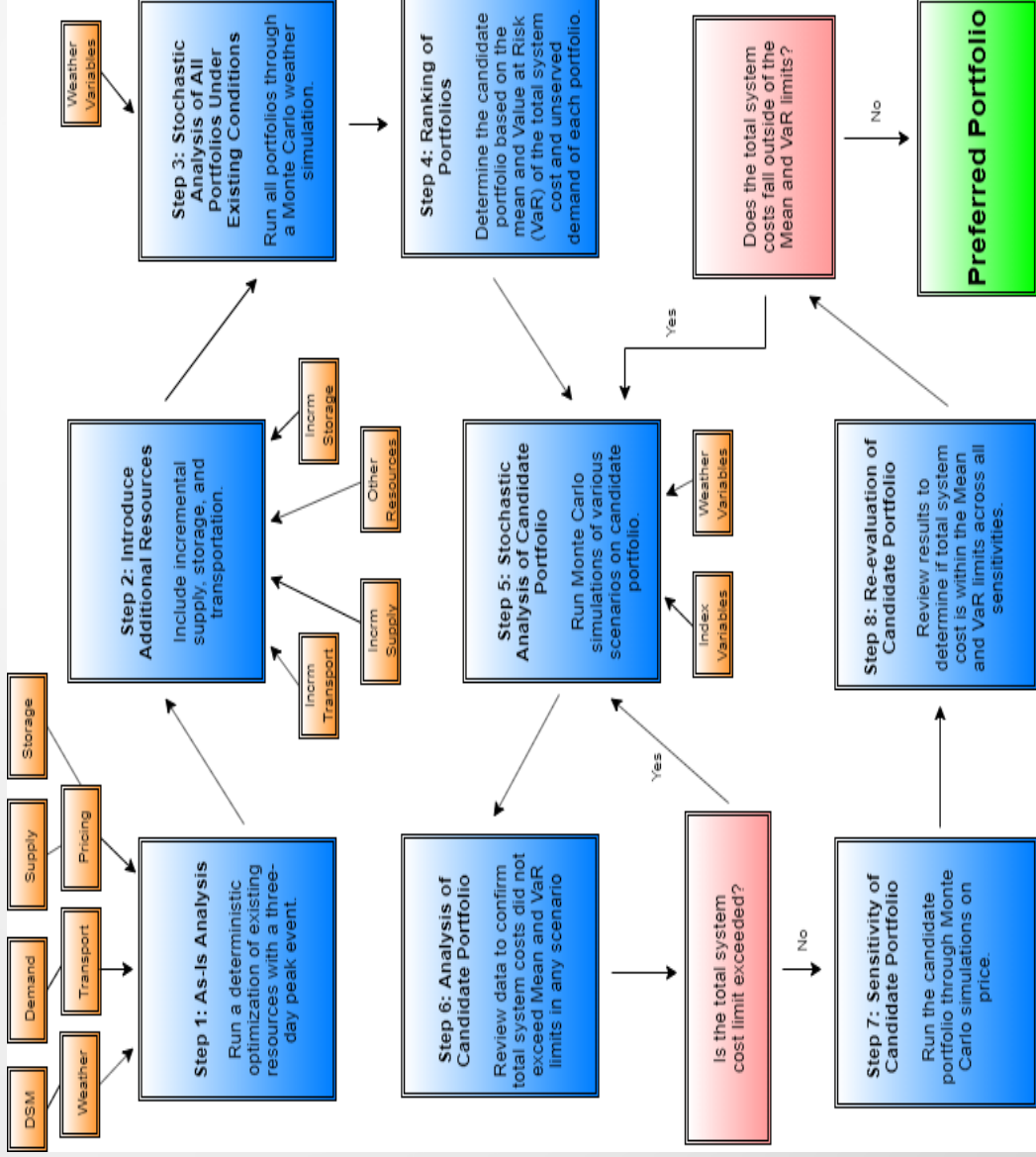
- Supply needs to get gas to the citygate.
- Many of Cascade's transport agreements were entered into decades ago, based on demand projections at that point in time.
- Sum of receipt quantity and aggregated delivery quantity can help identify resource deficiency depending on how rights are allocated.
- The aggregated look can mask individual citygate issues for looped sections, and the disaggregated look can create deficiencies where they don't exist.
- In many cases operational capacity is greater than contracted.
- SENDOUT® has perfect knowledge.

# Supply Resource Optimization Process

- **Step 1: As-Is Analysis**
  - Run a deterministic optimization of existing resources with a three-day peak event to uncover timing and quantity of resource deficiencies.
- **Step 2: Introduce Additional Resources**
  - Include incremental supply, storage, and transportation to derive a deterministic optimal portfolio, additional portfolios.
- **Step 3: Stochastic Analysis of All Portfolios Under Existing Conditions**
  - Run all portfolios through a Monte Carlo weather simulation, using expected growth, supply and storage accessibility. Record the probability distributions of total system costs for each portfolio.
- **Step 4: Ranking of Portfolios**
  - Determine the preferred portfolio based on the mean and Value at Risk (VaR) of the total system cost and unserved demand of each portfolio. This resource mix will be the best combination of cost and risk for Cascade and its customers.

# Supply Resource Optimization Process (Cont'd)

- **Step 5: Stochastic Analysis of Preferred Portfolio**
  - Run Monte Carlo simulations of various scenarios on preferred portfolio; comparing Mean and VaR to a managerial limit.
- **Step 6: Analysis of Preferred Portfolio**
  - Review data to confirm total system costs did not exceed Mean and VaR limits in any scenario. If limit is exceeded, repeat step 5 with next highest ranked portfolio.
- **Step 7: Sensitivity of Preferred Portfolio**
  - Run the preferred portfolio through Monte Carlo simulations on price. Review results to determine if total system cost is within the Mean and VaR limits across all sensitivities.
- **Step 8: Re-evaluation of Preferred Portfolio**
  - If the total system costs fall outside of the Mean and VaR limits in sensitivity analysis, select the next most optimal portfolio to run scenario and sensitivity analysis on. Repeat as needed.



# Supply Resource Optimization Process Flow Chart



## Additional Preferred Portfolio Considerations

- Does it get supply to the citygate?
- Is it reliable?
- Does it have a long lead time?
- How much does it cost?
- New build vs. depreciated cost
- The rate pancake
- Is it a base load or peaking resource?
- How many dekatherms are needed?
- What is the “shape” of resource?
- Is it tried and true technology, new technology, or yet to be discovered?
- Who else will be competing for the resource?

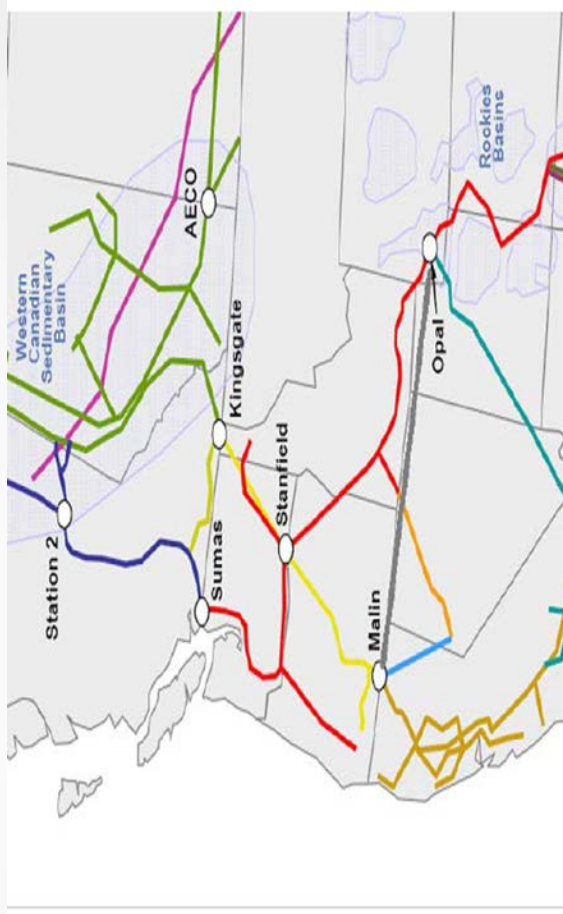
# Scenarios and Sensitivities

- Scenario:
  - Change in projected demand
  - Change in availability of existing resources to serve demand
  - Change in availability of supply
- Change in price forecast
- Change in environmental address
- Change in carbon forecast

Both carry the same importance, failure to pass either of them can lead to a portfolio being rejected

# All In Case

| KEY ELEMENTS IN SENDOUT SCENARIO   |   |
|--|---|
| Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. All items in <b>BLUE</b> mean those elements were dampened in the scenario.  |   |
| Current Station2<br>Current NGTL<br>Current GTN<br>Current NWP<br>Current Foothills<br>Current Ruby  | <p>JP1<br/>JP2<br/>JP3<br/>JP4<br/>PLY-1<br/>PLY-2</p> <p>AECO Base/Fixed, Winter, Day W/S, Peak<br/>SUMAS Base/Fixed, Winter, Day W/S, Peak<br/>ROCKIES Base/Fixed, Winter, Day W/S, Peak<br/>HUNT Base/Fixed, Winter, Day W/S, Peak<br/>KINGSGATE Base<br/>OPAL Base<br/>STAT2 Base</p> |
| All In   | <p>Ryckman Ck Storage<br/>Gill Ranch Storage<br/>Mist Storage<br/>Wild Goose Storage<br/>Aeco Hub Storage<br/>Magnum Storage<br/>Clay Basin Storage</p> <p>Opal Incrm Supply<br/>BioNatural/Gas<br/>Resource Mix - 3 Basins</p>   |
| Incremental NGTL<br>Incremental GTN N-S<br>NWP I-S Mainline EXP<br>Incremental Ruby<br>NWP Wen lateral EXP<br>Incremental Foothills<br>NWP Z20 lateral EXP<br>T-South-So Crossing<br>Trails West (Palomar)<br>NWP East OR Mainline EXP<br>Incremental GTN S-N<br>Incremental Enbridge<br>Pacific Connector |   |



The All In Case run allows the Company to see what the model would select if all current and probable resources are available.

# Low Growth and High Growth

| KEY ELEMENTS IN SENDOUT SCENARIO   |   |
|--|---|
| <p>Low Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. All items in <b>BLUE</b> mean those elements were dampened in the scenario.</p> <p>Current Station2<br/>Current NGTL<br/>Current GTN<br/>Current NWP<br/>Current Foothills<br/>Current Ruby</p>  | <p>AECO Base/Fixed, Winter, Day W/S, Peak<br/>SUMAS Base/Fixed, Winter, Day W/S, Peak<br/>ROCKIES Base/Fixed, Winter, Day W/S, Peak<br/>HUNT Base/Fixed, Winter, Day W/S<br/>KINGSGATE Base<br/>OPAL Base<br/>STATZ Base</p>    |
| <p>High Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. All items in <b>BLUE</b> mean those elements were dampened in the scenario.</p> <p>Current Station2<br/>Current NGTL<br/>Current GTN<br/>Current NWP<br/>Current Foothills<br/>Current Ruby</p> | <p>AECO Base/Fixed, Winter, Day W/S, Peak<br/>SUMAS Base/Fixed, Winter, Day W/S, Peak<br/>ROCKIES Base/Fixed, Winter, Day W/S, Peak<br/>HUNT Base/Fixed, Winter, Day W/S<br/>KINGSGATE Base<br/>OPAL Base<br/>STATZ Base</p>    |
| <p>Low Growth</p> <p>Incremental NGTL<br/>Incremental GTN N-S<br/>NWP I-5 Mainline EXP<br/>Incremental Ruby<br/>NWP Wen lateral EXP<br/>Incremental Foothills<br/>NWP Z20 lateral EXP<br/>T-South-So Crossing<br/>Trails West (Palomar)<br/>NWP East OR Mainline EXP<br/>Incremental GTN S-N<br/>Incremental Enbridge<br/>Pacific Connector</p>  | <p>Ryckman Crk Storage<br/>Gill Ranch Storage<br/>Mist Storage<br/>Wild Goose Storage<br/>Aeco Hub Storage<br/>Magnum Storage<br/>Clay Basin Storage</p> <p>Opal Incrm Supply<br/>BioNaturalGas<br/>Resource Mix - 3 Basins</p> |
| <p>High Growth</p> <p>Incremental NGTL<br/>Incremental GTN N-S<br/>NWP I-5 Mainline EXP<br/>Incremental Ruby<br/>NWP Wen lateral EXP<br/>Incremental Foothills<br/>NWP Z20 lateral EXP<br/>T-South-So Crossing<br/>Trails West (Palomar)<br/>NWP East OR Mainline EXP<br/>Incremental GTN S-N<br/>Incremental Enbridge<br/>Pacific Connector</p>                                       | <p>Ryckman Crk Storage<br/>Gill Ranch Storage<br/>Mist Storage<br/>Wild Goose Storage<br/>Aeco Hub Storage<br/>Magnum Storage<br/>Clay Basin Storage</p> <p>Opal Incrm Supply<br/>BioNaturalGas<br/>Resource Mix - 3 Basins</p> |

# Limit BC and Limit Alberta

| KEY ELEMENTS IN SENDOUT SCENARIO  |   |
|---|---|
| <p>Medium Load Growth, Medium Gas Price Forecast. Average weather with Peak Event. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. All items in <b>BLUE</b> mean those elements were dampened in the scenario.</p>                              | <p>Medium Load Growth, Medium Gas Price Forecast. Average weather with Peak Event. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. All items in <b>BLUE</b> mean those elements were dampened in the scenario.</p>  |
| <p>Current Station2<br/>Current NGTL<br/>Current GTN<br/>Current NWP<br/>Current Foothills<br/>Current Ruby</p>   | <p>JP1<br/>JP2<br/>JP3<br/>JP4<br/>PLY-1<br/>PLY-2</p>  |
| <p>Limit BC</p>   | <p>Limit Alberta</p>  |
| <p>Incremental NGTL<br/>Incremental GTN N-S<br/>NWP I-5 Mainline EXP<br/>Incremental Ruby<br/>Incremental Foothills<br/>NWP Z20 lateral EXP<br/>T-South-So Crossing<br/>Trails West (Palomar)<br/>NWP East OR Mainline EXP<br/>Incremental GTN S-N<br/>Incremental Enbridge<br/>Pacific Connector</p> | <p>Incremental NGTL<br/>Incremental GTN N-S<br/>NWP I-5 Mainline EXP<br/>Incremental Ruby<br/>NWP Wen lateral EXP<br/>Incremental Foothills<br/>NWP Z20 lateral EXP<br/>T-South-So Crossing<br/>Trails West (Palomar)<br/>NWP East OR Mainline EXP<br/>Incremental GTN S-N<br/>Incremental Enbridge<br/>Pacific Connector</p> |
| <p>Ryckman Crk Storage<br/>Gill Ranch Storage<br/>Mist Storage<br/>Wild Goose Storage<br/>Aeco Hub Storage<br/>Magnum Storage<br/>Clay Basin Storage</p>  | <p>Ryckman Crk Storage<br/>Gill Ranch Storage<br/>Mist Storage<br/>Wild Goose Storage<br/>Aeco Hub Storage<br/>Magnum Storage<br/>Clay Basin Storage</p>  |
| <p>Opal Incrm Supply<br/>BioNaturalGas<br/>Resource Mix - 3 Basins</p>  | <p>Opal Incrm Supply<br/>BioNaturalGas<br/>Resource Mix - 3 Basins</p>  |
| <p>Sumas Base/Fixed, Winter, Day W/S, Peak<br/>Rockies Base/Fixed, Winter, Day W/S, Peak<br/>Hunt Base/Fixed, Winter, Day W/S<br/>Kingsgate Base<br/>Opal Base<br/>Stat2 Base</p>   | <p>Aeco Base/Fixed, Winter, Day W/S, Peak<br/>Sumas Base/Fixed, Winter, Day W/S, Peak<br/>Rockies Base/Fixed, Winter, Day W/S, Peak<br/>Hunt Base/Fixed, Winter, Day W/S<br/>Kingsgate Base<br/>Opal Base<br/>Stat2 Base</p>  |

# Limit Canada and Limit Rockies

| KEY ELEMENTS IN SENDOUT SCENARIO  |   | KEY ELEMENTS IN SENDOUT SCENARIO  |  |
|---|---|---|--|
| Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. All items in <b>BLUE</b> mean those elements were dampened in the scenario. |   | Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. All items in <b>BLUE</b> mean those elements were dampened in the scenario. |  |
| Limit<br>Canada   | <p>Current Station2</p> <p>Current NGTL</p> <p>Current GTN</p> <p>Current NWP</p> <p>Current Foothills</p> <p>Current Ruby</p>  | <p>JP1</p> <p>JP2</p> <p>JP3</p> <p>JP4</p> <p>PLY-1</p> <p>PLY-2</p>   | <p>AECO Base/Fixed, Winter, Day W/S, Peak</p> <p>SUMAS Base/Fixed, Winter, Day W/S, Peak</p> <p>ROCKIES Base/Fixed, Winter, Day W/S, Peak</p> <p>HUNT Base/Fixed, Winter, Day W/S</p> <p>KINGSGATE Base</p> <p>OPAL Base</p> <p>STATZ Base</p> |
|   | <p>Incremental NGTL</p> <p>Incremental GTN N-S</p> <p>NWP I-5 Mainline EXP</p> <p>Incremental Ruby</p> <p>NWP Wen lateral EXP</p> <p>Incremental Foothills</p> <p>NWP Z20 lateral EXP</p> <p>T-South-So Crossing</p> <p>Trails West (Palomar)</p> <p>NWP East OR Mainline EXP</p> <p>Incremental GTN S-N</p> <p>Incremental Enbridge</p> <p>Pacific Connector</p> | <p>Ryckman Crk Storage</p> <p>Gill Ranch Storage</p> <p>Mist Storage</p> <p>Wild Goose Storage</p> <p>Aeco Hub Storage</p> <p>Magnum Storage</p> <p>Clay Basin Storage</p>  | <p>Opal Incrm Supply</p> <p>BioNatural/Gas</p> <p>Resource Mix - 3 Basins</p>  |
| Limit<br>Rockies  | <p>Incremental NGTL</p> <p>Incremental GTN N-S</p> <p>NWP I-5 Mainline EXP</p> <p>Incremental Ruby</p> <p>NWP Wen lateral EXP</p> <p>Incremental Foothills</p> <p>NWP Z20 lateral EXP</p> <p>T-South-So Crossing</p> <p>Trails West (Palomar)</p> <p>NWP East OR Mainline EXP</p> <p>Incremental GTN S-N</p> <p>Incremental Enbridge</p> <p>Pacific Connector</p> | <p>JP1</p> <p>JP2</p> <p>JP3</p> <p>JP4</p> <p>PLY-1</p> <p>PLY-2</p>   | <p>AECO Base/Fixed, Winter, Day W/S, Peak</p> <p>SUMAS Base/Fixed, Winter, Day W/S, Peak</p> <p>ROCKIES Base/Fixed, Winter, Day W/S, Peak</p> <p>HUNT Base/Fixed, Winter, Day W/S</p> <p>KINGSGATE Base</p> <p>OPAL Base</p> <p>STATZ Base</p> |
|   | <p>Ryckman Crk Storage</p> <p>Gill Ranch Storage</p> <p>Mist Storage</p> <p>Wild Goose Storage</p> <p>Aeco Hub Storage</p> <p>Magnum Storage</p> <p>Clay Basin Storage</p>  | <p>Opal Incrm Supply</p> <p>BioNatural/Gas</p> <p>Resource Mix - 3 Basins</p>   | <p>Opal Incrm Supply</p> <p>BioNatural/Gas</p> <p>Resource Mix - 3 Basins</p>  |

# Limit JP and Limit Ply Storage

| KEY ELEMENTS IN SENDOUT SCENARIO   |   |
|--|---|
| Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. All items in <b>BLUE</b> mean those elements were dampened in the scenario.  | Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. All items in <b>BLUE</b> mean those elements were dampened in the scenario.   |
| <p><b>Current Station2</b></p> <p><b>Current NGTL</b></p> <p><b>Current GTN</b></p> <p><b>Current NWP</b></p> <p><b>Current Foothills</b></p> <p><b>Current Ruby</b></p>   | <p><b>JP1</b></p> <p><b>JP2</b></p> <p><b>JP3</b></p> <p><b>JP4</b></p> <p><b>PLY-1</b></p> <p><b>PLY-2</b></p>   |
| <p><b>Limit Storage - JP</b></p> <p><b>Incremental NGTL</b></p> <p><b>Incremental GTN N-S</b></p> <p><b>NWP I-5 Mainline EXP</b></p> <p><b>Incremental Ruby</b></p> <p><b>NWP Wen lateral EXP</b></p> <p><b>Incremental Foothills</b></p> <p><b>NWP Z20 lateral EXP</b></p> <p><b>T-South-So Crossing</b></p> <p><b>Trails West (Palomar)</b></p> <p><b>NWP East OR Mainline EXP</b></p> <p><b>Incremental GTN S-N</b></p> <p><b>Incremental Enbridge</b></p> <p><b>Pacific Connector</b></p>  | <p><b>AECO Base/Fixed, Winter, Day W/S, Peak</b></p> <p><b>SUMAS Base/Fixed, Winter, Day W/S, Peak</b></p> <p><b>ROCKIES Base/Fixed, Winter, Day W/S, Peak</b></p> <p><b>HUNT Base/Fixed, Winter, Day W/S</b></p> <p><b>KINGSGATE Base</b></p> <p><b>OPAL Base</b></p> <p><b>STAT2 Base</b></p> <p><b>Ryckman Crk Storage</b></p> <p><b>Gill Ranch Storage</b></p> <p><b>Mist Storage</b></p> <p><b>Wild Goose Storage</b></p> <p><b>Aeco Hub Storage</b></p> <p><b>Magnum Storage</b></p> <p><b>Clay Basin Storage</b></p> <p><b>Opal Incrm Supply</b></p> <p><b>BioNaturalGas</b></p> <p><b>Resource Mix - 3 Basins</b></p> |
| <p><b>Limit Storage - Ply</b></p> <p><b>Incremental NGTL</b></p> <p><b>Incremental GTN N-S</b></p> <p><b>NWP I-5 Mainline EXP</b></p> <p><b>Incremental Ruby</b></p> <p><b>NWP Wen lateral EXP</b></p> <p><b>Incremental Foothills</b></p> <p><b>NWP Z20 lateral EXP</b></p> <p><b>T-South-So Crossing</b></p> <p><b>Trails West (Palomar)</b></p> <p><b>NWP East OR Mainline EXP</b></p> <p><b>Incremental GTN S-N</b></p> <p><b>Incremental Enbridge</b></p> <p><b>Pacific Connector</b></p> | <p><b>JP1</b></p> <p><b>JP2</b></p> <p><b>JP3</b></p> <p><b>JP4</b></p> <p><b>PLY-1</b></p> <p><b>PLY-2</b></p> <p><b>Ryckman Crk Storage</b></p> <p><b>Gill Ranch Storage</b></p> <p><b>Mist Storage</b></p> <p><b>Wild Goose Storage</b></p> <p><b>Aeco Hub Storage</b></p> <p><b>Magnum Storage</b></p> <p><b>Clay Basin Storage</b></p> <p><b>Opal Incrm Supply</b></p> <p><b>BioNaturalGas</b></p> <p><b>Resource Mix - 3 Basins</b></p>   |





# No Ply Storage and No Storage

| KEY ELEMENTS IN SENDOUT SCENARIO   |   |
|--|---|
| Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. All items in <b>BLUE</b> mean those elements were dampened in the scenario.  | Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. All items in <b>BLUE</b> mean those elements were dampened in the scenario.                               |
| <p><b>Current Station2</b></p> <p><b>Current NGTL</b></p> <p><b>Current GTN</b></p> <p><b>Current NWP</b></p> <p><b>Current Foothills</b></p> <p><b>Current Ruby</b></p>   | <p><b>JP1</b></p> <p><b>JP2</b></p> <p><b>JP3</b></p> <p><b>JP4</b></p> <p><b>PLY-1</b></p> <p><b>PLY-2</b></p>   |
| <p><b>Incremental NGTL</b></p> <p><b>Incremental GTN N-S</b></p> <p><b>NWP I-5 Mainline EXP</b></p> <p><b>Incremental Ruby</b></p> <p><b>NWP Wen lateral EXP</b></p> <p><b>Incremental Foothills</b></p> <p><b>NWP Z20 lateral EXP</b></p> <p><b>T-South-So Crossing</b></p> <p><b>Trails West (Palomar)</b></p> <p><b>NWP East OR Mainline EXP</b></p> <p><b>Incremental GTN S-N</b></p> <p><b>Incremental Enbridge</b></p> <p><b>Pacific Connector</b></p> | <p><b>AECO Base/Fixed, Winter, Day W/S, Peak</b></p> <p><b>SUMAS Base/Fixed, Winter, Day W/S, Peak</b></p> <p><b>ROCKIES Base/Fixed, Winter, Day W/S, Peak</b></p> <p><b>HUNT Base/Fixed, Winter, Day W/S</b></p> <p><b>KINGSGATE Base</b></p> <p><b>OPAL Base</b></p> <p><b>STAT2 Base</b></p> |
| <p><b>No Storage - Ply</b></p>   | <p><b>Ryckman Crk Storage</b></p> <p><b>Gill Ranch Storage</b></p> <p><b>Mist Storage</b></p> <p><b>Wild Goose Storage</b></p> <p><b>Aeco Hub Storage</b></p> <p><b>Magnum Storage</b></p> <p><b>Clay Basin Storage</b></p>   |
| <p><b>No Storage - Both</b></p>  | <p><b>Opal Incrm Supply</b></p> <p><b>BioNaturalGas</b></p> <p><b>Resource Mix - 3 Basins</b></p>   |

# Sensitivities Analyses

| Sensitivities       |         | Assumptions   |
|---------------------|---------|---|
| <b>Price</b>        | High    | Medium Load Growth, Average Weather with Peak Event, High Gas Price Environment   |
|                     | Low     | Medium Load Growth, Average Weather with Peak Event, Low Gas Price Environment  |
| <b>Env. Adder</b>   | 0%      | Medium Load Growth, Average Weather with Peak Event, Medium Gas Price Environment with No Adder for Unknown Regulatory Impacts  |
|                     | 20%     | Medium Load Growth, Average Weather with Peak Event, Medium Gas Price Environment with 20% Adder for Unknown Regulatory Impacts |
|                     | 30%     | Medium Load Growth, Average Weather with Peak Event, Medium Gas Price Environment with 30% Adder for Unknown Regulatory Impacts |
| <b>Carbon Adder</b> | Various | Medium Load Growth, Average Weather with Peak Event, Medium Gas Price Environment with Various Potential Carbon Futures Modeled |

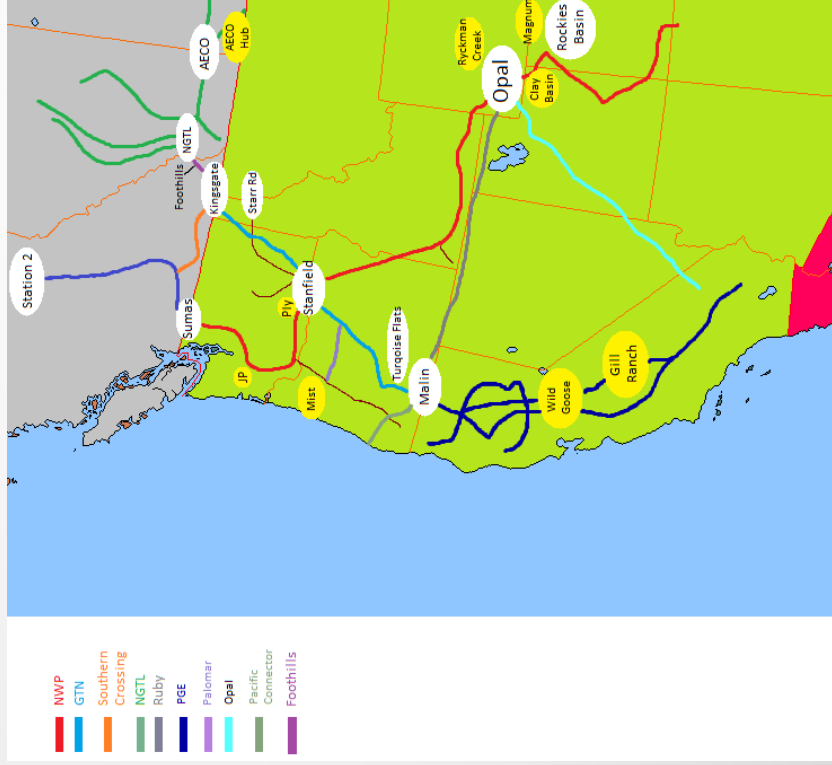
# Alternative Resources



# Major resource issues on the horizon

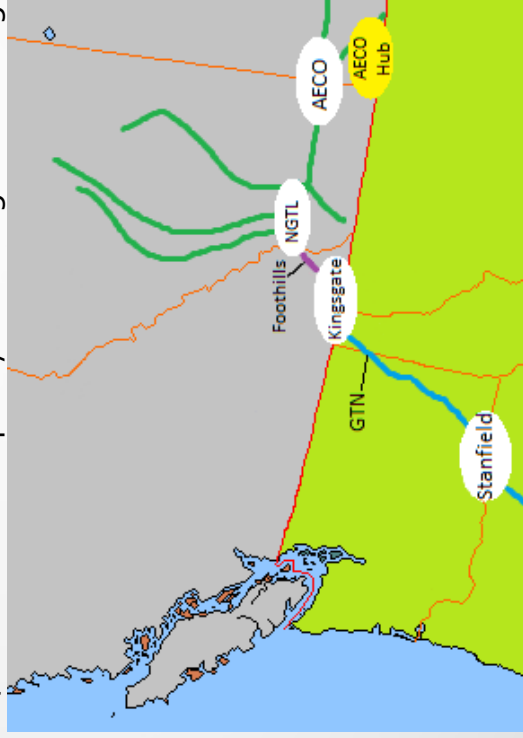
- Once a deficiency is identified, Cascade must analyze potential solutions to ensure service over the planning horizon.
- Conversations with partners at various pipelines, storage facilities, new supply sources.
- SENDOUT® is used to ultimately derive the optimal mix of resources, referred to as the “preferred portfolio.”

# Location of Current & Alternative Resources



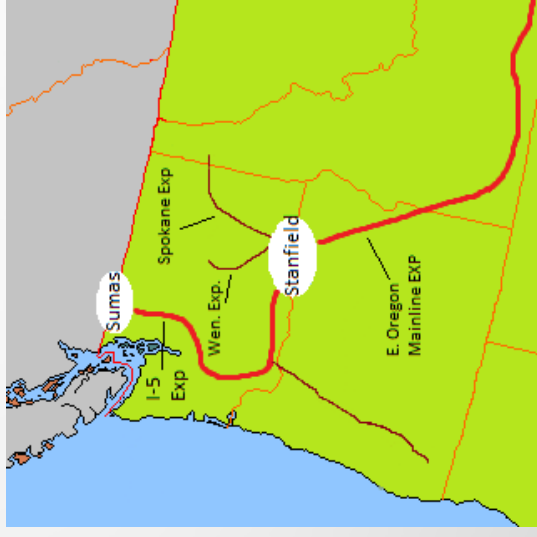
# Incremental Transport – North to South

- Incremental NGTL – Additional capacity to move gas from AECO basin to Alberta/BC border
- Incremental Foothills – Additional capacity to move gas from Alberta/BC border to Kingsgate
- Incremental GTN N/S – Additional capacity to move gas from Kingsgate to various citygates along GTN



## Incremental Transport – Northwest Pipeline

- I-5 Mainline Expansion – Additional capacity to move gas along I-5 corridor in western Washington
- Wenatchee Lateral Expansion – Additional capacity to move gas along Wenatchee Lateral to central Washington
- Spokane Lateral Expansion – Additional capacity to move gas along Spokane Lateral to eastern Washington
- Eastern Oregon Mainline Expansion – Additional capacity to move gas along Eastern Oregon Lateral to Oregon citygates



# Incremental Transport – South to North

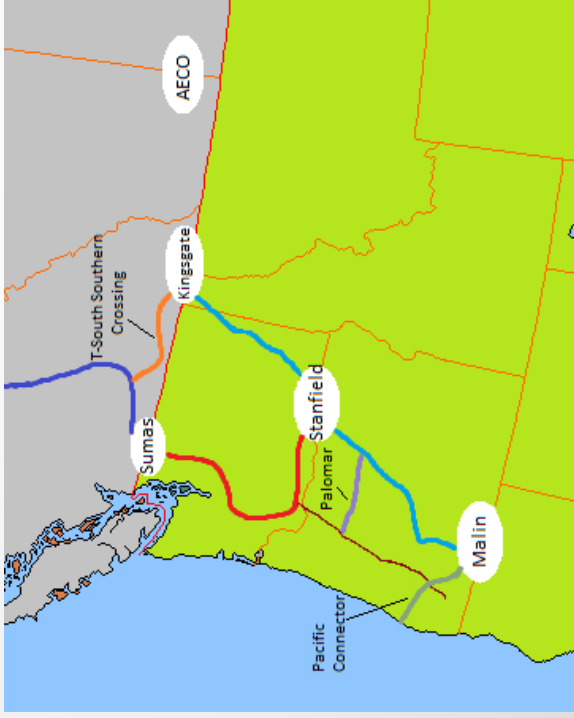
- Incremental Opal– Additional capacity to move gas from Utah to Opal
- Incremental GTN S/N – Additional capacity to move gas from Turquoise Flats to various citygates along GTN
- Incremental Ruby – Additional capacity to move gas from Rockies Basin to Turquoise Flats





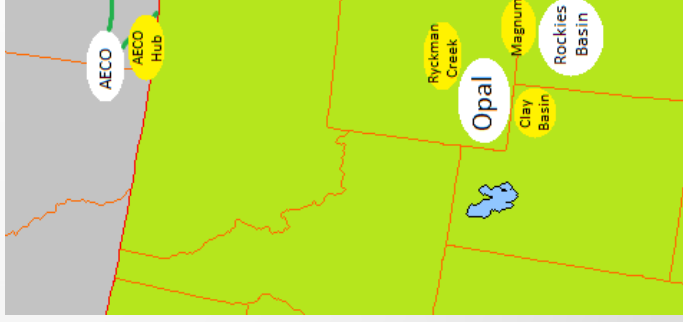
# Incremental Transport – Bilateral

- T-South Southern Crossing – Price arbitrage opportunity to move gas between Sumas and AECO basins bilaterally
- Trails West (Palomar) – Additional capacity to move Rockies gas to the I-5 corridor
- Pacific Connector – Pipeline that will feed LNG facility on Oregon coast, increasing liquidity at Malin



## Incremental Storage - North and East

- Ryckman Creek Storage – Additional storage in southwest Wyoming serving the system, primarily Oregon
- Magnum Storage – Additional storage near Rocky Mountains, serving the system, primarily Oregon
- AECO Hub Storage – Additional storage near AECO Hub, serving the system
- Clay Basin Storage – Additional storage near Opal



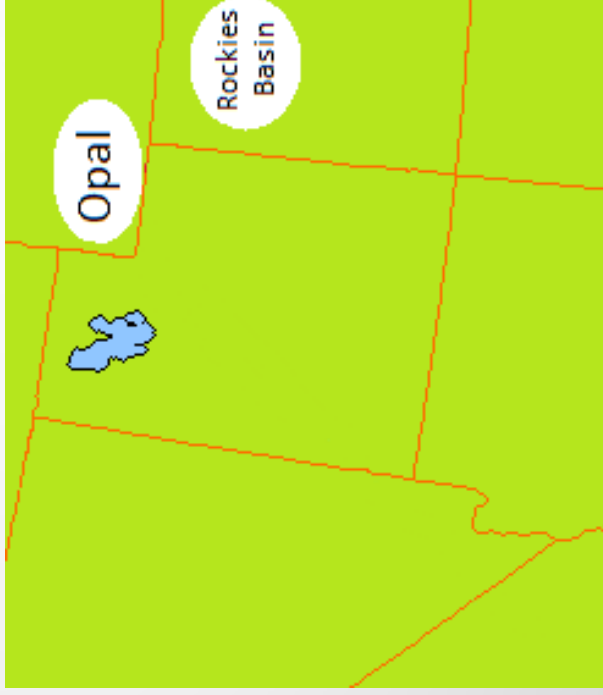
# Incremental Storage - South and West

- Gill Ranch Storage – Additional storage in central California, serving the system, primarily Oregon
- Mist Storage – Additional storage in northern Oregon, serving the system, primarily Washington
- Wild Goose Storage – Additional storage in northern California, serving the system, primarily Oregon



# Incremental Supplies

- Incremental Opal Supply – Additional supply around the Rockies Basin
- Renewable Natural Gas – Incremental biogas supply directly to distribution system



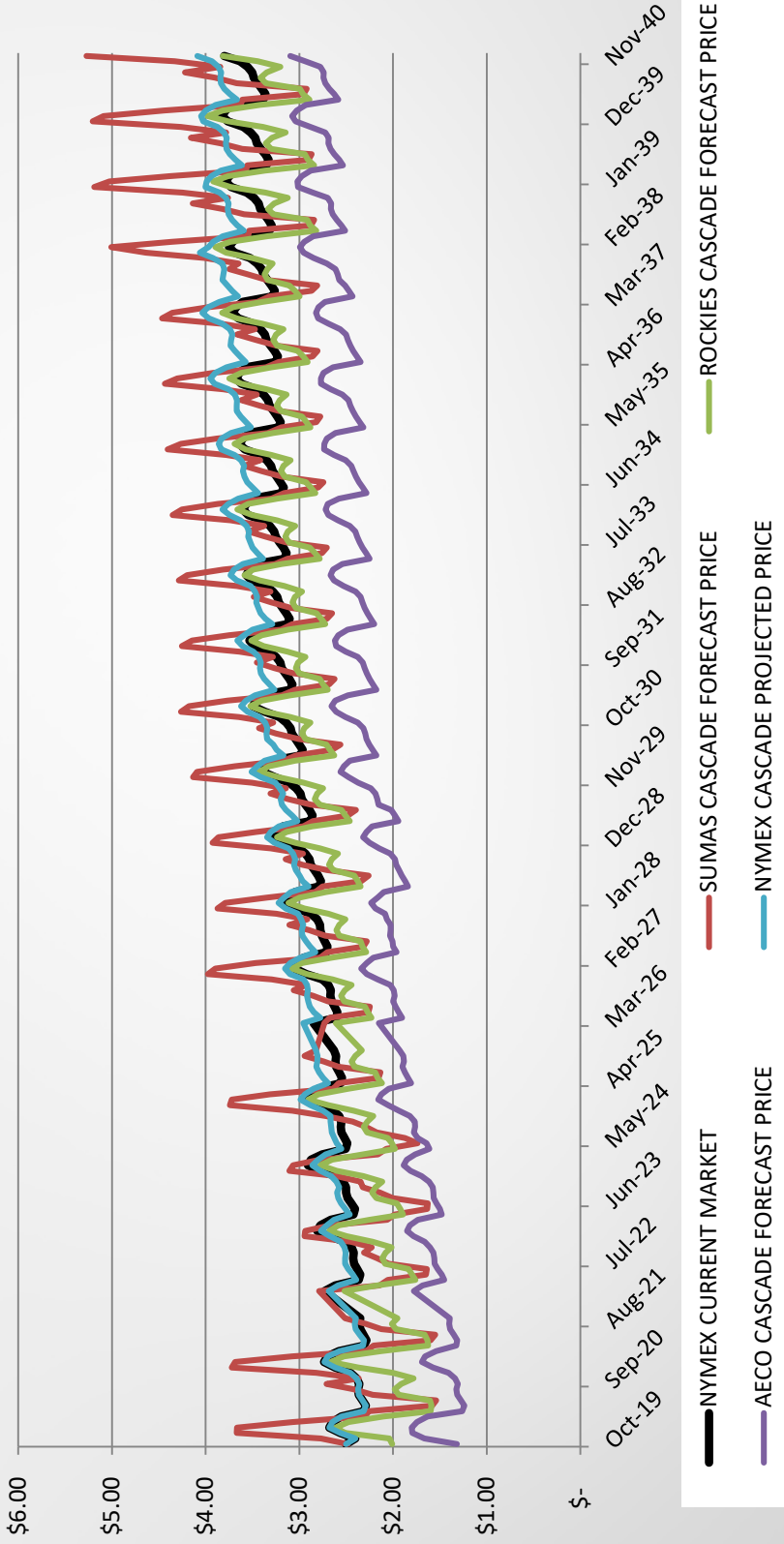
# Price Forecast Results



### Interpolated Age Dampened Final Weights



# CNGC Price Forecast as of 09/30/2019



# Avoided Cost Methodology and Calculation



# Avoided Cost Overview

- As part of the IRP process, Cascade produces a 20-year price forecast and 45 years of avoided costs.
- The avoided cost is an estimated cost to serve the next unit of demand with a supply side resource option at a point in time. This incremental cost to serve represents the cost that could be avoided through energy conservation.
- The avoided cost forecast can be used as a guideline for comparing energy conservation with the cost of acquiring and transporting natural gas to meet demand.

- For the 2020 IRP, Cascade has continued to evolve its avoided cost formula to create a more transparent and intuitive final number.
- Cascade has also calculated distribution system costs and a risk premium for the first time in the 2020 OR IRP
- Cascade evaluates the impact that a range of environmental externalities, including CO<sub>2</sub> emission prices, would have on the avoided costs in terms of cost adders and supply costs.
- The Company produces an expected avoided cost case based on peak day and, in the case of distribution system costs, peak hour.

# Avoided Cost Formula

The components that go into Cascade's avoided cost calculation are as follows:

$$AC_{nominal} = TC_v + SC_v + ((CC + C_{tax}) * E_{adder}) + DSC + RP$$

Where

- $AC_{nominal}$  = The nominal avoided cost for a given year. To put this into real dollars you must apply the following:  $\text{Avoided Cost} / (1 + \text{inflation rate})^Y$  Years from the reference year.
- $TC_v$  = Variable Transportation Costs
- $SC_v$  = Variable Storage Costs
- $CC$  = Commodity Costs
- $C_{tax}$  = Carbon Tax
- $E_{adder}$  = Environmental Adder, as recommended by the Northwest Power and Conservation Council
- $DSC$  = Distribution System Costs
- $RP$  = Risk Premium

# Methodology

- Transportation costs are pulled directly from the major pipelines that Cascade utilizes (NWP, GTN, Enbridge, Ruby, Nova Gas Transmission (NGTL) and Foothills).
- Storage costs are only captured if there is an avoidable future storage cost (ie. On system storage).
- Commodity Costs are taken from Cascade's 20-year price forecast.
- Risk Premium is the cost associated with hedging.
- Distribution System Costs only look at costs associated with growth. Pipeline integrity cannot be avoided.

# Methodology - Carbon

- Modeling carbon compliance costs is a challenge because the future of carbon is uncertain.
- As discussed during scenarios and sensitivities, Cascade will model the impact of a variety of potential carbon pathways.
- Cascade's primary carbon forecast is based on the California Cap and Trade marketplace. This is not an endorsement of this policy, but rather a qualitative assessment of what the resource planning team believes is the most probable carbon future in the state of Oregon.

# Methodology – Distribution System Costs

- Cascade's distribution system costs are calculated as a function of the Company's authorized margin, weighted by the load share of each rate class.
- Authorized margin is defined as the applicable cost of service including authorized rate of return.
- The weighted margin number is then multiplied by the percentage of projects of Cascade budgeted projects specifically related to growth.
- Since Avoided Cost is based on peak day, the margin calculation is then multiplied by the ratio of peak day demand to an average day's demand to get the margin impact on peak day.
- Distribution system analysis is concerned with the pressure during peak hour, so the daily number must then be multiplied by the ratio of peak hour demand to that day's total demand.

# Example of Distribution Cost Calculation

| Data Item                                     | Value    |
|---|----------|
| Weighted Margin (Dth)                         | 0.084967 |
| * Growth Share (37%)                          | 0.031438 |
| *Peak Day Impact (Peak Demand/Average Demand) | 0.119075 |
| *Peak Hour Impact (Peak Hour/Peak Day Demand) | 0.006112 |

# Methodology – Risk Premium

- Cascade defines risk premium as the additional cost the Company would have to pay for a fixed price to fully hedge its portfolio versus open market FOM prices.
- Theoretical fixed pricing comes from the company's AMA Partner, Tenaska Marketing Ventures.
- Pricing is received at all three basins Cascade purchases gas from, and then blended based on expected supply needs at the basins.
- Following regional best practices, if this value is negative the Company records the risk premium as zero, as described in the following table.



# 2020 Avoided Cost Risk Premium

| Year # | Calendar Year | Risk Reduction Value<br>(Real \$/Dth) |
|--------|---------------|---------------------------------------|
| 1      | 2020          | -\$0.159                              |
| 2      | 2021          | -\$0.139                              |
| 3      | 2022          | -\$0.108                              |
| 4      | 2023          | -\$0.067                              |
| 5      | 2024          | -\$0.104                              |
| 6      | 2025          | -\$0.245                              |
| 7      | 2026          | -\$0.301                              |
| 8      | 2027          | -\$0.221                              |
| 9      | 2028          | -\$0.109                              |
| 10     | 2029          | -\$0.078                              |
| 11     | 2030          | -\$0.105                              |
| 12     | 2031          | -\$0.069                              |
| 13     | 2032          | \$0.000                               |
| 14     | 2033          | -\$0.001                              |
| 15     | 2034          | -\$0.016                              |
| 16     | 2035          | -\$0.030                              |
| 17     | 2036          | -\$0.057                              |
| 18     | 2037          | -\$0.141                              |
| 19     | 2038          | -\$0.459                              |
| 20     | 2039          | -\$0.304                              |

# Avoided Cost - Conclusion

- Cascade has filed its new avoided cost inputs as a proposed alternative in its UM 1893 filing.
- Cascade has also provided current avoided cost inputs to the Energy Trust of Oregon, who will be sending back a conservation potential assessment based on these inputs.
- Annualized avoided cost in real 2019 dollars range from \$2.49/dth in a non-carbon environment to \$7.93 in a carbon environment in 2040.

# 2020 IRP Remaining Schedule

| Date (Subject to change)    | State | Process Element   | Location (Subject to change) | Notes                       |
|-----------------------------|-------|---|------------------------------|-----------------------------|
| Wednesday, January 8, 2020  | OR    | TAG 4 slides distributed to stakeholders  |                              |                             |
| Wednesday, January 15, 2020 | OR    | TAG 4 Carbon Impacts, Conservation (Energy Trust of Oregon), Bio-Natural Gas, Preliminary Resource Integration Results. | Portland, OR - 9 am to 3 pm  |                             |
| Wednesday, March 4, 2020    | OR    | TAG 5 slides distributed to stakeholders  |                              |                             |
| Wednesday, March 11, 2020   | OR    | TAG 5: Final Integration Results, finalization of plan components, Proposed new 4-year Action Plan.                     | Salem, OR - 9 am to 12 pm    | Meadow room at OPUC Offices |
| Tuesday, May 12, 2020       | OR    | Draft of 2020 OR IRP distributed  |                              |                             |
| Friday, June 12, 2020       | OR    | Comments due on draft from all stakeholders   |                              |                             |
| Tuesday, June 30, 2020      | OR    | TAG 6, if needed  | WebEx Only                   |                             |
| Friday, July 31, 2020       | OR    | IRP filing in Oregon  |                              |                             |

## ADDITIONAL QUESTIONS?

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# Cascade Natural Gas Corporation

## 2020 Integrated Resource Plan Technical Advisory Group Meeting #3

Wednesday, November 6<sup>th</sup>, 2019

Cascade's Offices in Deschutes Room

Kennewick, WA





### OPUC Tag Meeting 3

**Date & Time:** 11/6/2019, 09:00 AM – 12:00 PM

**Location:** Cascade Natural Gas General Office in Kennewick, WA – Deschutes Room

**In attendance:** Mark Sellers-Vaughn, Brian Robertson, Devin McGreal, Ashton Davis, Linda Offerdahl, Mike Parvinen, Eric Wood, Tom Pardee (Avista)

**Called in:** Bruce Folsom, Monica Cowlshaw, Garrett Senger, Jim Cordaro (Ruby), Mark Iverson (Ruby), Mike Paruszkiewicz (NWN), Anna Kim (OPUC)

**Minutes by:** Brian Robertson

Mark Sellers-Vaughn kicked off the meeting by thanking everyone that showed up. Brian went over fire safety of the building, introductions and the agenda.

- Jim and Mark from Kinder Morgan gave a presentation of the Ruby Pipeline as well as their view of the current energy market.
- Linda Offerdahl then presented Cascade's Distribution System Planning.
  - Discussed System Overview.
  - Discussed the Synergy modeling and how it works.
  - Explained the data gathering process and how it's implemented into Synergy.
  - Linda explained the pros and cons of several different solutions to pipeline pressure issues.
  - Anna asked how the new pipe size is determined if old pipe needs to be replaced. Linda responded and said it depends on future growth in the area.
  - Linda explained that the engineers put together the projects and shows other alternative projects. Management then decides which projects go in.
  - Linda then shared future projects that are currently planned in the state of Oregon.
- Eric Wood then described Cascade's Gas Supply Overview.
  - Eric discussed the Company's transportation, supply, and storage in depth.
  - Highlighted Cascade's 2020 portfolio design.
  - Eric presented a peak day example for Cascade. Anna asked if that was the case for all peak events. Eric said no, there are many different ways to supply gas. Anna would like to see different examples added to the IRP.
- Brian Robertson then discussed Cascade's SENDOUT modeling.
  - Brian shared the challenges of modeling as well as how SENDOUT has perfect knowledge.

- Brian discussed the Resource Optimization Process. Brian noted that more information would be discussed at TAG 4.
  - Brian then explained how Cascade defines scenarios vs sensitivities.
- Ashton Davis presented alternative resources for Cascade.
  - These resources include incremental transportation, supply, and storage.
- Devin McGreal presented Cascade's price forecast and avoided cost.
  - Devin shared the formula that Cascade is using for the 2020 avoided cost calculation.
  - Devin went in depth on several of the avoided cost inputs, such as carbon, distribution system planning, and risk premium.
  - Anna noted that Cascade's carbon sensitivity was higher than other LDCs in UM-1893. Cascade will discuss this further at TAG 4.
- Brian wrapped up the meeting discussing the remaining schedule.

TAG 4 will take place on January 15<sup>th</sup>, 2020 at the Portland International Airport - Umatilla room.

**The meeting was adjourned at 12:00 PM.**

# Cascade Natural Gas Corporation

## 2020 Integrated Resource Plan Technical Advisory Group Meeting #4

Wednesday, Jan. 15th, 2020  
Portland International Airport  
Portland, OR

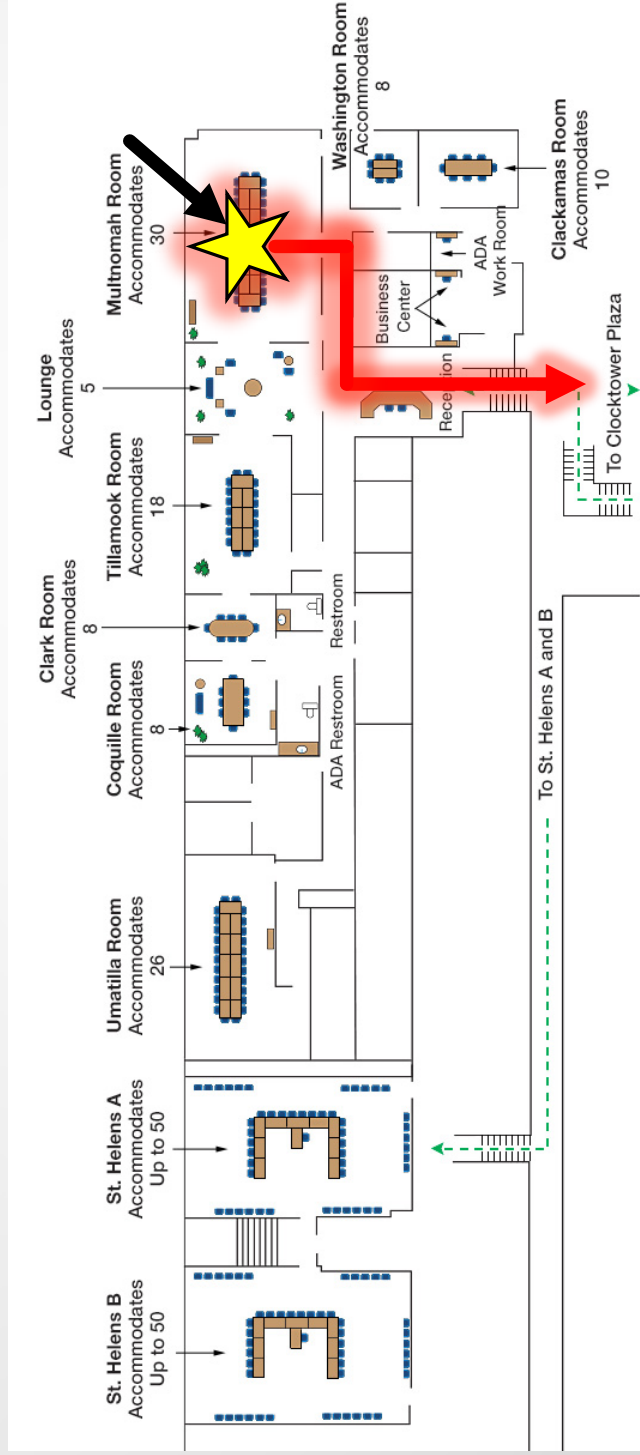




# Agenda

- Introductions
- Safety Moment
- Renewable Natural Gas
- Energy Trust of Oregon Presentation
- Carbon Impacts
- SENDOUT Modeling
- Preliminary Modeling Results
- Upcoming Schedule
- Questions

# Safety!

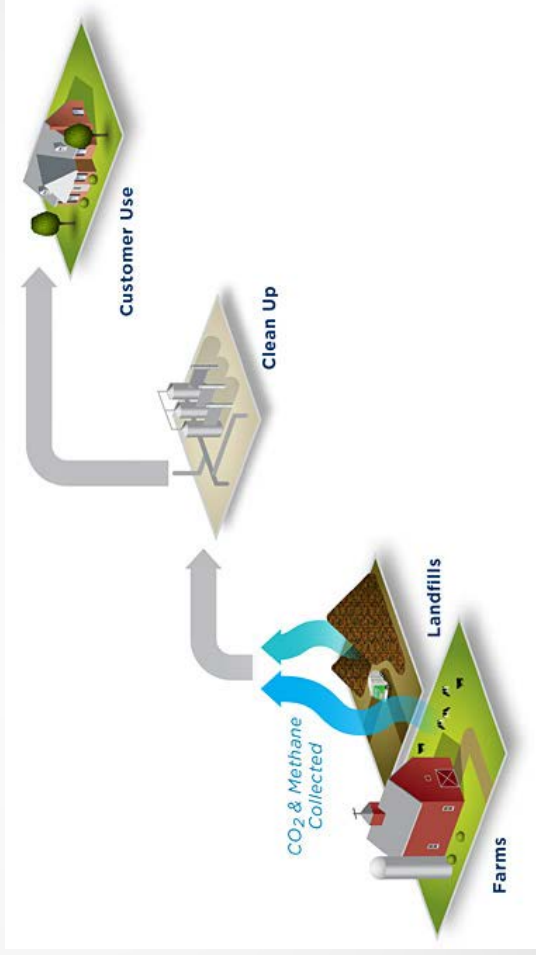


# Renewable Natural Gas



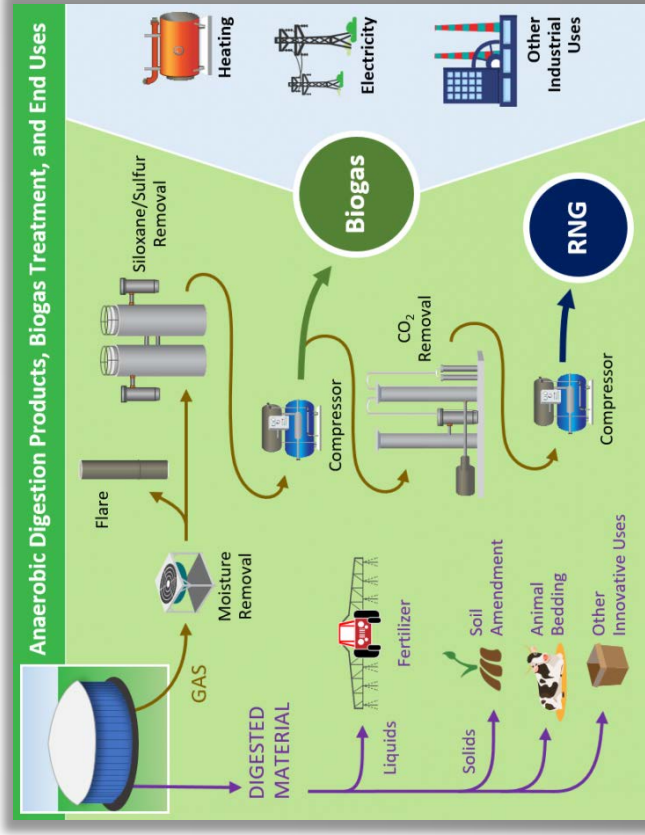
# What is Renewable Natural Gas (RNG)?

- RNG is pipeline quality natural gas produced from various biomass sources through biochemical processes such as anaerobic digestion or gasification.<sup>1</sup>



# Renewable Natural Gas

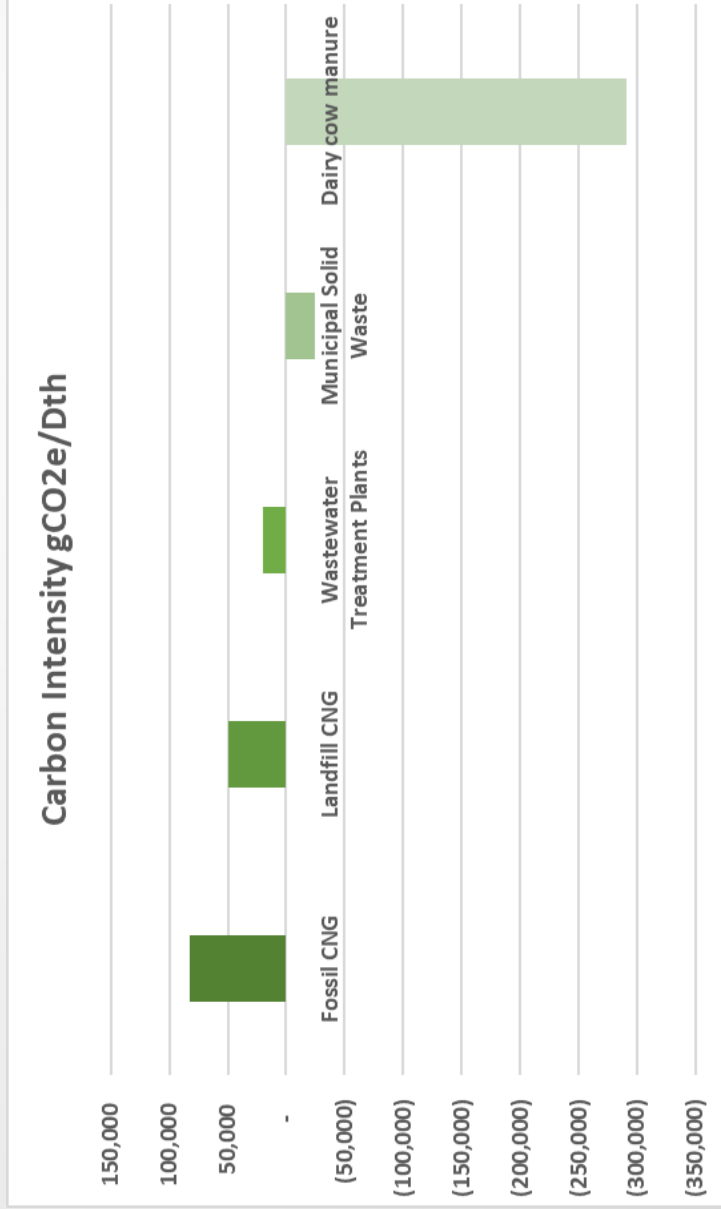
- **Examples:**
  - **Biogas from Landfills**
    - Collect waste from residential, industrial, and commercial entities.
    - Digestion process takes place in the ground, rather than in a digester.
  - **Biogas from Livestock Operations**
    - Collects animal manure and delivers to anaerobic digester.
  - **Biogas from Wastewater Treatment**
    - Produced during digestion of solids that are removed during the wastewater treatment process.
- Other sources include organic waste from food manufacturers and wholesalers, supermarkets, restaurants, hospitals, and more.<sup>1</sup>



# Renewable Natural Gas



# Carbon Intensity



# Regulatory Matters Regarding RNG

- AR 632 and UM 2030
- AR 632 is an open docket regarding RNG Rulemaking. The most recent meeting was held December 13, 2019. Rules are likely to be adopted by July 31, 2020. A few key points for IRPs:
  - IRPs should include an RNG-specific chapter.
  - RNG projects will likely need to be acknowledged in IRPs.
- UM 2030 is an open docket for determining the cost-effectiveness of RNG resources for Northwest Natural. Cascade is aware of this docket and is an active participant.
- SB 98 in Oregon
- SB 98 requires the Public Utility Commission to adopt by rule renewable natural gas program for natural gas utilities to recover prudently incurred qualified investments in meeting certain targets for including renewable natural gas in gas purchases for distribution to retail natural gas customers.



# Regulatory Matters Regarding RNG (Cont'd)

- HB 1257 in Washington
- HB 1257 Section 13 states that a natural gas company may propose a renewable natural gas program under which the company would supply renewable natural gas for a portion of the natural gas sold or delivered to its retail customers. Section 14 states that each gas company must offer by tariff a voluntary renewable natural gas service available to all customers to replace any portion of the natural gas that would otherwise be provided by the gas company.
- Cascade is aware of the Washington State University Study on Renewable Natural Gas
  - A study around what RNG is and a possible roadmap of RNG in WA State.
- Treatment of Carbon Intensity
  - Cascade understands there are differing schools of thought for how to record Carbon Intensity of different sources of RNG and will continue to monitor the related legislative efforts.
- Any other items Cascade should be following?

# Cascade Market Research

- Options for securing RNG will involve purchase and/or participation in infrastructure.
- No "spot market" for RNG at this point due to long off-take commitments.
- Lead times on new RNG projects up to 36 months.
- Landfill projects are typically the largest RNG opportunity at 1,000-7,000 dth/day and usually require lowest capital investment.
- Digester projects, due to higher carbon intensity, do very well in the Renewable Identification Numbers (RINs) market and run 50-500 dth/day (expensive to operate).
- Food waste/wastewater treatment projects seen as an ideal option for utilities as they have low RINs and Low Carbon Fuel Standards (LCFS) potential.
- \$10-\$30/dth long-term off-take deals.

# Cascade Market Research (Cont'd)

- New landfill projects typically command \$10-\$19/dth with environmental attributes and facility investment recovery.
- Digesters need \$15-\$20/dth off-take deals.
- Dairy projects can be \$25-\$30/dth.
- Fortis B.C. has 9 Bcf/yr of RNG under contract.
- Some surveys have found customers will not pay more than \$7/dth to natural gas.

# What is Cascade doing?

- **RNG planning**
  - Internal Attendees
    - Regulatory
    - Business Development – Oregon & Washington
    - Energy Efficiency
    - Public Affairs
    - Resource Planning Team
    - Gas Supply
  - External Attendees
    - Lobbyists
    - NWGA
    - Other LDC's located in Oregon & Washington
- **Climate Action Plan Support**
  - Inclusion of biogas and offset program exploration as part of City of Bend's Climate Action Plan



# Cascade's RNG Goals

- The Company's long-term view and approach to RNG
- Roles and Responsibilities
- RNG Policy – federal, state and local guidelines and requirements
  - Electrification and RNG parity
- Voluntary Programs/Offsets
- Energy Efficiency & RNG
- Future opportunities
- Standards

# Potential RNG Projects in Cascade's Service Territory

- Working with municipalities, wastewater treatment plants, biodigesters with industrial customers, and landfills.



# Energy Efficiency Resource Assessment for CNG's 2020 IRP

January 15<sup>th</sup>, 2020

# Agenda

- About Energy Trust
- Energy Trust's Resource Assessment Model Overview and Methodology
- IRP Savings Projection Overview
  - The Deployment of Cost-Effective Achievable Savings
- Forecast Results
- Scenarios Results





# About Energy Trust of Oregon

Independent  
nonprofit

Serving 1.6 million customers of  
Portland General Electric,  
Pacific Power, NW Natural,  
Cascade Natural Gas and Avista

Providing access  
to affordable  
energy

Generating  
homegrown,  
renewable power

Building a  
stronger Oregon  
and SW  
Washington

# Energy Trust's Resource Assessment Model Overview

## Resource Assessment (RA) Purpose

- Informs utility Integrated Resource Planning (IRP)
- Provides estimates of 20-year energy efficiency potential and the associated load reduction
- Helps utilities to strategically plan future investment in both demand and supply side resources



## RA Model Background

- 20-year energy efficiency potential estimates
- “Bottom-up” modeling approach – measure level inputs are scaled to utility level efficiency potential
- Energy Trust uses a model in *Analytica* that was developed by Navigant Consulting in 2014
  - The *Analytica* RA Model calculates Technical, Achievable and Cost-Effective Achievable Energy Efficiency Potential.
  - Final program/IRP targets are established via a deployment protocol exogenous of the model.
- Inputs refreshed to reflect most up to date assumptions according to IRP schedules
- A “living model” and is constantly being improved



## Changes to Modeling Since 2018 IRP

- Stakeholder workshop in Fall of 2017 and implemented several methodology changes:
  - Inclusion of Large Project Adder
  - Align to NWPCC method for deployment ramping to 100% of total cost-effective achievable potential
    - Exceptions: emerging techs and hard to reach measures
- Understand load forecasts better to provide most accurate forecast of what will come off the system
  - Cost-effective potential may be realized through programs or codes and standards.
  - Unclaimed savings adder
- Scenario Runs

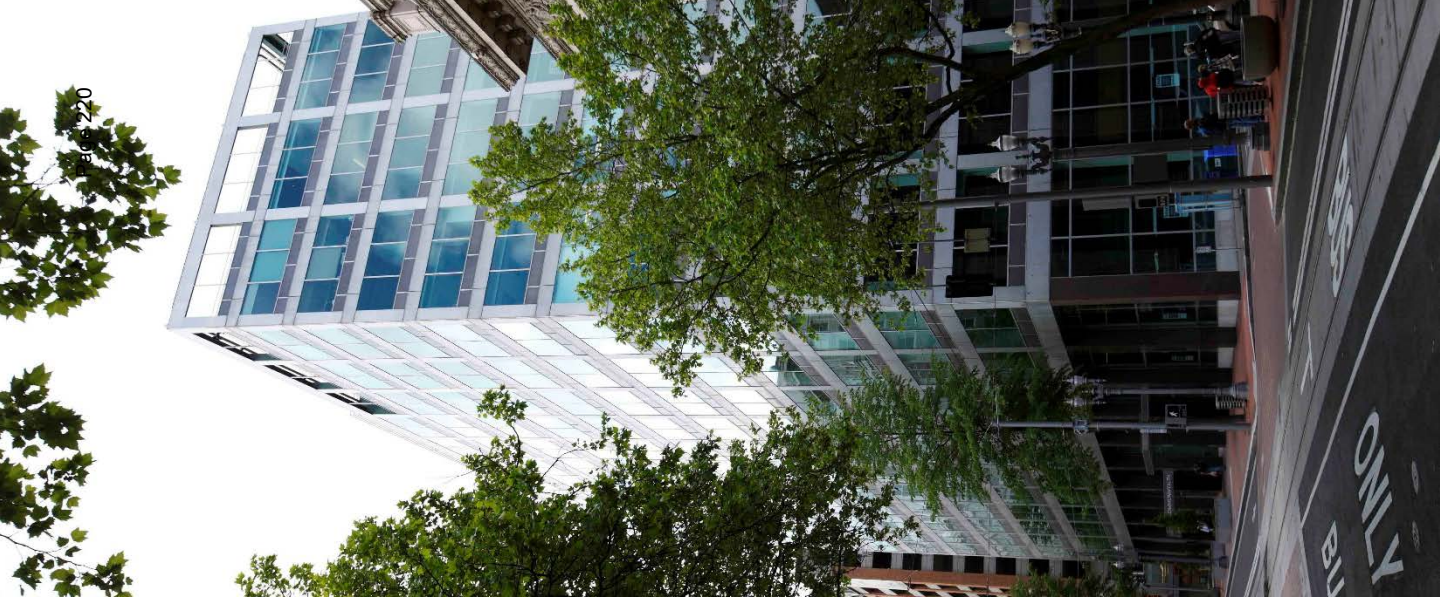
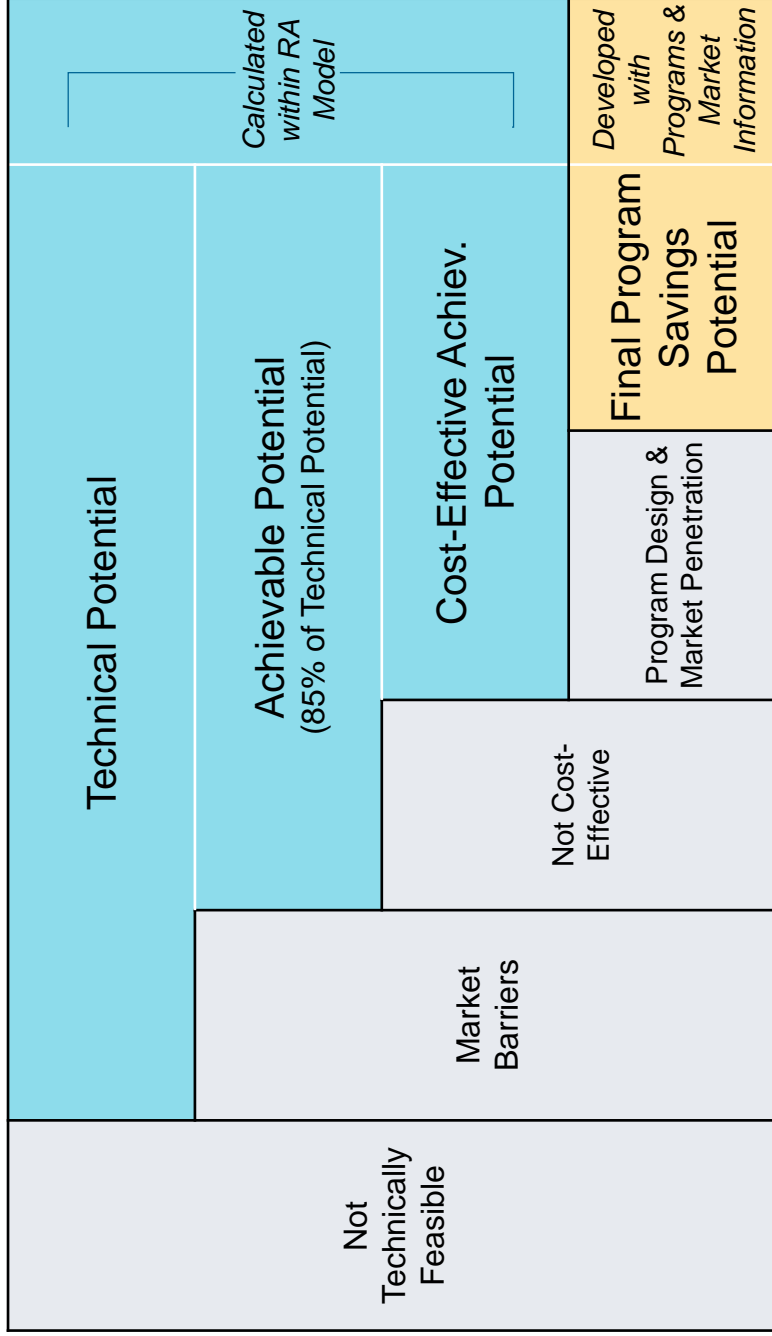
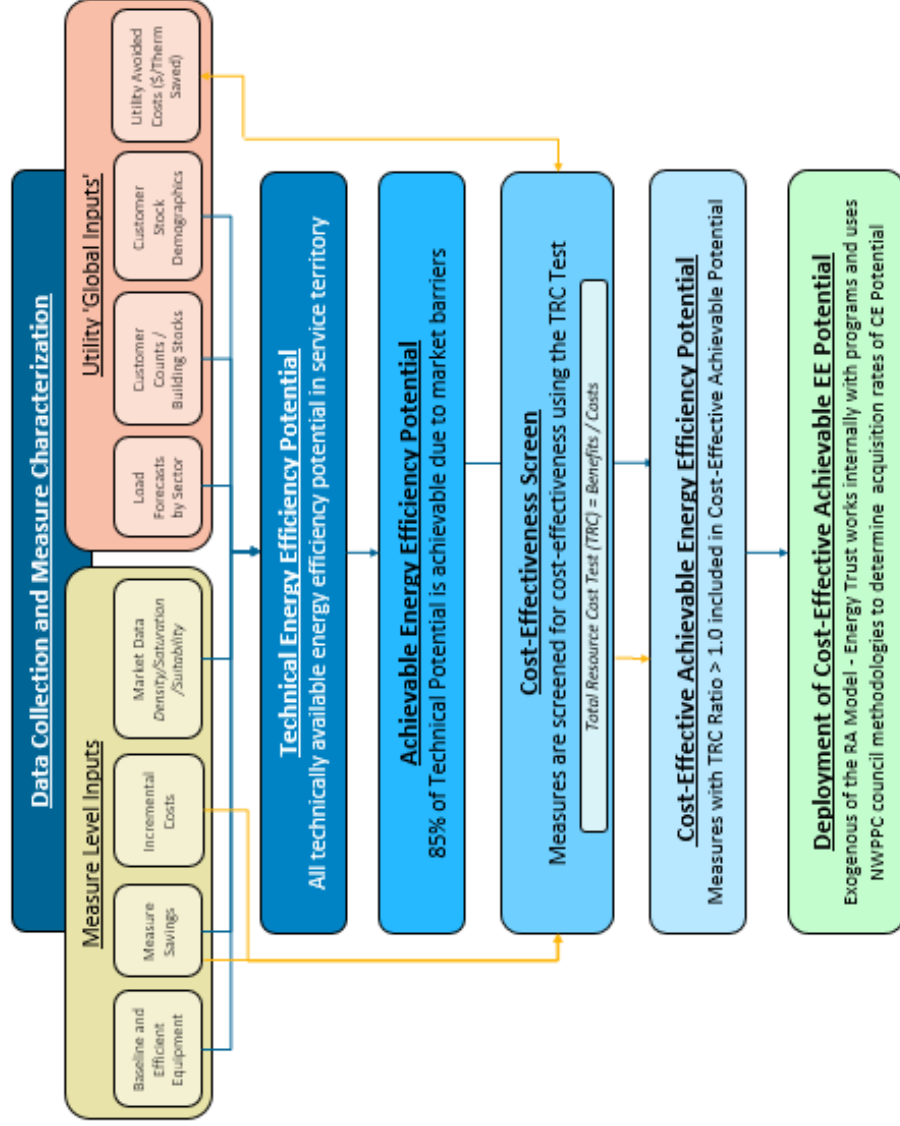


FIG. 2-20





# Methodology Overview

## ‘Bottom-up’ modeling approach:

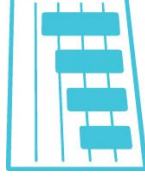
1. Measure inputs are characterized per unit
2. Number of units per scaling basis are estimated
  - *Residential*: # of Homes Served
  - *Commercial*: 1000s of Sq. Ft. Served
  - *Industrial*: Customer Segment Load Forecasts
3. The savings and costs of each measure are scaled to the utility level based on scaling basis inputs provided by CNG

## Simple Example (*Illustrative Numbers*)



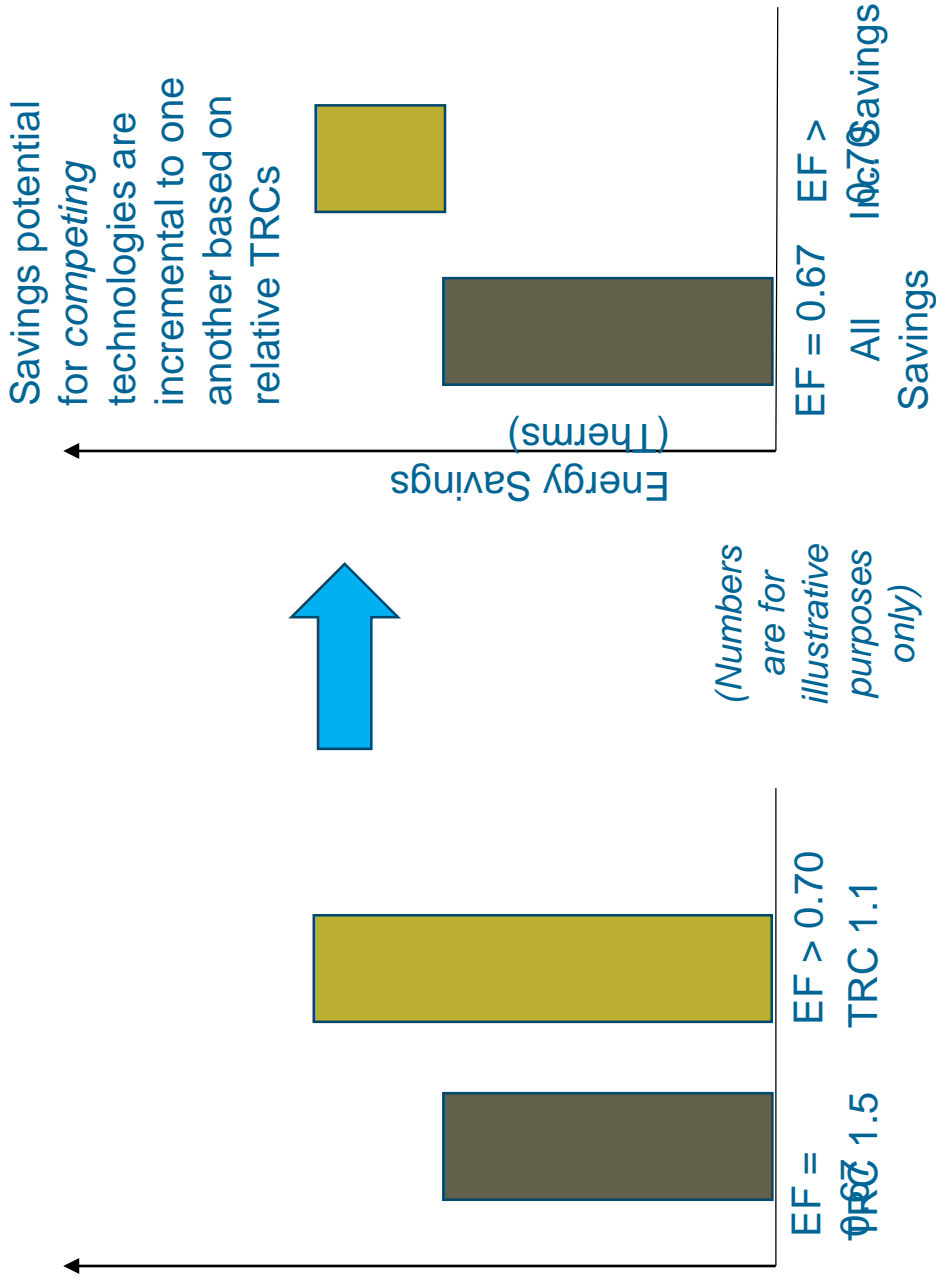


# RA Model inputs



| Measure Level Inputs   | Utility ‘Global’ Inputs  |
|--|--|
| <p><b>Measure Definition and Application:</b></p> <ul style="list-style-type: none"> <li>• Baseline/efficient equip. definition</li> <li>• Applicable customer segments</li> <li>• Installation type (RET/ROB/NEW)*</li> <li>• Measure life</li> </ul> | <p><b>Customer and Load Forecasts</b></p> <ul style="list-style-type: none"> <li>• Used to scale measure level savings to a service territory</li> <li>• Residential Stocks: # of homes</li> <li>• Commercial Stocks: 1000s of Sq.Ft.</li> <li>• Industrial Stocks: Customer load</li> </ul> |
| <p><b>Measure Savings</b></p>  | <p><b>Avoided Costs (provided by utilities)</b></p>  |
| <p><b>Measure Cost</b></p> <ul style="list-style-type: none"> <li>• Incremental cost for ROB/NEW measures</li> <li>• Full cost for retrofit measures</li> </ul>  | <p><b>Customer Stock Demographics:</b></p> <ul style="list-style-type: none"> <li>• Heating fuel splits</li> <li>• Water heat fuel splits</li> </ul>   |
| <p><b>Market Data (for scaling)</b></p> <ul style="list-style-type: none"> <li>• Density</li> <li>• Baseline/efficient equipment saturations</li> <li>• Suitability</li> </ul>   |  |

# Incremental Measure Savings Approach (Competition groups – Gas water heaters)



# Cost-Effectiveness Screen



- Energy Trust utilizes the Total Resource Cost (TRC) test to screen measures for cost effectiveness

$$\text{TRC} = \frac{\text{Measure Benefits}}{\text{Total Measure Cost}}$$

- If TRC is > 1.0, it is cost-effective
- Measure Benefits:
  - Avoided Costs (provided by Cascade)
    - Annual measure savings x NPV avoided costs per therm
  - Quantifiable Non-Energy Benefits
    - Water savings, etc.

## Total Measure Costs:

- The customer cost of installing an EE measure (full cost if retrofit, incremental over baseline if replacement)

## Cost-Effectiveness Override in Model

Energy Trust applied this feature to measures found to be NOT Cost-Effective in the model but are offered through Energy Trust programs.

Reasons:

1. Blended avoided costs may produce different results than utility specific avoided costs
2. Measures offered under an OPUC exception per UIM 551 criteria.

The following measures had the CE override applied (all under OPUC exception):

- Res Insulation (ceiling, floor, wall)
- Res Tank Water Heater (0.67-0.69 only)



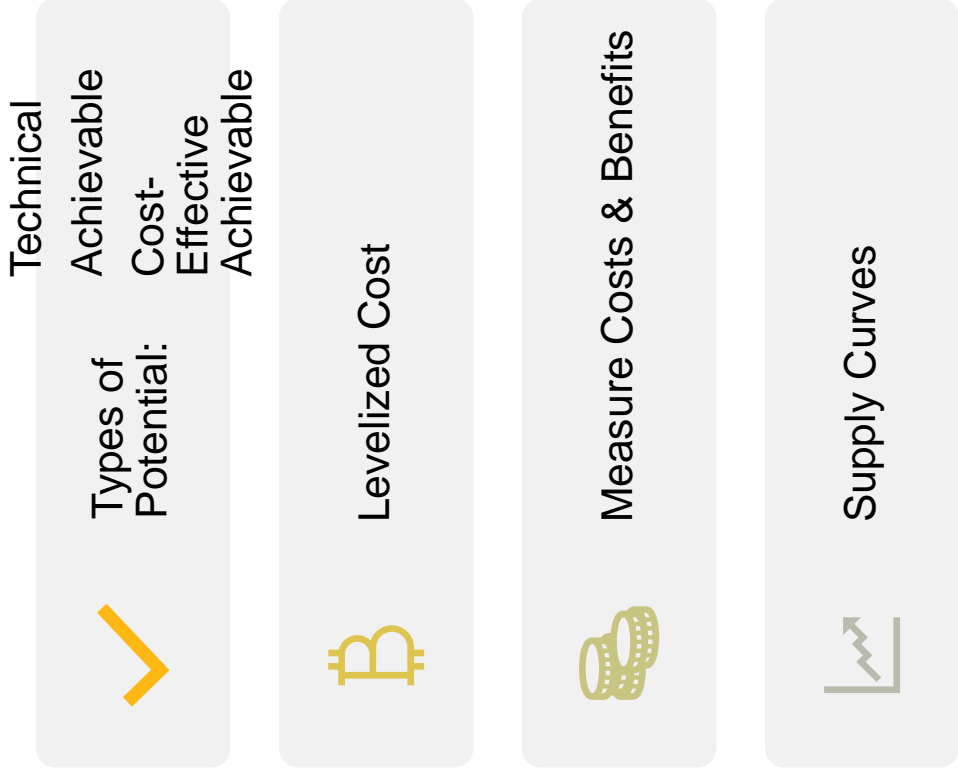
# Emerging Technologies/Risk Factors

| Residential  | Commercial   | Industrial  |
|--|--|---|
| <ul style="list-style-type: none"> <li>• Path 5 Emerging Super Efficient Whole Home</li> <li>• Window Replacement (U&lt;.20), Gas SH</li> <li>• Absorption Gas Heat Pump Water Heaters</li> <li>• Advanced Insulation</li> </ul> | <ul style="list-style-type: none"> <li>• Advanced Ventilation Controls</li> <li>• DOAS/HRV - GAS Space Heat</li> <li>• DHW Circulation Pump</li> <li>• Gas-fired HP HW</li> <li>• Gas-fired HP, Heating</li> <li>• Zero Net Energy Path</li> </ul> | <ul style="list-style-type: none"> <li>• Gas-fired HP Water Heater</li> <li>• Wall Insulation- VIP, R0-R35</li> </ul> |

- Model includes savings potential from emerging technologies
- Factors in changing performance, cost over time
- Utilize risk factors to hedge against uncertainty
  - Market, technical and data source risk are assessed.

| Risk Factors for Emerging Technologies |   |   |  |  |  |
|--|---|---|--|--|--|
| Risk Category                          | 10%   | 30%   | 50%                                      | 70%  | 90%  |
| Market Risk<br>(25% weighting)         | Requires new/changed business model                                   | Requires training of contractors. Consumer acceptance barriers exist. | Training for contractors available.      | Trained contractors  | Established business models  |
|  | Start-up, or small manufacturer                                       |   | Multiple products in the market.         | Already in U.S. Market   |  |
| Technical Risk<br>(25% weighting)      | Significant changes to infrastructure                                 | Low volume manufacture r.   | New product with broad commercial appeal | Proven technology in different application or different region | Proven technology in target application. Multiple potentially viable approaches. |
|  | Requires training of contractors. Consumer acceptance barriers exist. |   |  |  |  |
| Data Source Risk<br>(50% weighting)    | Prototype in first field tests.                                       | Based only on manufacturer claims                                     | Engineering assessment or lab test       | Third party case study (real world installation)               | Evaluation results or multiple third party case studies                          |
|  | A single or unknown approach  |   |  |  |  |

# Model Outputs



# IRP Savings Projections: Methodology to Deploy Cost-Effective Achievable Potential



## Why Deploy?

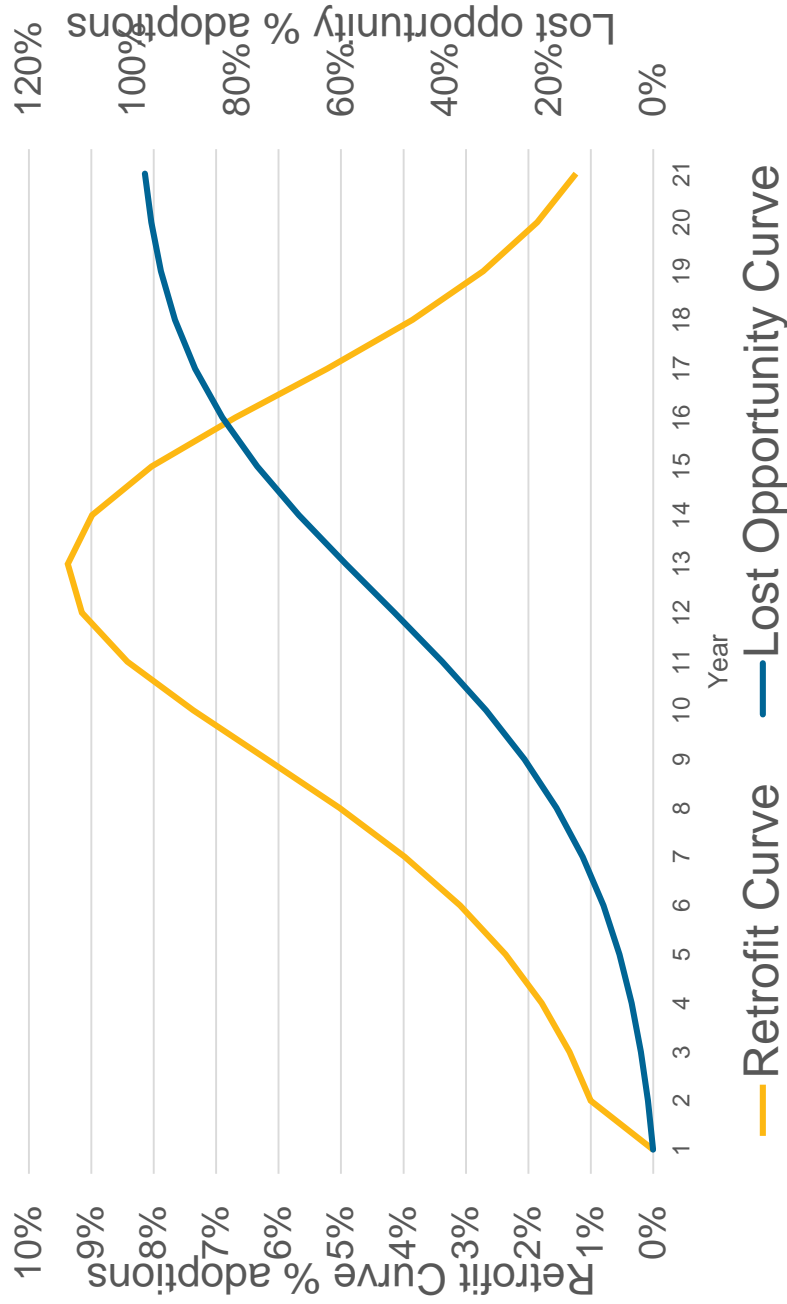
- The RA model results represent the maximum savings potential in a given year.
- Ramp rates are an estimate of how much of that available potential will come off CNG's system.
- Energy Trust ramp rates are based on NWPCC methods and ramp rates, but calibrated to be specific to Energy Trust.



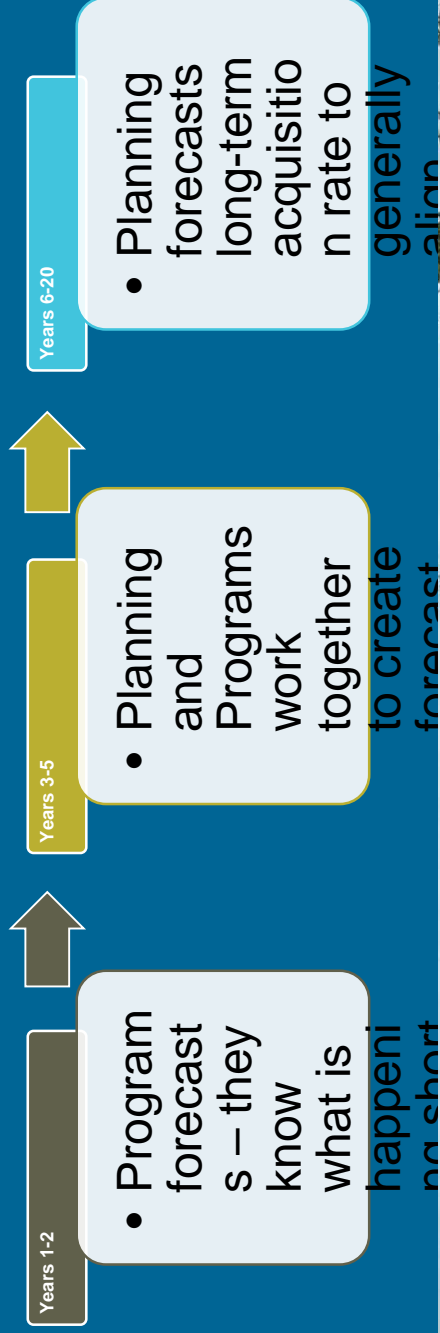
## Ramp Rate Overview

- Total RA Model cost-effective potential is different depending on the measure type.
- **Retrofit measure savings** are 100% of all potential in every year, therefore must be distributed in a curve that adds to 100% over the forecast timeframe (bell curve)
- **Lost opportunity measure savings** are the savings available in that year only and deployment rates are what % of that available potential rate can be achieved – results in an s-curve
- Generally follows the NWPCC deployment methodology
  - 100% cumulative penetration for retrofit measures over 20-year forecast
  - 100% annual penetration for lost opportunity by end of 20-year forecast (program or code achieved)
  - Hard to reach measures or emerging technologies do not ramp to 100%

# Ramp Rate Examples



# Ramp Rate Calibration



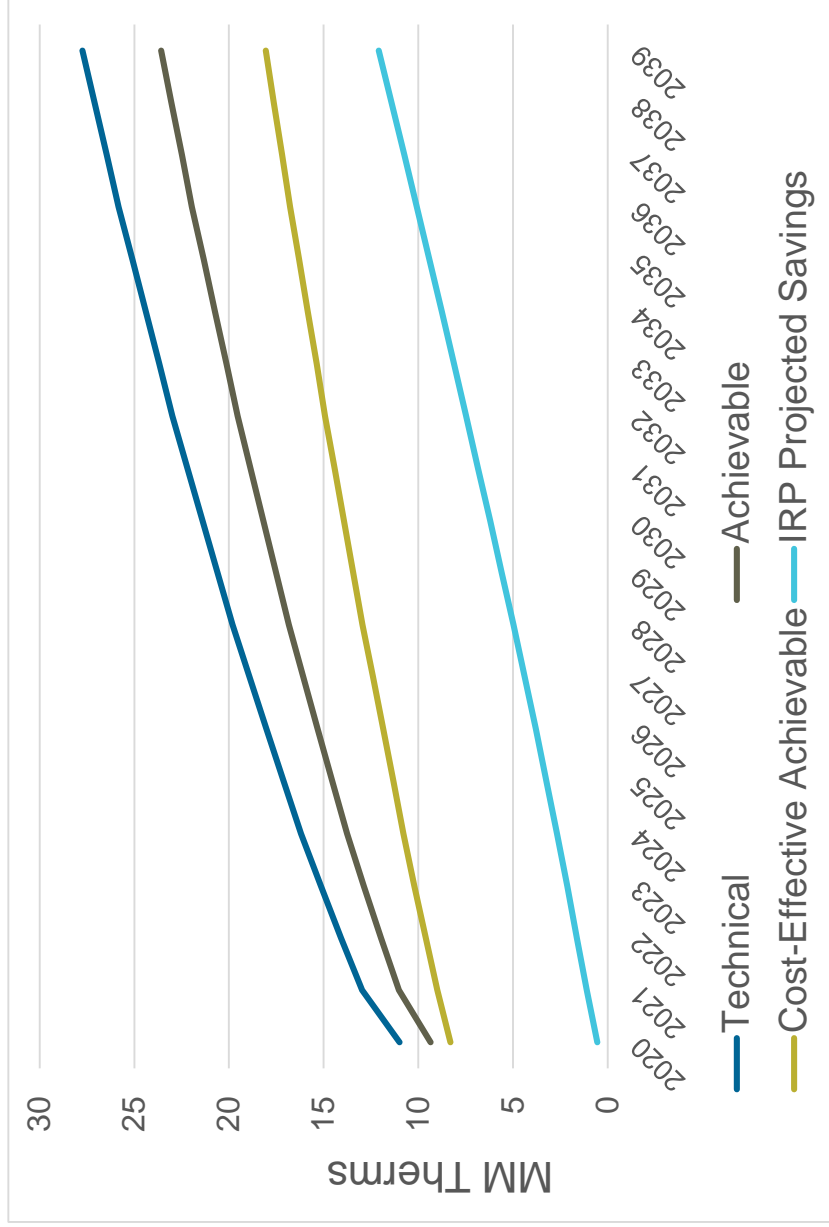
## Application of Ramp Rates & Relation to RA Model Results

- Energy Trust's calibration process means ramp rates are not the same as the NWPCC, but follow similar methods.
- Ramp rates are specific to CNG.
- The application of these ramp rates is the reason why not all of the RA Model Cost-Effective Achievable Potential is forecasted to be acquired.
- The deployment process is done exogenously of the RA Model.

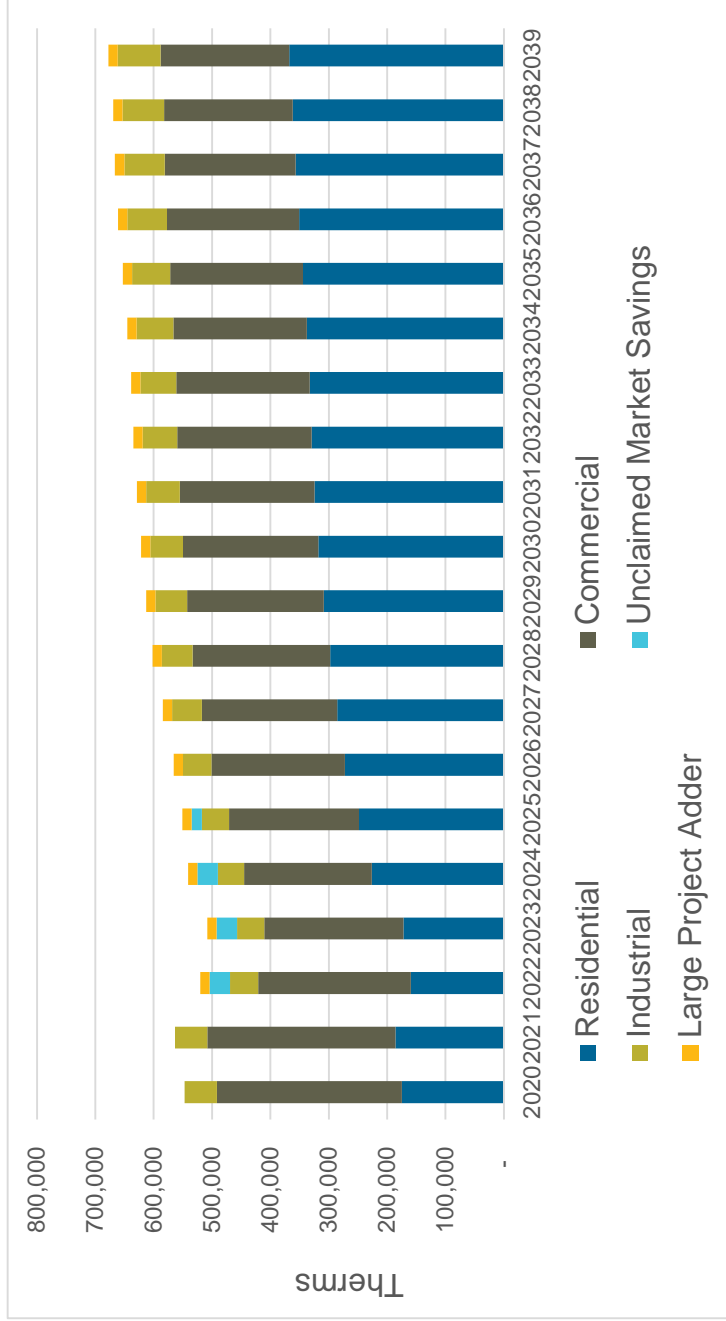


# CNG's 2020 IRP Results

# Cumulative Savings by Type and Year

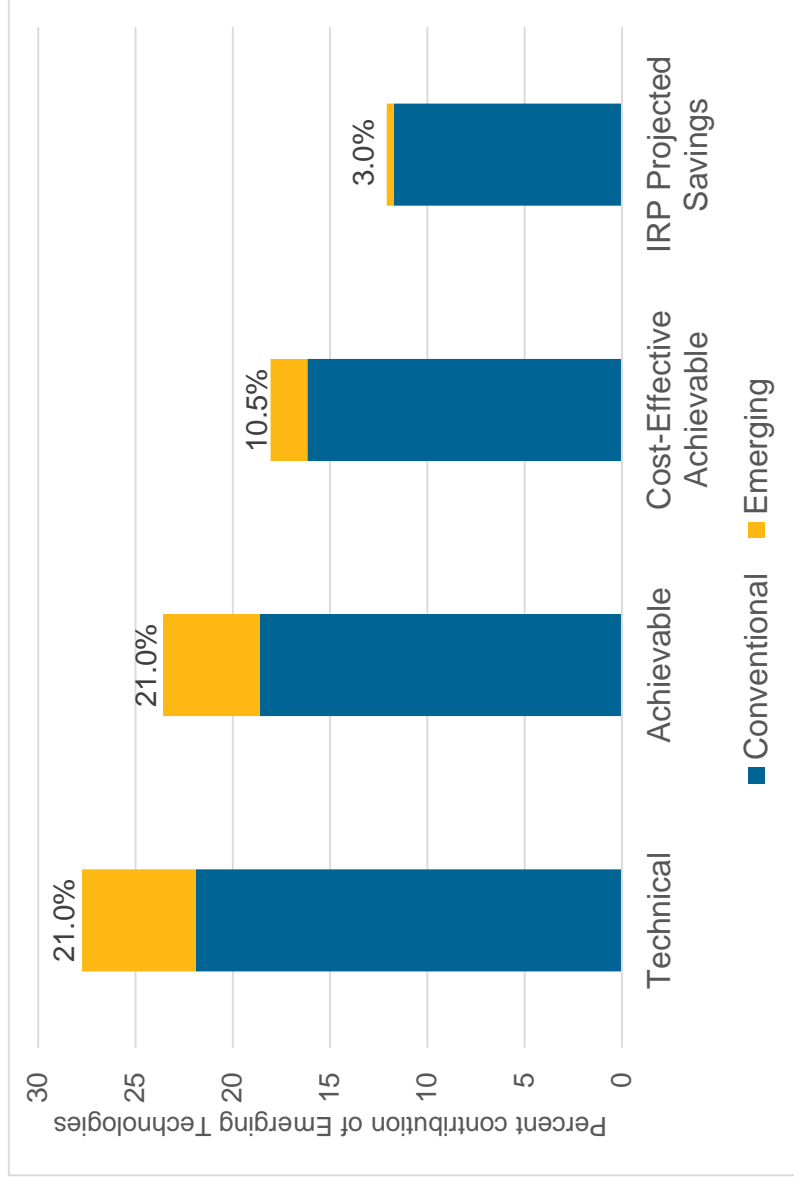


# Annual Deployed IRP Forecasted Savings

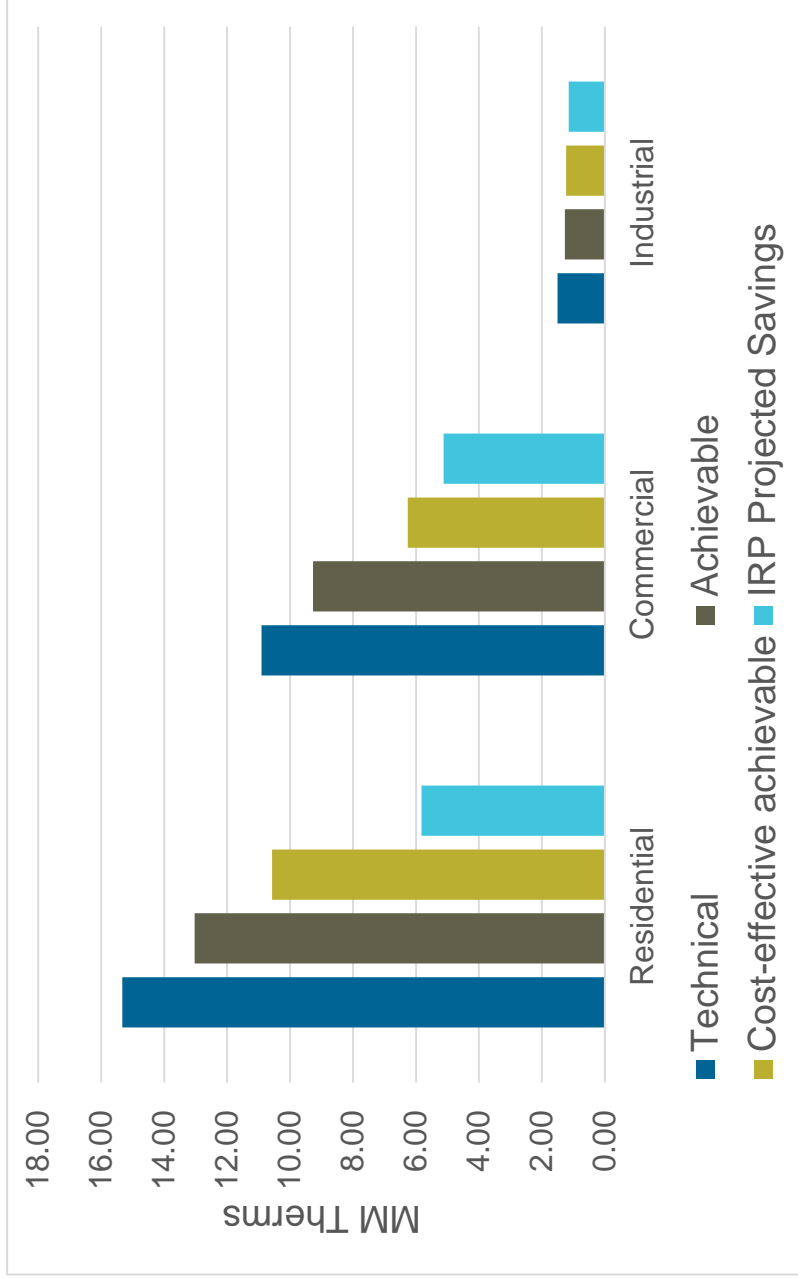




# Cumulative Contribution of Emerging Technologies



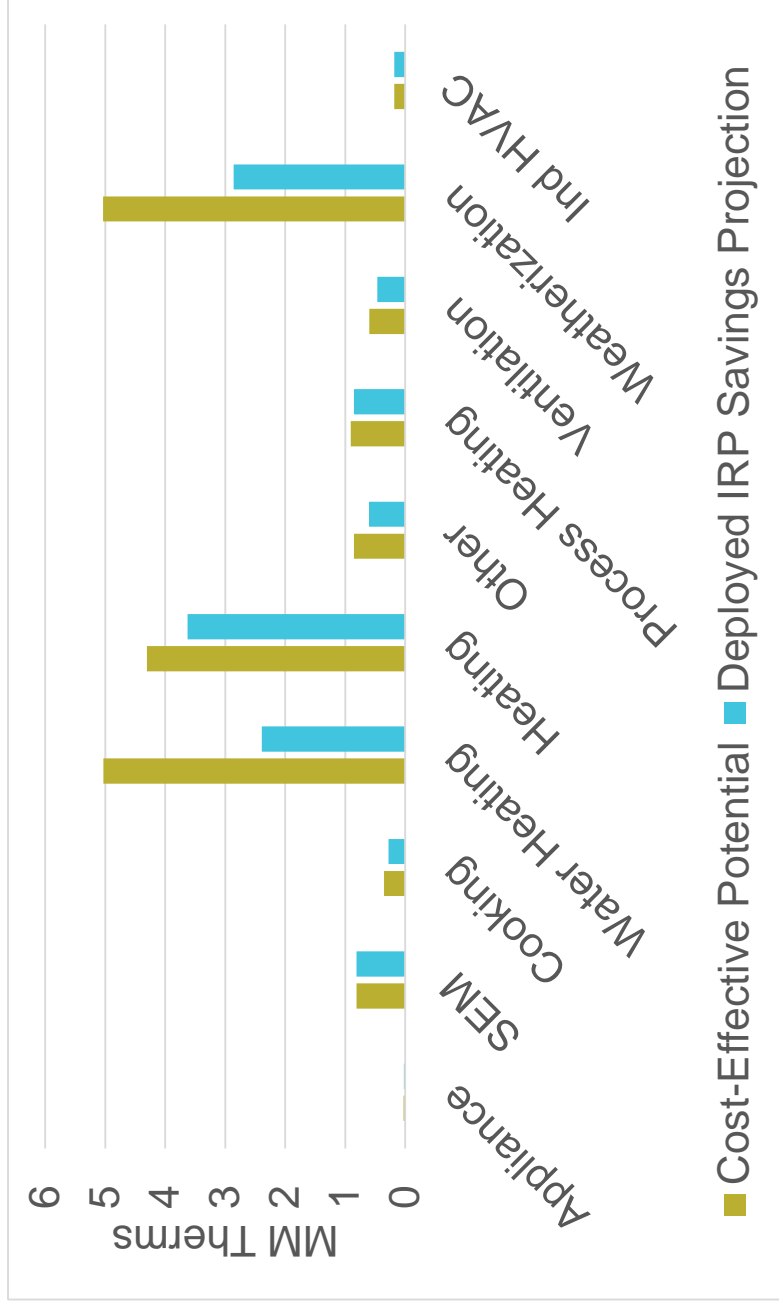
# Cumulative Savings by Sector and Type



## Cumulative Savings by Sector and Type (Therms)

|                                     | Residential | Commercial | Industrial | All Sectors |
|-------------------------------------|-------------|------------|------------|-------------|
| Technical Potential                 | 15,330,968  | 10,907,894 | 1,495,547  | 27,734,409  |
| Achievable Potential                | 13,031,322  | 9,271,710  | 1,271,215  | 23,574,247  |
| Cost-effective Achievable Potential | 10,567,961  | 6,259,466  | 1,229,985  | 18,057,412  |
| IRP Projected Savings               | 5,823,039   | 5,121,593  | 1,148,116  | 12,092,748  |

# Cumulative Cost-Effective Savings & IRP Savings Projections by End-Use Compared



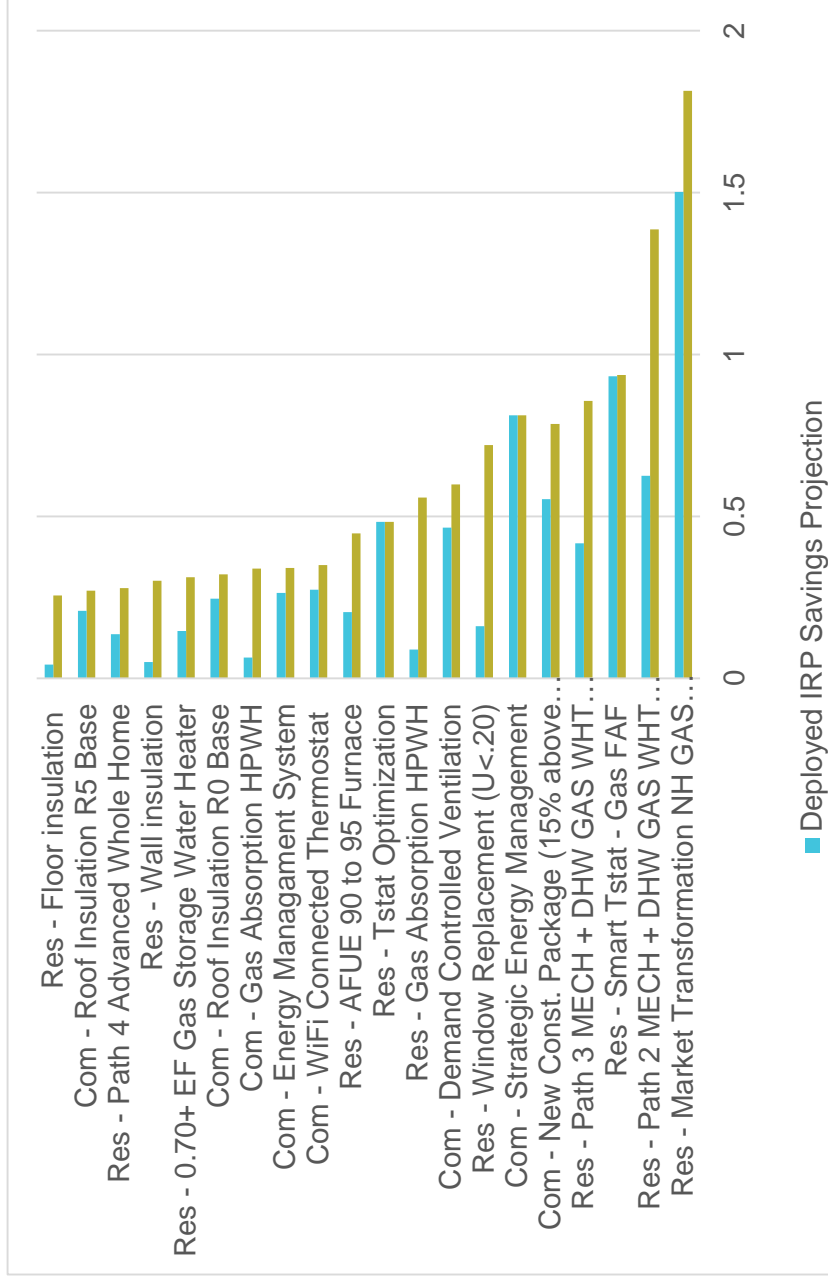
# Top 20 Measures:

2020 ENERGY STAR  
IRP Process

Appendix A  
IRP Process

Page 244

## Cumulative Cost-Effective Savings & IRP Savings Projections Compared



# Cost Effective Override Effect

Energy Trust applied this feature to measures found to be NOT Cost-Effective in the model but are offered through Energy Trust programs under OPUC Exception

| Total Cumulative Potential                | Cost-Effective Potential | Deployed IRP Savings Projection |
|---|--------------------------|---------------------------------|
| Savings with CE Override (MM Therms)      | 18.06                    | 12.09                           |
| Savings with NO CE Override (MM Therms)   | 17.08                    | 11.93                           |
| Variance (MM Therms)                      | 0.98                     | 0.17                            |
| <b>CE Overridden % of Total Potential</b> | <b>5.4%</b>              | <b>1.4%</b>                     |

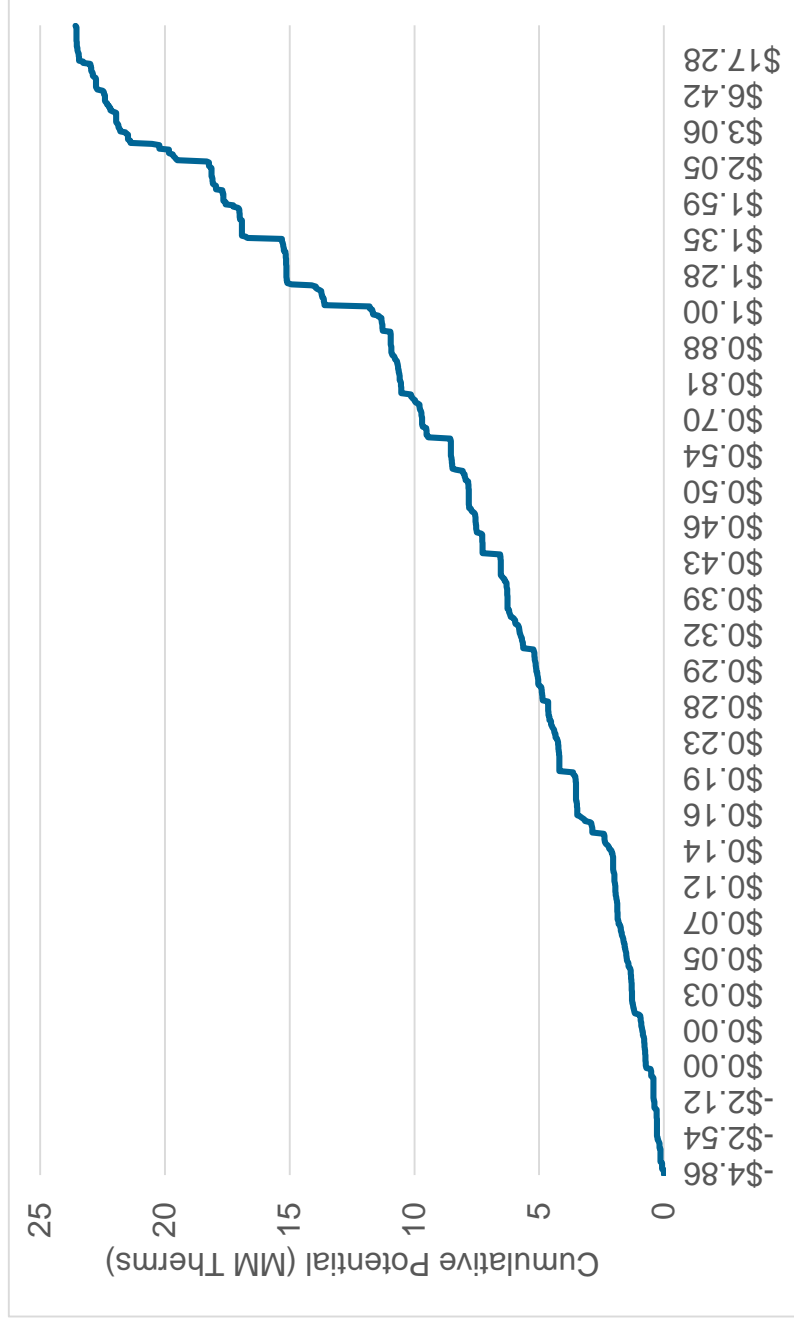
| Measures that are Overridden             | Override Applied? | Notes          |
|--|-------------------|----------------|
| Res - Attic/Ceiling insulation           | TRUE              | OPUC Exception |
| Res - Floor insulation                   | TRUE              | OPUC Exception |
| Res - Wall insulation                    | TRUE              | OPUC Exception |
| Res - 0.67/0.69 EF Gas Tank Water Heater | TRUE              | OPUC Exception |

# Peak Day Factors and Cumulative Peak Day Savings Estimates

- Energy Trust also provides estimates of a peak day reduction in peak day consumption
- Peak Day factors derived from Energy Trust avoided cost calculations

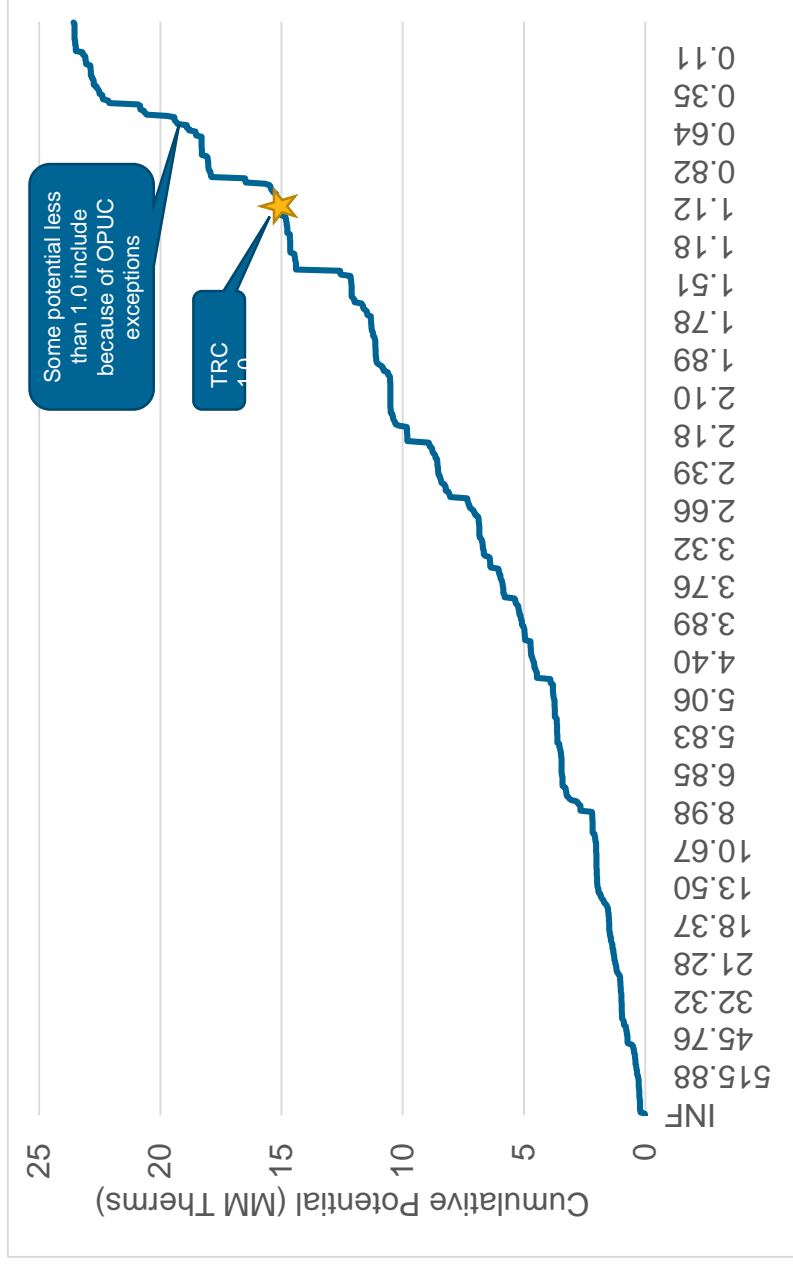
|                    | Peak Day Factor | CE Potential Peak Day Therms (cumulative) | IRP Savings Targets Peak Day Therms (cumulative) |
|--------------------|-----------------|---|--|
| Cooking            | 0.30%           | 1,099                                     | 863  |
| Com Heating        | 1.80%           | 89,959                                    | 73,216   |
| Domestic Hot Water | 0.40%           | 10,249                                    | 4,791  |
| FLAT               | 0.30%           | 2,545                                     | 2,344  |
| Res Heating        | 2.10%           | 192,531                                   | 110,512  |
| Res Clotheswasher  | 0.20%           | 6   | 3  |

# Supply Curve by Levelized Cost (20 year Cumulative Achievable Potential)

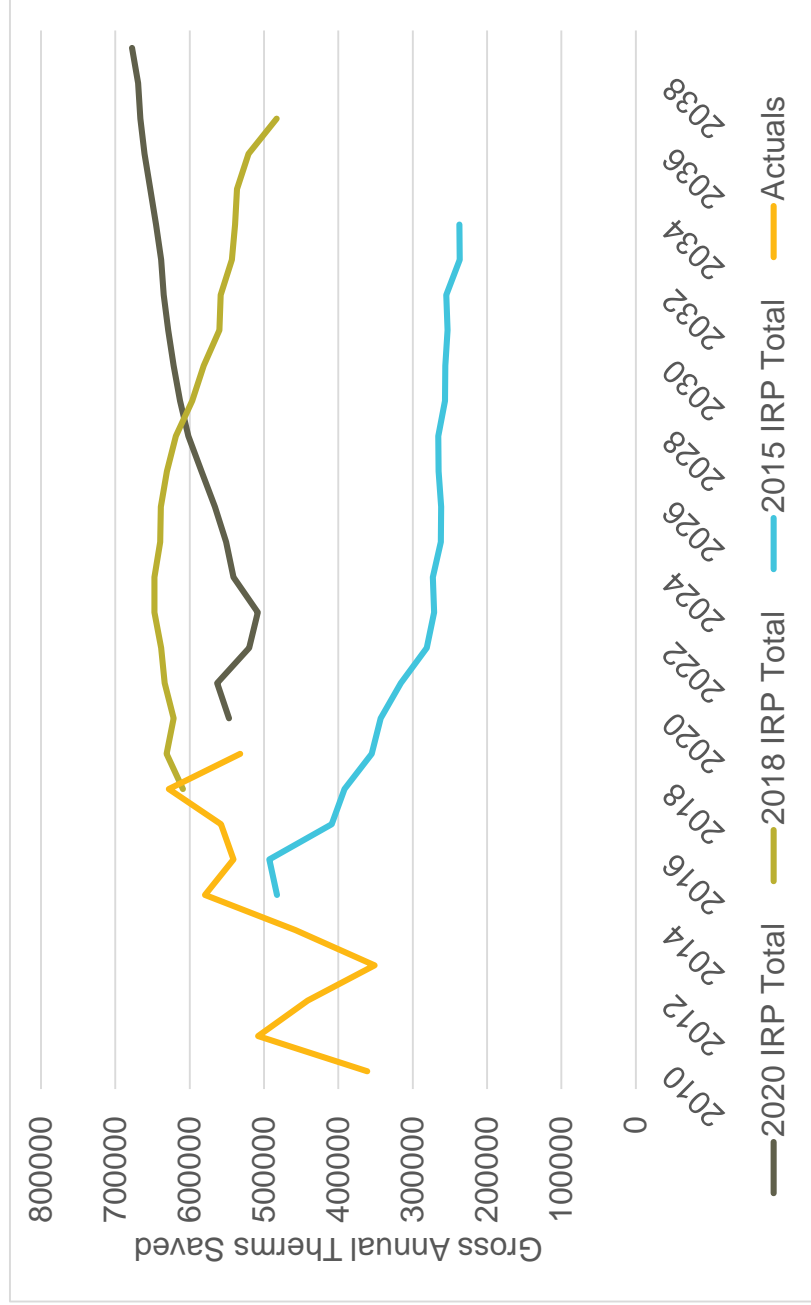




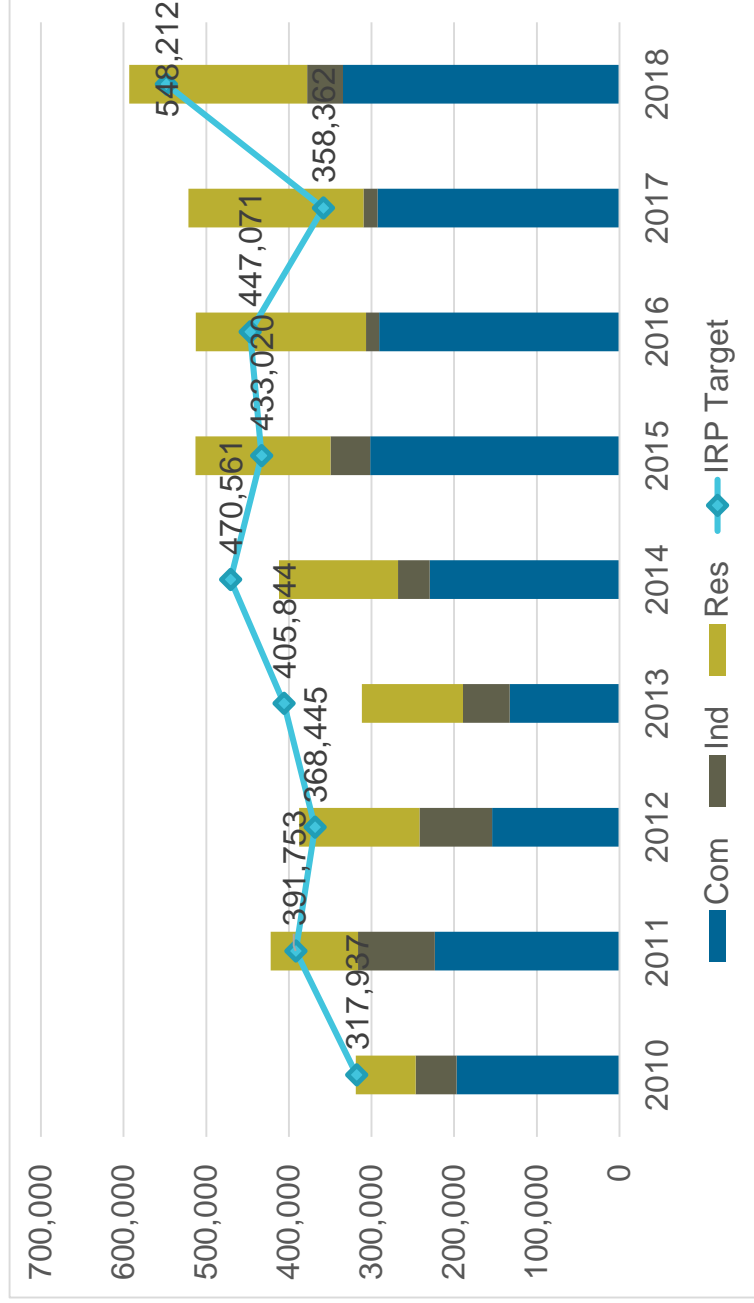
# Supply Curve by TRC Ratio (20 year Cumulative Achievable Potential)



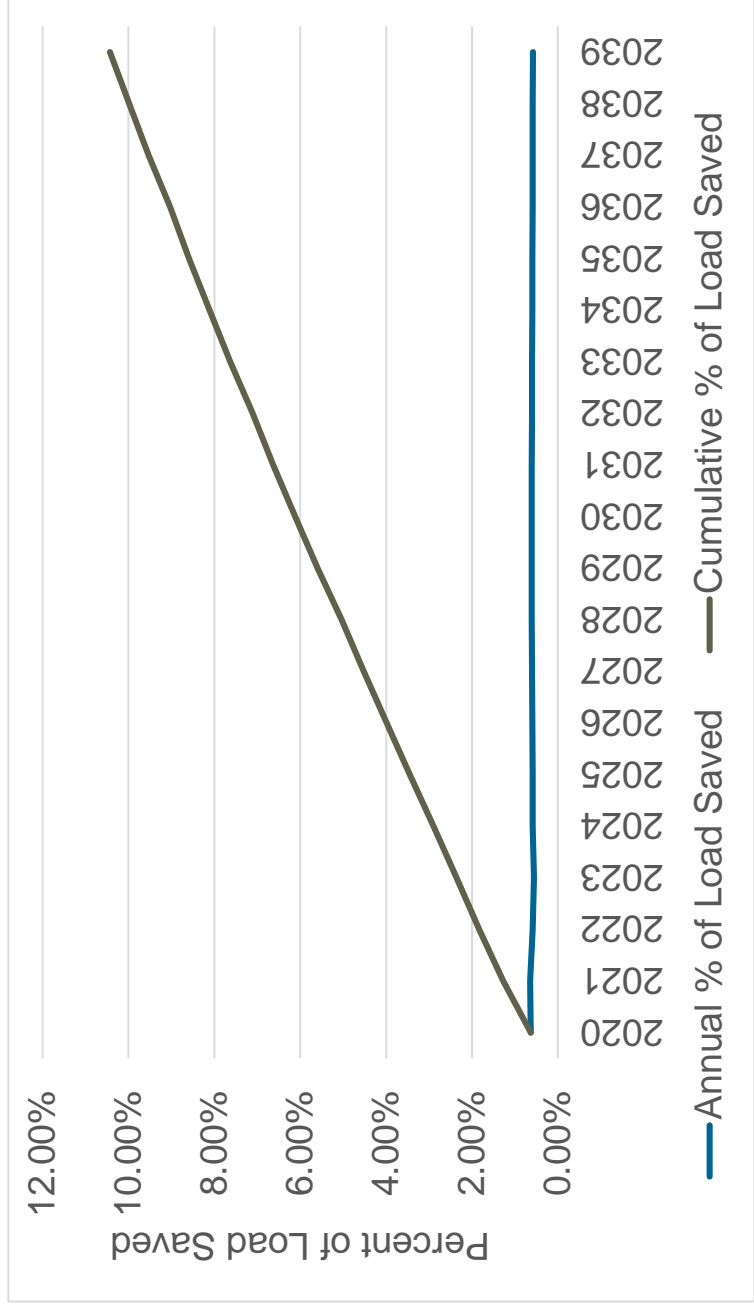
# IRP Forecasts Compared to Actual Savings (Annual Gross Therms)



# Historical Performance compared to IRP targets (Annual Net Therms)



# Savings as a Percent of Load Forecast



# Scenario Runs

## Scenarios Overview

- Ran 4 scenarios for CNG's 2018 IRP
- Scenario 1:
  - Base Case Ramp Rates / Social Cost of Carbon Avoided Costs
- Scenario 2:
  - Base Case Ramp Rates / Market Price of Carbon Avoided Costs
- Scenario 3:
  - Low Ramp Rates / Reference Case Avoided Costs
- Scenario 4:
  - High Ramp Rates / Reference Case Avoided Costs



## Carbon Scenarios Methodology

- Utilized two different carbon price forecasts in the modeled avoided costs
  - Social Cost of Carbon (higher than base case (Cap & Trade) carbon assumption)
  - Market Cost of Carbon (lower than the base case (Cap & Trade) carbon assumption)
- Ran model with updated avoided costs
- Input CE results into deployment tool and did not change ramp rates except for years 1 and 2 to reflect current budget goals for 2020/2021

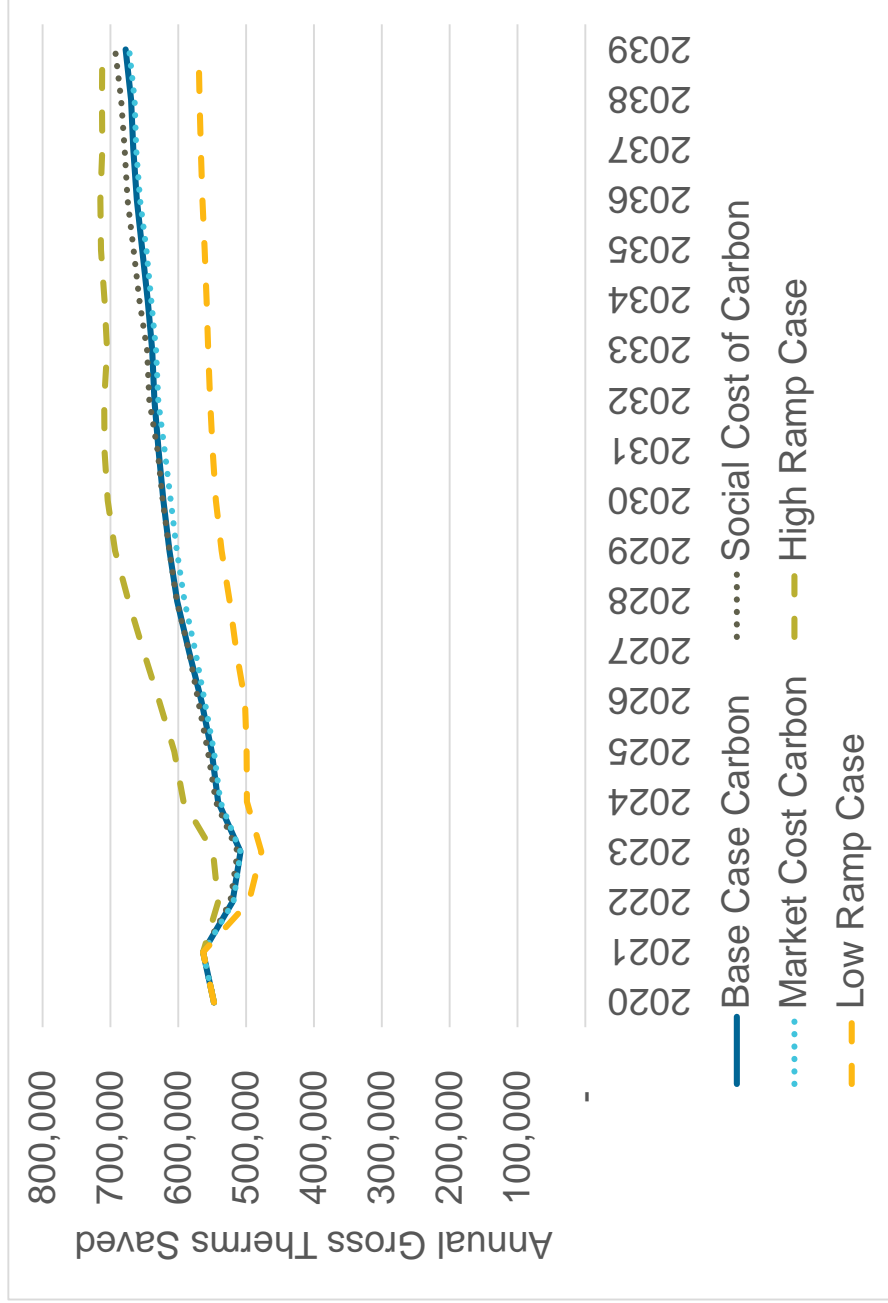


## High/Low Ramp Scenarios Methodology

- These both utilize the base case avoided costs
- These scenarios front load savings potential or slow it down.
  - High Ramp Methodology:
    - Reaching 100% of available Replacement/New measures earlier in the forecast (about 5 years)
    - Front load some of the retrofit savings
    - Applying a faster adoption curve of emerging technologies
  - Low Ramp Methodology:
    - Reaching only 85% of the available Replacement/New measures in the forecast (instead of 100% by the end of the forecast as in the base case)
    - Reaching only 85% of total Retrofit achievable potential deployed in the base case
    - Slower adoption curve for emerging technologies.



# Scenario Analysis Results (Annual Therms)



## Carbon Scenarios Discussion

- Carbon price has a minimal effect on the overall deployed cost effective potential
- These scenarios only look at the incremental differences in cost-effective potential, not customer adoption elasticity
- There are very few measures that are on the margin (just below 1.0 TRC) in terms of cost-effectiveness
- CE is tested for each year in the model, so measures on the margin just shift when they become cost effective



## High/Low Ramp Scenarios Discussion

- Energy Trust's influence on outcomes is uncertain
- Could be the result of one or a combination of the following factors:
  - Increased incentives from higher avoided costs due to carbon
  - Economic booms or slowdowns
  - Increased awareness of carbon and therefore increased interest in EE adoption (or the opposite)
  - Increased or decreased funding of energy efficiency in Oregon
  - Carbon legislation or other legislation
  - Customer behavior or interest in certain technologies



Thank you

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Planning

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# Carbon Impacts



# Carbon Discussion

- Purpose of this section is to discuss the rationale and decision-making process behind Cascade’s carbon modeling.
- Intended to be a collaborative discussion so questions are particularly encouraged.

# Base Case Carbon Forecast – Cap and Trade Market

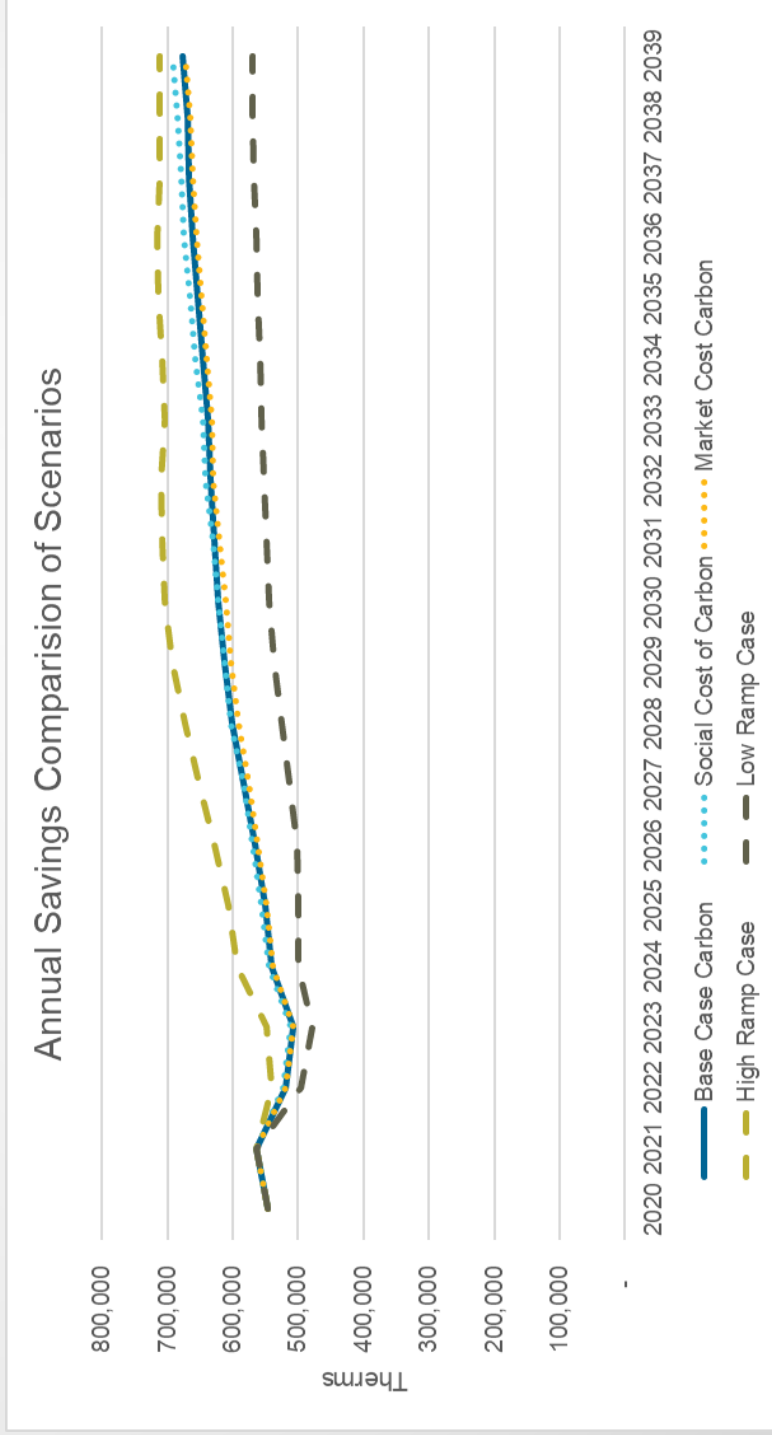
- Cascade’s resource planning team worked closely with its internal environmental analysts to make a qualitative decision as to the most probable carbon future in Oregon, which they believe to be a Cap and Trade marketplace analogous to the California marketplace.
- Cascade chose to continue using a deterministic approach to carbon compliance forecasting to be consistent with Cascade’s other modeling methodologies, as well as to avoid having to make subjective probabilistic assumptions about future carbon costs.
- Sensitivity analysis, both deterministic and stochastic, helps the Company quantify the uncertainty around carbon compliance costs.

# Alternative Carbon Forecasts

- Cascade will run deterministic sensitivity analysis on two alternative carbon futures: Social Cost of Carbon and a 2018 national proposal titled Market Choice.
- Cascade will also run a stochastic sensitivity analysis of all potential carbon futures and include the results in the 2020 OR IRP.
- Ultimately, according to an analysis performed by ETO, the difference in carbon forecasts are not nearly as impactful to conservation potential as ramp rates are.



# CPA Comparison: Scenarios vs Ramp Rate



# SENDOUT® Optimization Modeling

## SENDOUT® Model

- Cascade utilizes SENDOUT® for resource optimization.
- This model permits the Company to develop and analyze a variety of resource portfolios to help determine the type, size, and timing of resources best matched to forecast requirements.
- SENDOUT® is very powerful and complex. It operates by combining a series of existing and potential demand side and supply side resources, and optimizes their utilization at the lowest net present cost over the entire planning period for a given demand forecast.

## SENDOUT® Model (Cont'd)

- SENDOUT® utilizes a linear programming approach.
- The model knows the exact load and price for every day of the planning period based on the analyst's input and can therefore minimize costs in a way that would not be possible in the real world.
- Therefore, it is important to recognize that linear programming analysis provides helpful but not perfect information to guide decisions.

# Modeling Transportation In SENDOUT® is a Balancing Act

- Start with a point in time look at each jurisdiction's resources
- Use the Nov19-Oct20 PGA portfolio
- Contracts –Receipt and Delivery Points
- We start with current transport contracts, using centralized receipts and approximately 67 delivery locations
- Rates - Current contractual, with CPI increase every 3 years
- Contractual vs. Operational
- Contractual can be overly restrictive
- Operational can be overly flexible
- Incorporating operational realities into our modeling can defer the need to acquire new resources.
- Gas Supply's job is to get gas from the supply basin to the pipeline citygate
- IRP focus is on the core
- Operations job is to take gas from the pipeline gate to our customers
- Operations focus is on the system, not just the core
- Limiting factor is receipt quantity –how much can you bring into the system?

## Modeling Challenges

- Supply needs to get gas to the citygate.
- Many of Cascade's transport agreements were entered into decades ago, based on demand projections at that point in time.
- Sum of receipt quantity and aggregated delivery quantity can help identify resource deficiency depending on how rights are allocated.
- The aggregated look can mask individual citygate issues for looped sections, and the disaggregated look can create deficiencies where they don't exist.
- In many cases operational capacity is greater than contracted.
- SENDOUT® has perfect knowledge.

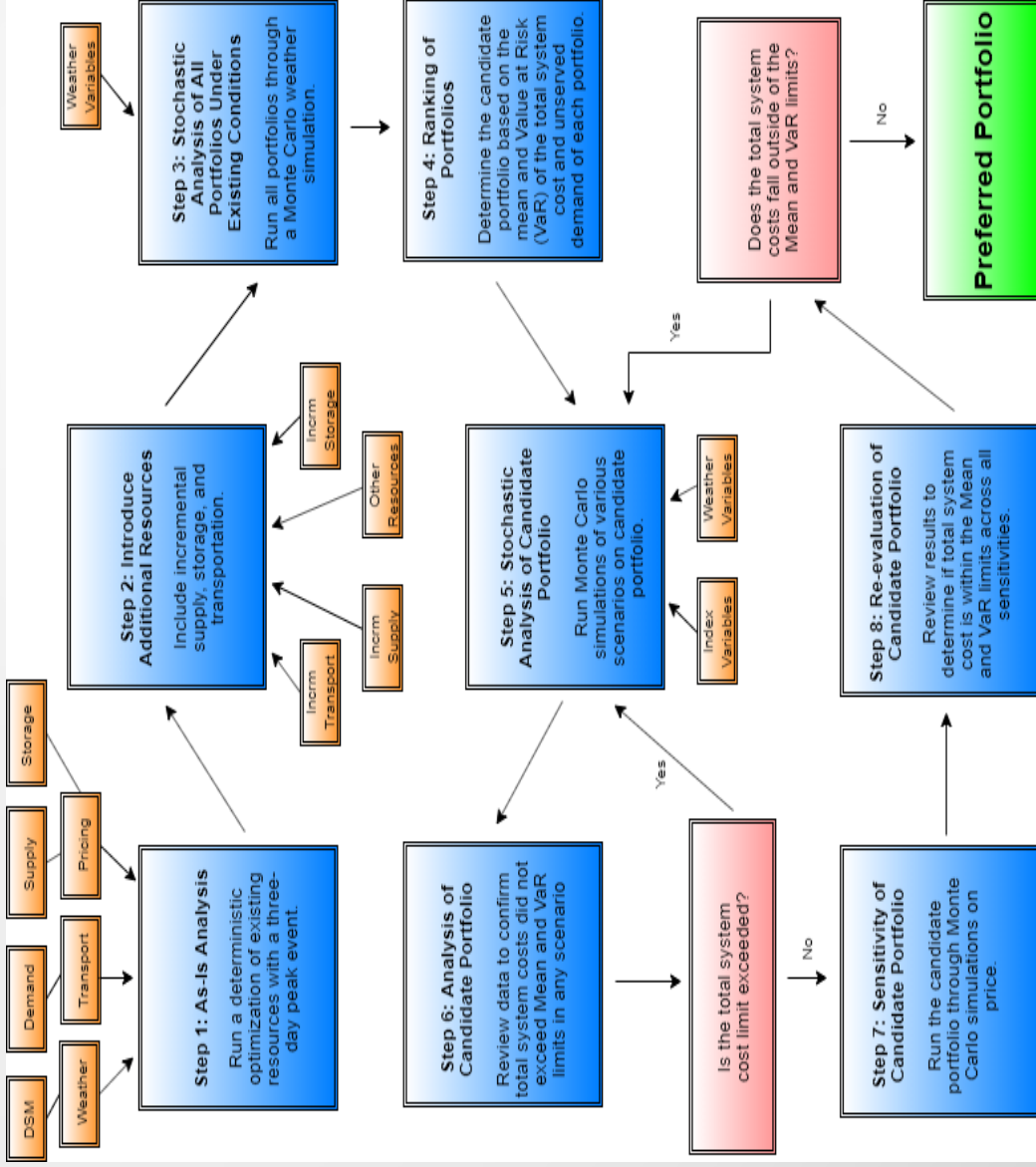
## Supply Resource Optimization Process

- **Step 1: As-Is Analysis**
  - Run a deterministic optimization of existing resources with a three-day peak event to uncover timing and quantity of resource deficiencies.
- **Step 2: Introduce Additional Resources**
  - Include incremental supply, storage, and transportation to derive a deterministic optimal portfolio, additional portfolios.
- **Step 3: Stochastic Analysis of All Portfolios Under Existing Conditions**
  - Run all portfolios through a Monte Carlo weather simulation, using expected growth, supply and storage accessibility. Record the probability distributions of total system costs for each portfolio.
- **Step 4: Ranking of Portfolios**
  - Determine the candidate portfolio based on the mean and Value at Risk (VaR) of the total system cost and unserved demand of each portfolio. This resource mix will be the best combination of cost and risk for Cascade and its customers.

## Supply Resource Optimization Process (Cont'd)

- **Step 5: Stochastic Analysis of Candidate Portfolio**
  - Run Monte Carlo simulations of various scenarios on candidate portfolio; comparing Mean and VaR to a managerial limit.
- **Step 6: Analysis of Candidate Portfolio**
  - Review data to confirm total system costs did not exceed Mean and VaR limits in any scenario. If limit is exceeded, repeat step 5 with next highest ranked portfolio.
- **Step 7: Sensitivity of Candidate Portfolio**
  - Run the candidate portfolio through Monte Carlo simulations on price. Review results to determine if total system cost is within the Mean and VaR limits across all sensitivities.
- **Step 8: Re-evaluation of Candidate Portfolio**
  - If the total system costs fall outside of the Mean and VaR limits in sensitivity analysis, select the next most optimal portfolio to run scenario and sensitivity analysis on. Repeat as needed until preferred portfolio is confirmed.





# Base Case Sendout Inputs

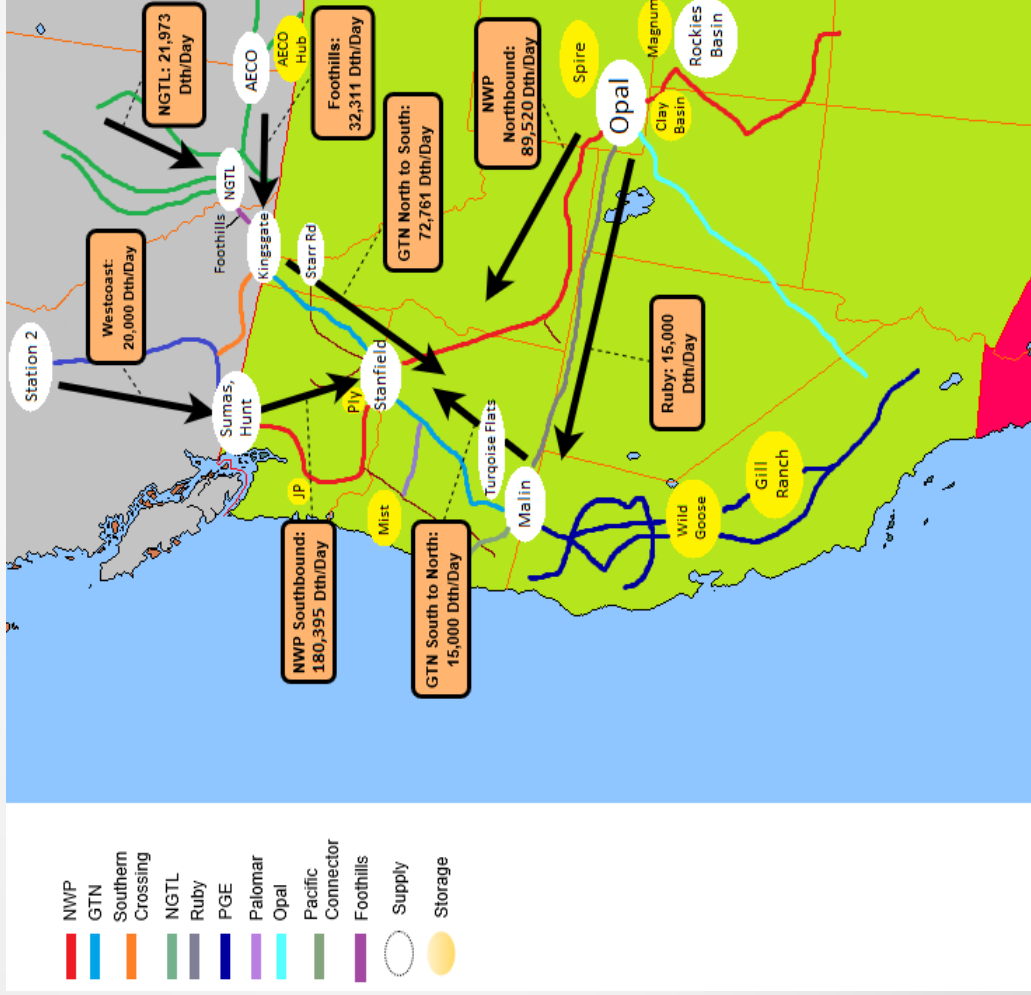
- Supply
- Storage
- Transportation
- Constraints
- Demand
- Weather
- Price Forecast

# Supply

- Cascade can purchase gas at four markets; AEEO, SUMAS, KINGSGATE and OPAL.
- At each market Cascade can purchase gas at different locations along the pipeline.
- For the first year, Cascade uses all current contracts for Supply inputs.
- For years 2-20, Cascade uses Base, Fixed, Winter base, Summer and Winter day gas, and Peak day incremental supplies as inputs.
- Over the planning horizon, the contracts are renewed in November and April.



# Supply



# Supply Base and Fixed

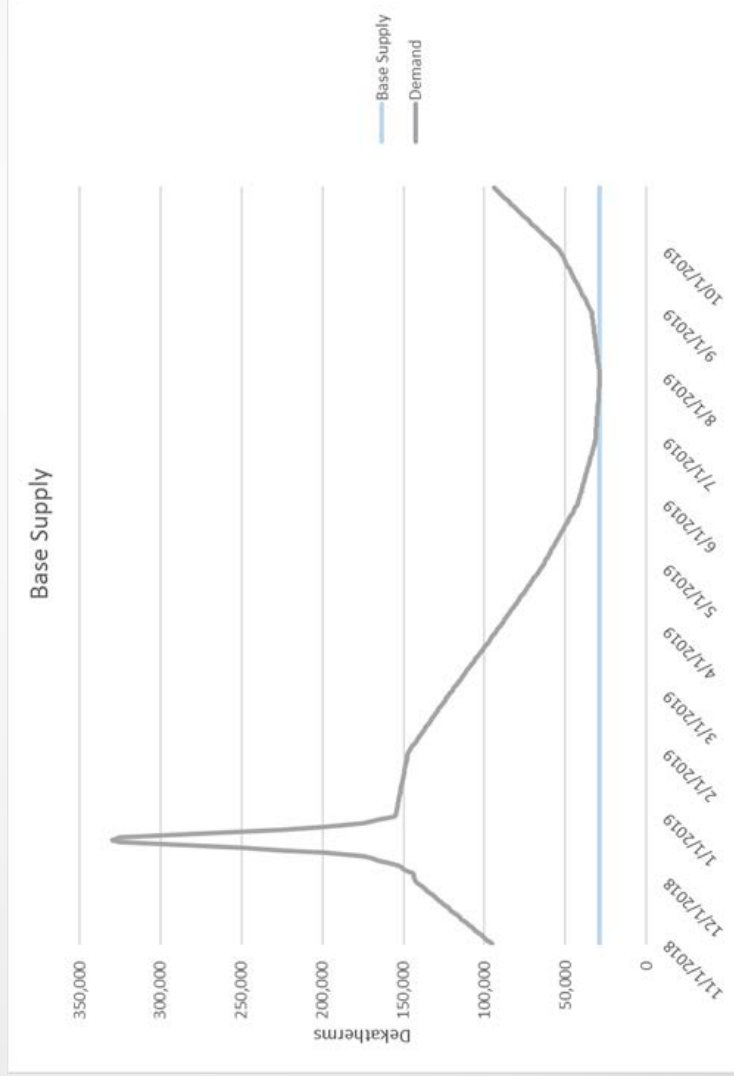
- Supply Base and Fixed are the baseline supply contracts that are entered into every 12 months.
- A base contract has a basis rate. This is defined as the price of gas at a given market (i.e., AECO base is the expected cost of gas at NYMEX plus the basis for AECO, for a given month).
- A fixed contract has a fixed rate.
- A penalty is applied to each contract when the gas is not taken for a day. This type of penalty forces these types of contracts to only take the optimal amount of gas to serve the base demand.

# Supply Example

|                                    | JAN 2017 | FEB 2017 | MAR 2017 | APR 2017 | MAY 2017 | JUN 2017 | JUL 2017 | AUG 2017 | SEP 2017 | Extension Option | Escalation Pattern | Monthly Multiplier | Index | Adder | Multiplier |
|------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|------------------|--------------------|--------------------|-------|-------|------------|
| Total MDO                          | 25000    |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Monthly Minimum Percent            | 100      |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Monthly Maximum Percent            |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Annual Minimum Percent             |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Annual Maximum Percent             |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Monthly Minimum                    |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Monthly Maximum                    |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Seasonal Minimum Percent           |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Seasonal Maximum Percent           |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Known Take                         |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Rate - Commodity                   | 2.5      |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Rate - Dispatch                    |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Rate - Known Commodity Cost        |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Rate - Other Variable 1            |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Rate - Other Variable 2            |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Rate - Penalty Annual              |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Rate - Penalty Seasonal            |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Rate - Penalty Monthly             |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Rate - Penalty Daily               |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Rate - D1                          | 2.5      |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Rate - D2                          |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Volume - D1 Volume                 |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Volume - D2 Volume                 |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Temp Cutoff Max Temperature        |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Available 2 Below Min/Above Max    |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Temp Cutoff Min Temperature        |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Apply Temperature Cutoff           |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Energy Indicator                   |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Process Indicator                  |          |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Resource Mix Start/Stop Indicators | Start    |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |
| Risk MDO Range Max                 | 25000    |          |          |          |          |          |          |          |          | Same             |                    |                    |       |       |            |



# Base Supply (Cont'd)

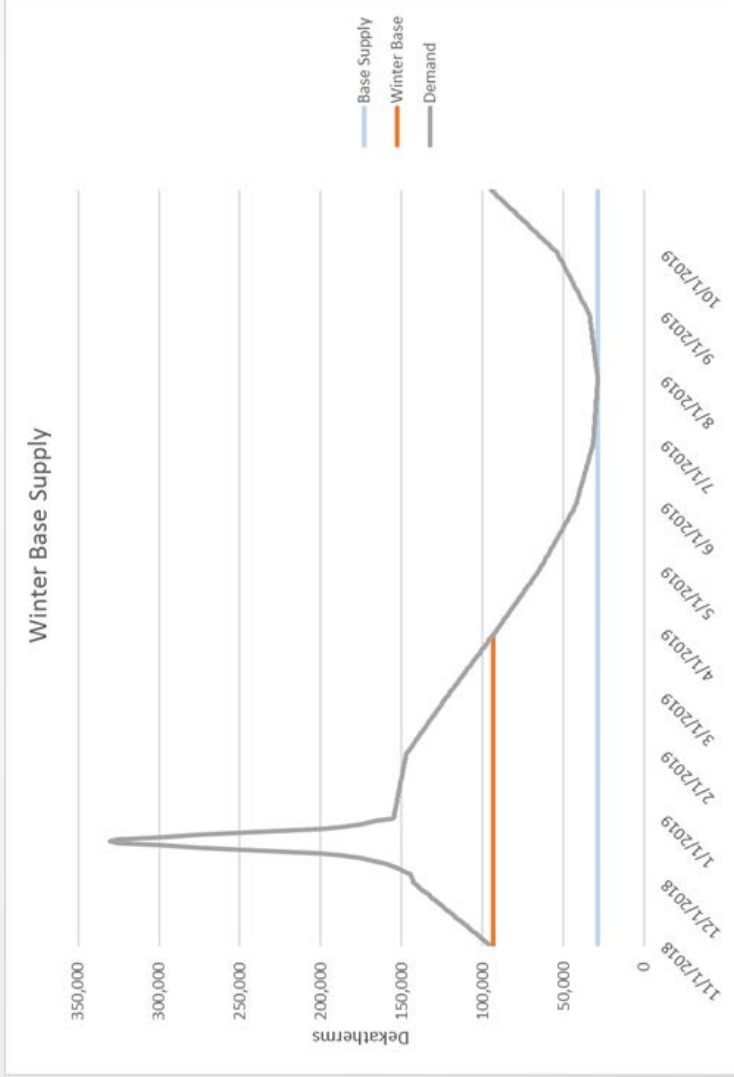


# Winter base Supply

- Winter base supply is contracted supply with a premium charge that is slightly higher than base gas.
- The Maximum Daily Quantity (MDQ) is optimally set by SENDOUT.
- Winter supply is renewed every November and completes at the end of March.
- Winter Supply is additional baseline supply on top of the base or fixed supplies for the winter months.
- There is a penalty associated to this contract to force SENDOUT to take the optimal amount of additional winter base gas.



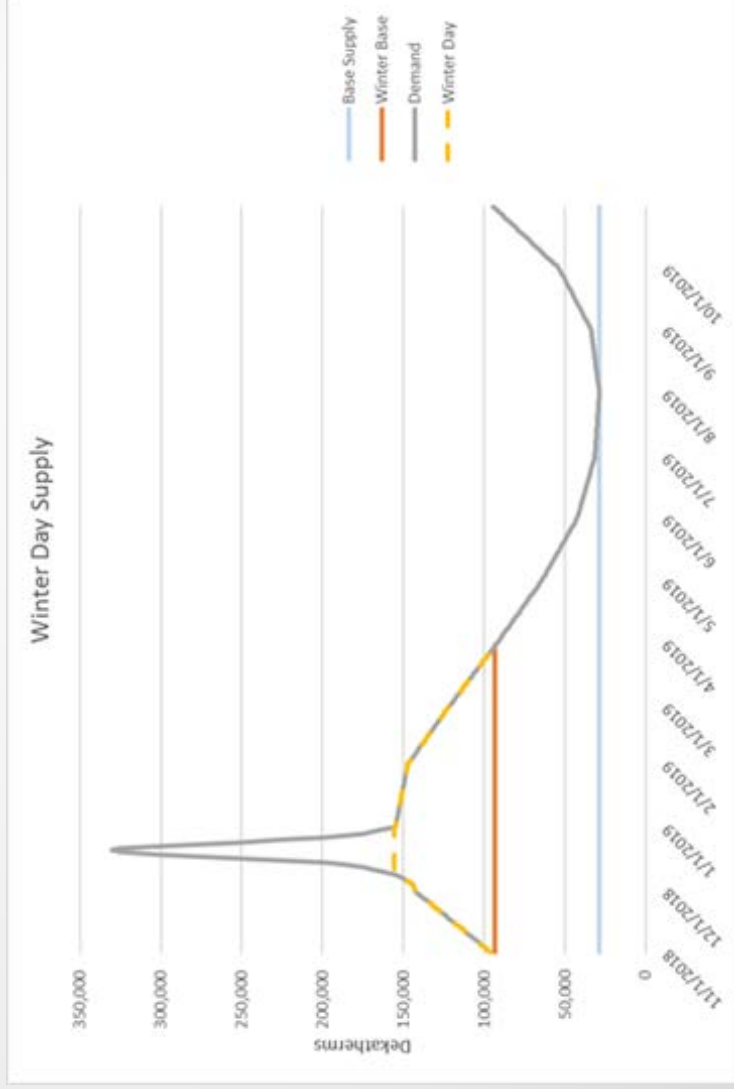
# Winter Base Supply (Cont'd)



# Day Supply (Winter)

- Winter Day supply is gas that is R-mixed at the beginning of November each year.
- The R-mix function takes into account the fixed and variable costs of a resource to determine the proper amount to take in a given period.
- Winter day gas has an MDQ cap but is not a must take supply.
- If a winter day supply has an MDQ of 10,000 dth then it can take anywhere from 0 to 10,000 dth of gas on any given day in the winter.
- Winter day supply has a slightly higher premium than winter base supply and it can be contracted from November to April.

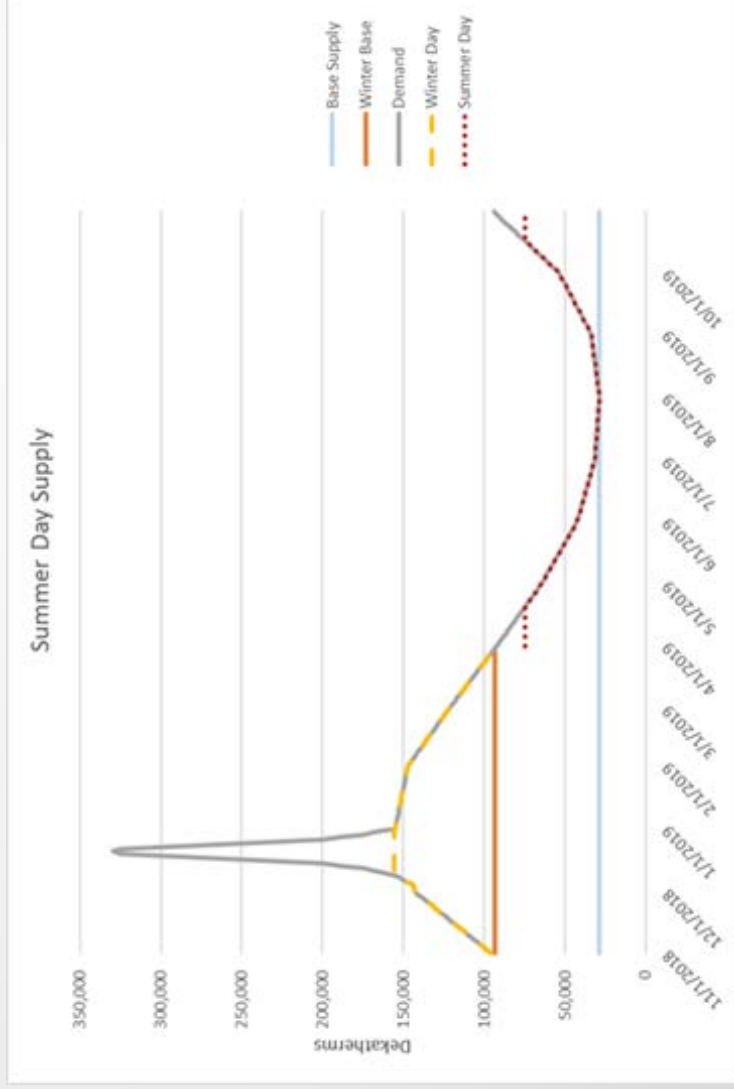
# Winter Day Supply (Cont'd)



# Day Supply (Summer)

- Summer day supply is gas that is R-mixed at the beginning of April each year.
- Summer day gas has an MDQ cap but is not a must take supply.
- If a summer day supply has an MDQ of 10,000 dth then it can take anywhere from 0 to 10,000 dth of gas on any given day in the summer.
- Summer day supply has a slightly higher cost than base supply and it can be contracted from April to November.

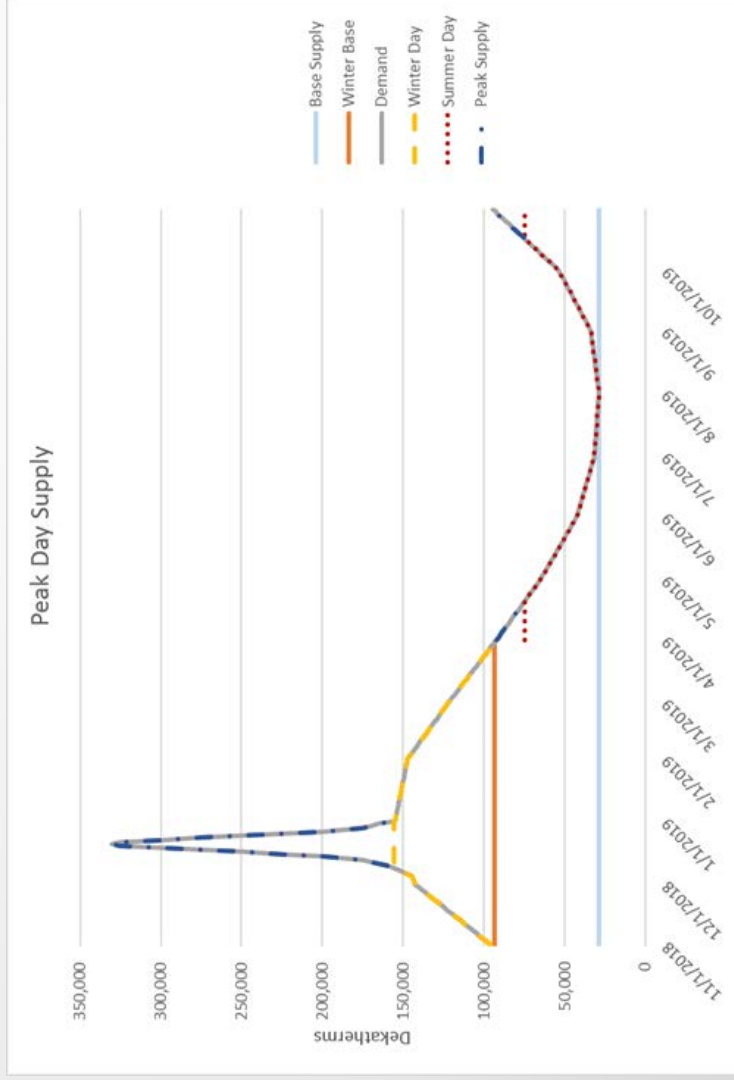
# Day Supply (Summer)



# Peak Supply

- Peak supply is gas purchased on high demand days where base, index, winter base, or day supply cannot accommodate.
- Peak supply has a slightly higher premium to buy than day supply.
- As long as Cascade has the transport capacity or can utilize a third party's transport capacity, we can purchase as much peak supply as needed to meet peak demand.

# Total Supply

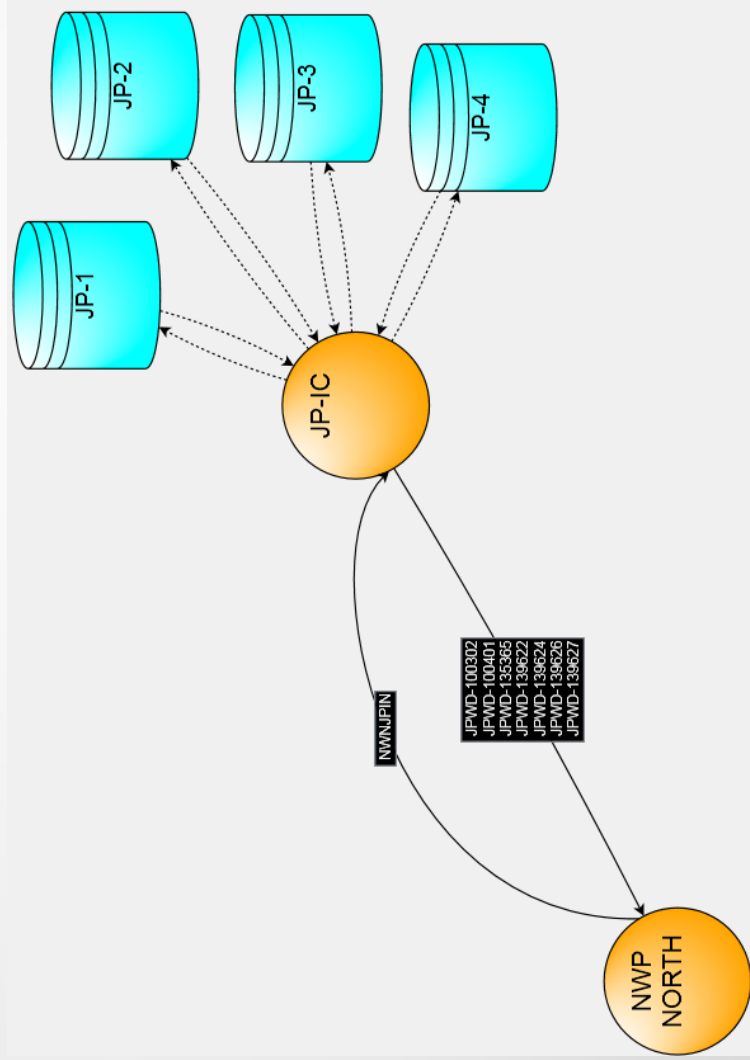


# Storage

- Cascade leases storage at 3 locations: Jackson Prairie (JP), Plymouth (Ply), and Mist.
- Cascade has 4 storage contracts with JP, 2 contracts with Plymouth, and 1 with Mist.
- Storage injections targets are set at 35% by the end of June, 80% by the end of August, and 100% by the end of September.
- These targets are set by our Gas Supply Oversight Committee.
- Cascade can withdrawal approximately 56,000 dth per day from JP, 78,000 dth per day from Plymouth, and 30,000 Dth per day from Mist for a total of approximately 164,000 dth per day.



# Storage Example



# Storage Example 2

| Process Indicator                     | JAN 2017 | FEB 2017 | MAR 2017 | APR 2017 | MAY 2017 | JUN 2017 | JUL 2017 | AUG 2017 | SEP 2017 | Escalation Option | Escalation Pattern | Monthly Multiplier |
|---------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-------------------|--------------------|--------------------|
| Inventory Maximum Physical Capacity   | 604351   |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Inventory Minimum Physical Percent    |          |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Target Inv - End of Period Max Pct    |          |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Target Inv - End of Period Min Pct    |          |          |          |          |          |          |          |          |          | Full Year         | >                  | >                  |
| Inventory Adjustment - Value per Unit |          |          |          |          |          | 35       | 80       | 100      |          | Same              | >                  | >                  |
| Injection Daily MGD - Volume          |          |          |          | 16789    |          |          |          |          |          | Same              | >                  | >                  |
| Withdrawal Daily MGD - Percent        |          |          |          |          |          |          |          |          |          | Last Year         | >                  | >                  |
| Withdrawal Daily MGD                  |          |          |          | 0        |          |          |          |          |          | Last Year         | >                  | >                  |
| Fuel Injection                        | 0.15     |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Fuel Withdrawal                       | 0.15     |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Basic - Carry                         |          |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Basic - Injection                     |          |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Basic - Withdrawal                    |          |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Basic - Other Injection               |          |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Basic - Other Withdrawal              |          |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Basic - Volume Charge                 |          |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Basic - D1                            | 01558    |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Basic - D2                            | 00057    |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Volume - D1 Volume                    | 16789    |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Volume - D2 Volume                    |          |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Storage Ratchets Table                |          |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Station Inv Layer 1 Value per Unit    | 3        |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Station Inv Layer 1 Volume            | 604351   |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Energy Conversion Factor              |          |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Injection Costing List - Transport    |          |          |          |          |          |          |          |          |          | Same              | >                  | >                  |
| Injection Costing List - Source       |          |          |          |          |          |          |          |          |          | Same              | >                  | >                  |

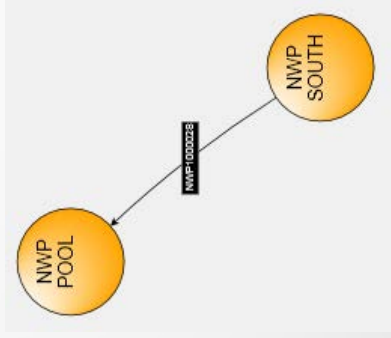
# Transportation

- Transportation contracts are the means of how Cascade gets the gas from the supplier to the end user.
- Cascade has multiple types of transportation:
  - A single delivery point.
  - Multiple delivery points.
- The multiple delivery point contracts gives Cascade the flexibility to move the gas where it's most needed.
- On NWP, transportation goes to the zonal level because MDDO's can be reallocated within a zone to the citygate. Additionally, NWP typically issues constraint concerns at the zonal level.
- On GTN, transportation goes to the citygate level as MDDO's cannot be reallocated within the GTN zone.

# Transportation (Cont'd)

- Transportation has an MDQ, a D1 rate, a transportation rate, and a fuel loss percentage.
- A maximum delivery quantity (MDQ) which is the maximum amount of gas Cascade can move on the pipeline on a single day.
- A D1 rate which is the reservation rate to have the ability to move the MDQ amount on the pipeline.
- A transportation rate which is the rate per dekatherm that is actually moved on the pipeline.
- The fuel loss percentage is the statutory percent of gas based on the tariff from the pipeline that is lost and unaccounted for from the point of where the gas was purchased to the citygate.

# Transport Example



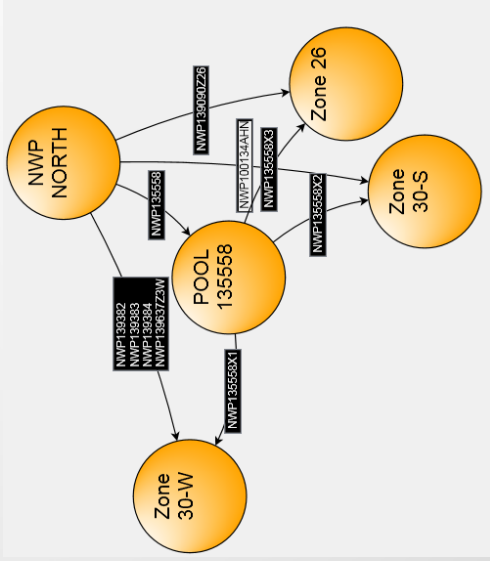
# Transport Example

|                        | JAN 2017 | FEB 2017 | MAR 2017 | APR 2017 | MAY 2017 | JUN 2017 | JUL 2017 | AUG 2017 | SEP 2017 | Extension Option | Escalation Pattern | Monthly Multiplier |
|------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|------------------|--------------------|--------------------|
| *Daily MDQ             | 116866   |          |          |          |          |          |          |          |          | Same             |                    |                    |
| *Daily Minimum Percent |          |          |          |          |          |          |          |          |          | Same             |                    |                    |
| Fuel                   | 1.28     |          |          |          |          |          |          |          |          | Same             |                    |                    |
| Rate - Transportation  | 0.03     |          |          |          |          |          |          |          |          | Same             |                    |                    |
| Rate - Other Variable  |          |          |          |          |          |          |          |          |          | Same             |                    |                    |
| Rate - DT Rate         | 0.39249  |          |          |          |          |          |          |          |          | Same             |                    | DaysInMonth        |

# Delivery Rights vs Receipt Rights

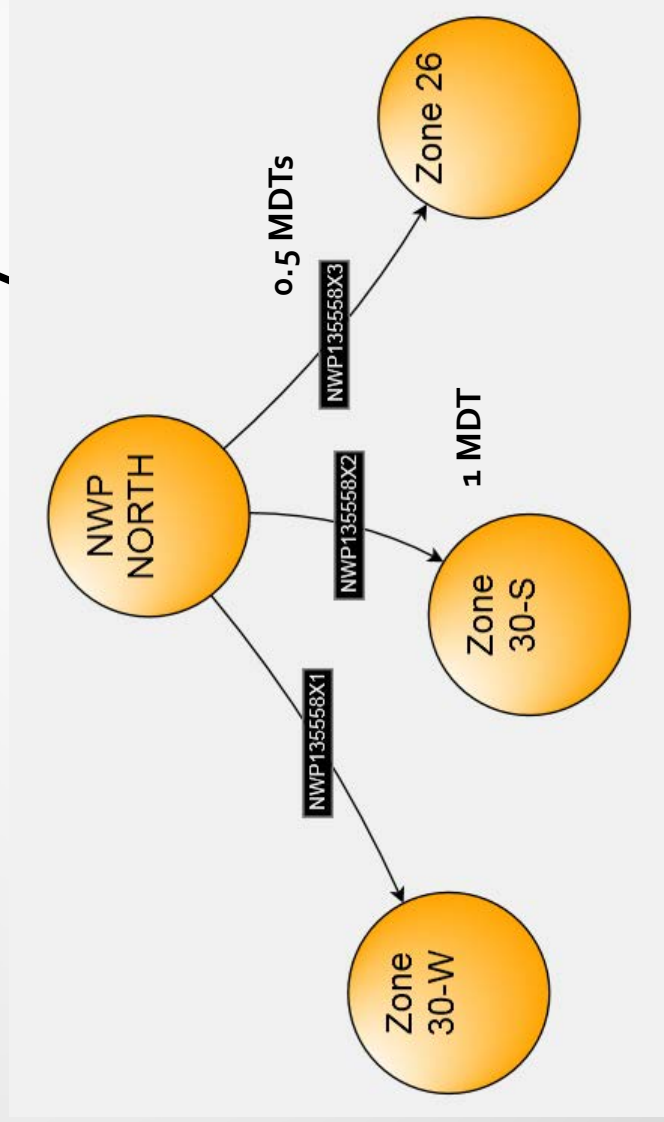
- Cascade has more Delivery Rights than Receipt Rights.
- Approximately 457,000 Dth of Delivery Rights.
- Approximately 360,000 Dth of Receipt Rights.
- The excess Delivery Rights allow Cascade to be flexible with the 360,000 Dth of Receipt Rights.

# Example of delivery right flexibility





# Example of delivery right inflexibility



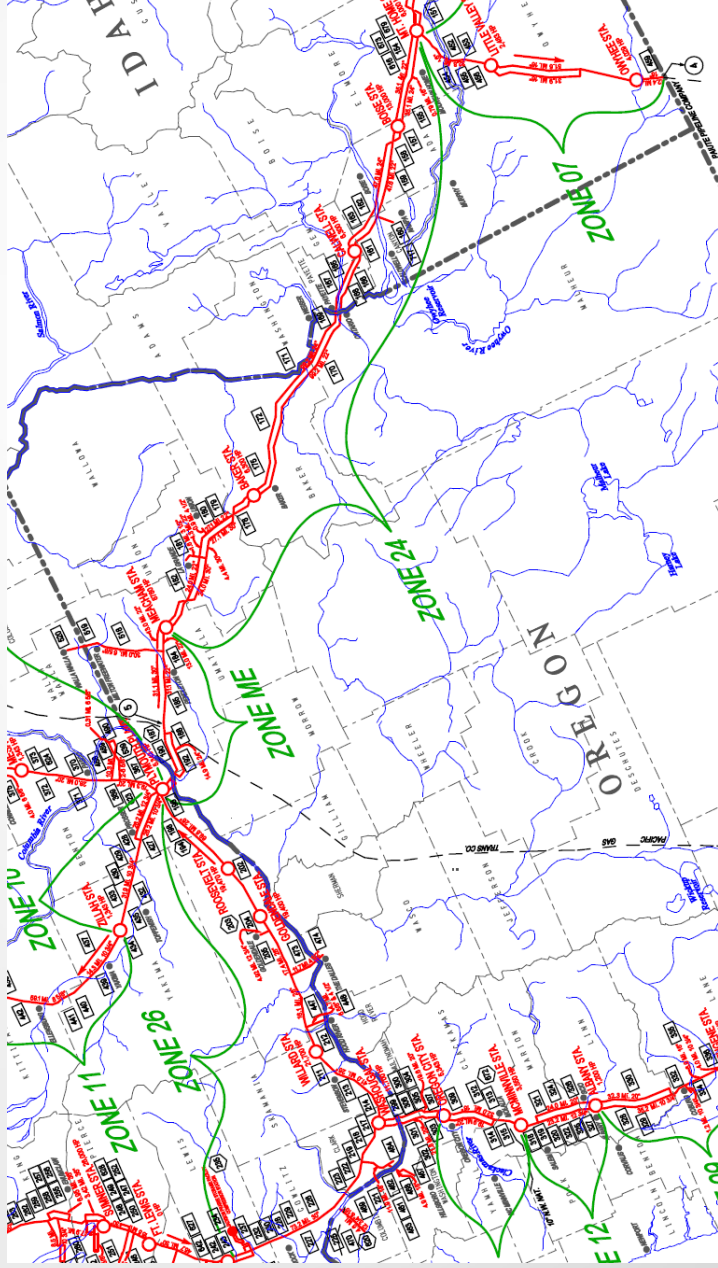
# Transport Constraints

- To simplify modeling in SENDOUT<sup>®</sup>, the software allows the user to group multiple paths of one contract into a constraint group.
- This tells SENDOUT<sup>®</sup> to allow each path to take up to X Dekatherms, but not to exceed X Dekatherms for all paths of the contract.
- The analyst identifies which contracts should be in the group and assigns an MDQ for the constraint group.

# Transport Constraints Example

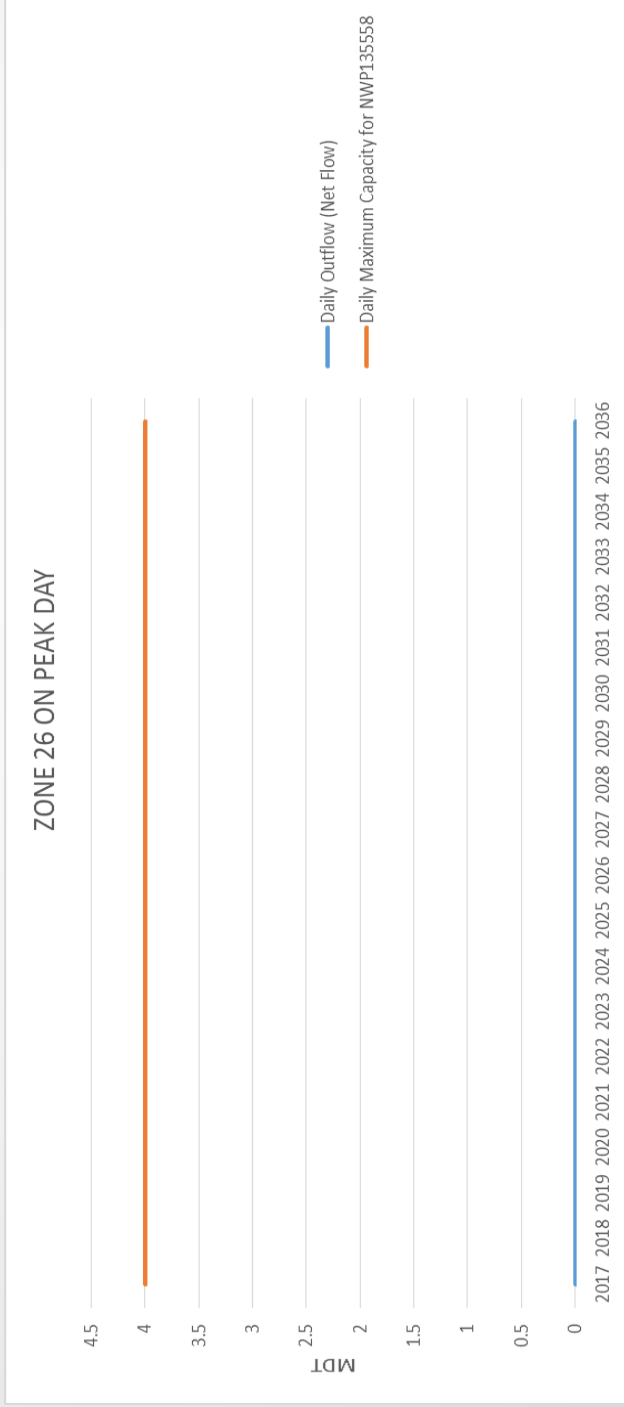
|                                    | JAN 2017 | FEB 2017 | MAR 2017 | APR 2017 | MAY 2017 | JUN 2017 | JUL 2017 | AUG 2017 | SEP 2017 | Extension Option |
|------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|------------------|
| Annual Max                         |          |          |          |          |          |          |          |          |          | Same             |
| Annual Min Percent                 |          |          |          |          |          |          |          |          |          | Same             |
| Seasonal Max                       |          |          |          |          |          |          |          |          |          | Same             |
| Seasonal Min Percent               |          |          |          |          |          |          |          |          |          | Same             |
| Monthly Max                        |          |          |          |          |          |          |          |          |          | Same             |
| Monthly Min Percent                |          |          |          |          |          |          |          |          |          | Same             |
| *Daily Max                         |          |          |          |          |          |          |          |          |          | Same             |
| *Daily Min Percent                 |          |          |          |          |          |          |          |          |          | Same             |
| Resource Mix Start/Stop Indicators |          |          |          |          |          |          |          |          |          | Same             |
| RMIX MDQ Max                       | 47603    |          |          |          |          |          |          |          |          | Same             |
| RMIX MDQ Min                       |          |          |          |          |          |          |          |          |          | Same             |
| Fixed Rate                         |          |          |          |          |          |          |          |          |          | Same             |
| Demand Annual Max Percent          |          |          |          |          |          |          |          |          |          | Same             |
| Demand Annual Min Percent          |          |          |          |          |          |          |          |          |          | Same             |
| Demand Seasonal Max Percent        |          |          |          |          |          |          |          |          |          | Same             |
| Demand Seasonal Min Percent        |          |          |          |          |          |          |          |          |          | Same             |
| Demand Monthly Max Percent         |          |          |          |          |          |          |          |          |          | Same             |
| Demand Monthly Min Percent         |          |          |          |          |          |          |          |          |          | Same             |
| *Demand Daily Max Percent          |          |          |          |          |          |          |          |          |          | Same             |
| *Demand Daily Min Percent          |          |          |          |          |          |          |          |          |          | Same             |

# Location of Zones (Source: NWP)

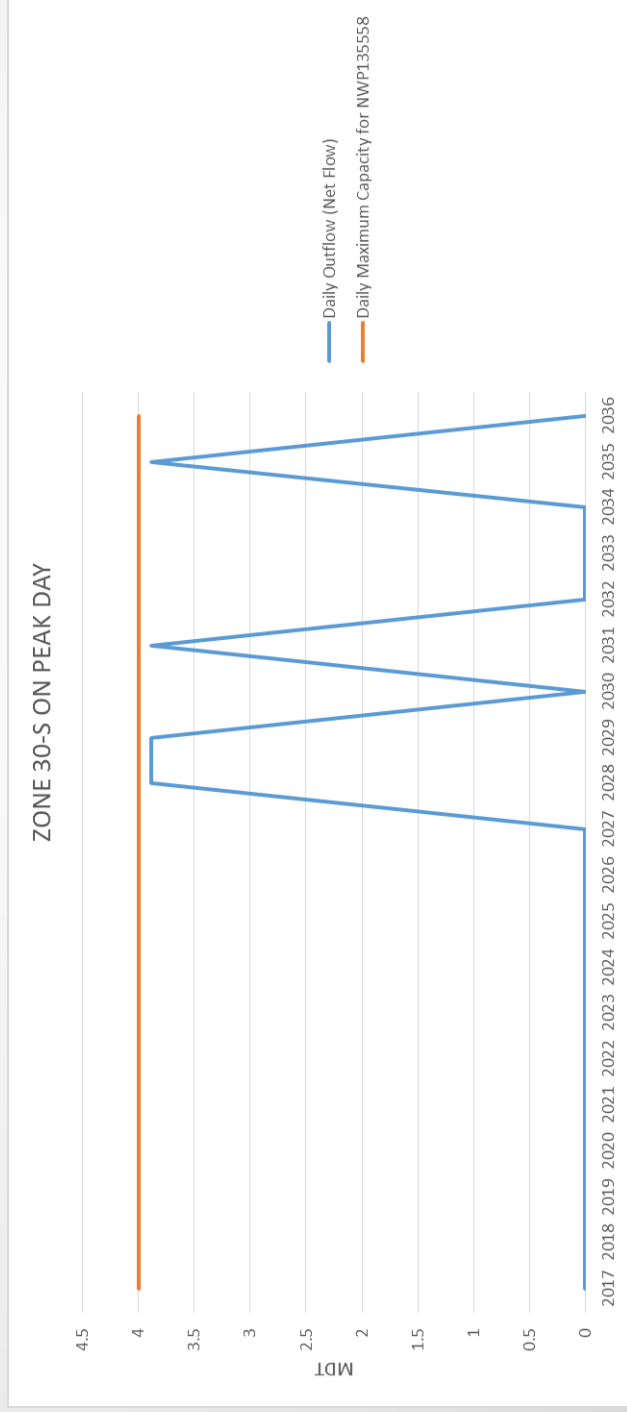


# Zone 26 on Peak Day for Transport

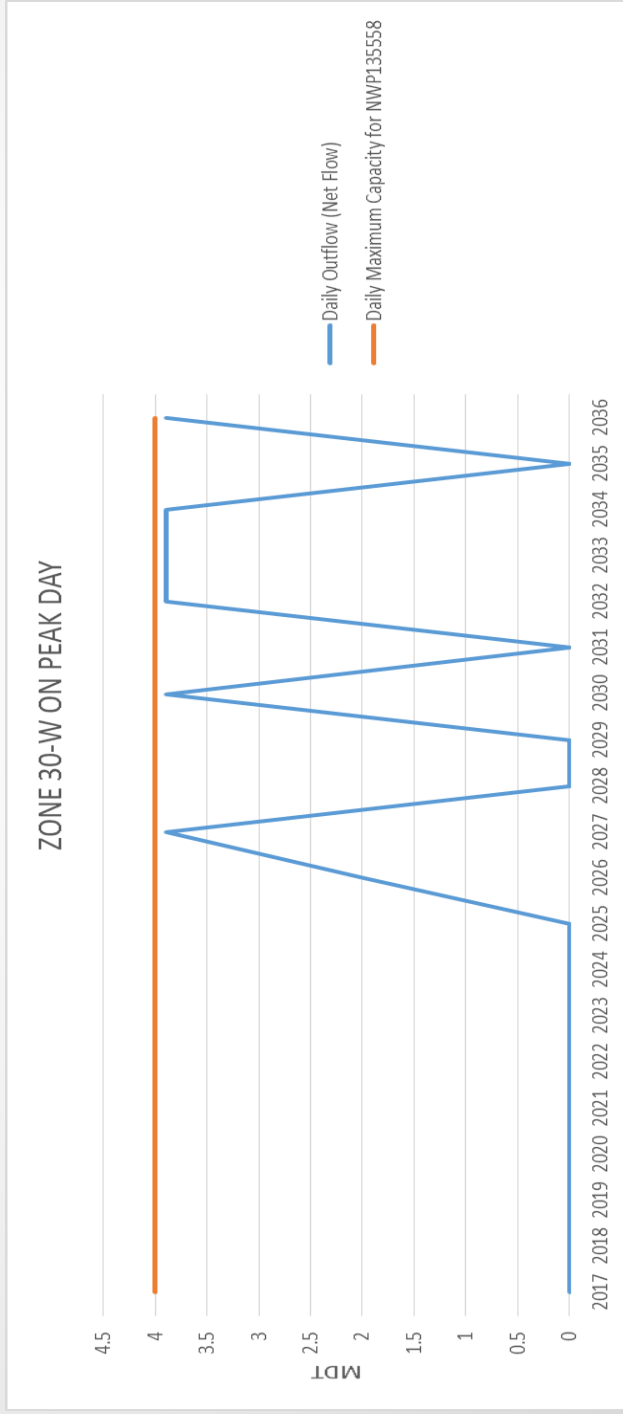
## 135558



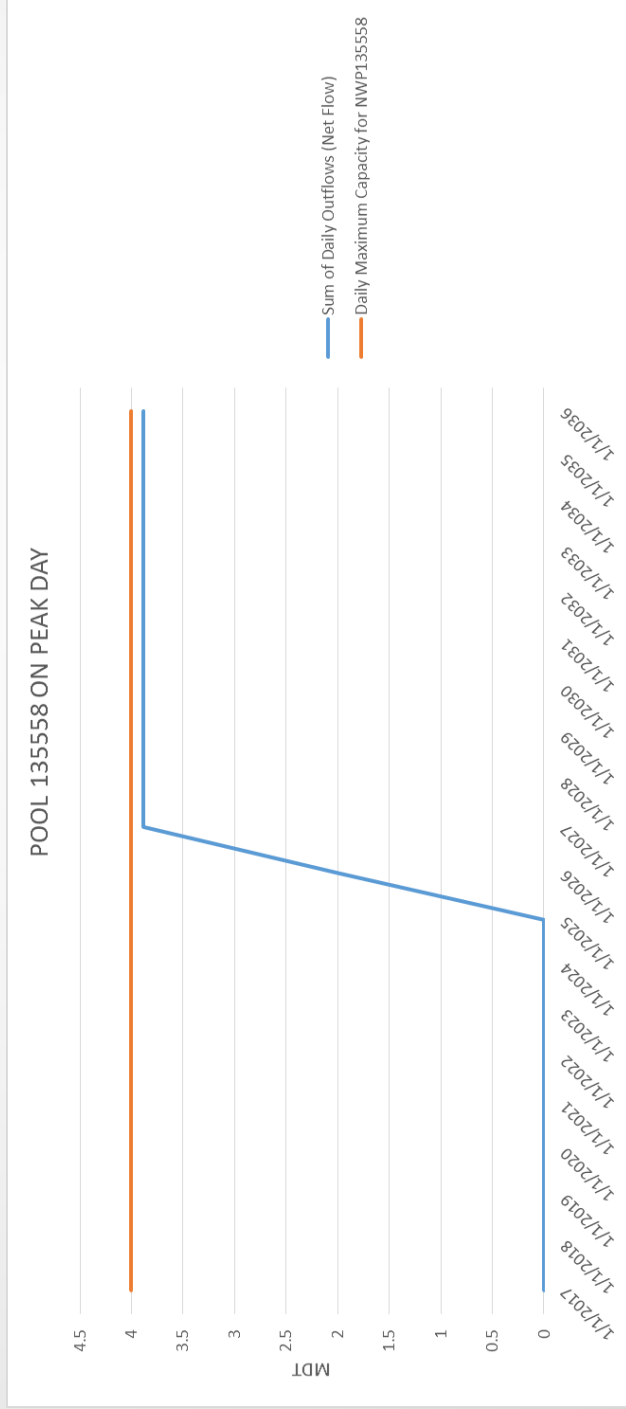
# Zone 30-S on Peak Day for Transport 135558



# Zone 30-W on Peak Day for Transport 135558



# Transport Contract 135558 on Peak Day





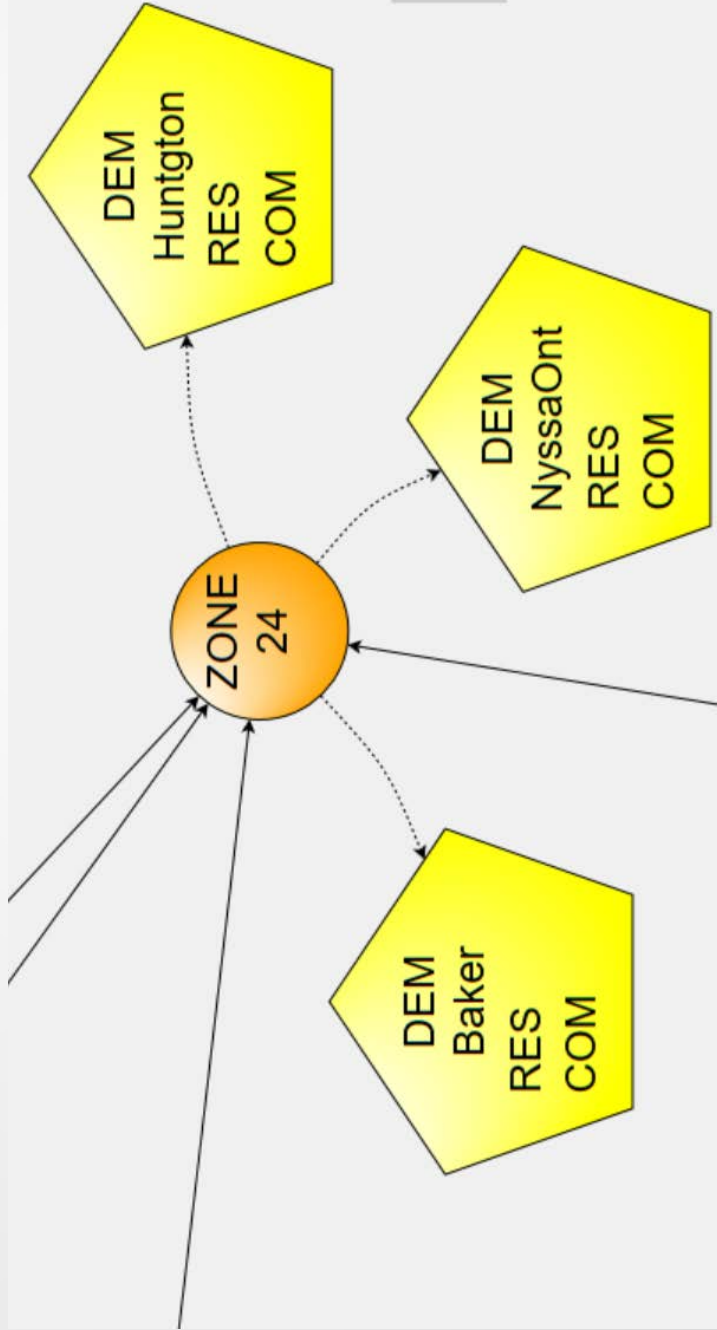
## Demand Behind the Gate

- Cascade has strived over the last several years to enhance the IRP forecast and resource analysis to get to as granular a level as possible using the available data.
- Attempts to forecast demand behind the gate using existing forecasting methodology has been challenging.
- Customer billing data does not have daily meter reads for core customers making regression analysis on use per HDD per customer difficult.
- Some towns can be served by multiple pipelines and the mix can change over time.

# Demand

- Demand is forecasted at the citygate level by rate schedule.
- For NWP, each citygate's demand is associated with the zone.
- For GTN, each citygate's demand is associated with its respective citygate interconnect.
- Demand Inputs
  - Forecast type (Monthly amount or Regressions).
  - Monthly projected customers for 20 years.
  - Regression coefficients if using the Regression forecast type.
  - If using a monthly number, it is the 2020 demand for that month with a growth factor.

# Demand Example



# Demand Example 2

| Forecast Method                       | JAN 2017 | FEB 2017 | MAR 2017 | APR 2017 | MAY 2017 | JUN 2017 | JUL 2017 | AUG 2017 | SEP 2017 | Extension Option | Escalation Pattern | Monthly Multiplier | Index | Adder | Multiplier |
|---------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|------------------|--------------------|--------------------|-------|-------|------------|
| Customers                             | 28347    | 28386    | 28429    | 28435    | 28456    | 28442    | 28450    | 28463    | 28489    | Same             | >                  | >                  | >     | >     | >          |
| *Demand - Daily                       |          |          |          |          |          |          |          |          |          | Same             | >                  | >                  | >     | >     | >          |
| Demand - Monthly Base                 |          |          |          |          |          |          |          |          |          | Same             | >                  | >                  | >     | >     | >          |
| Demand - Monthly Heat                 |          |          |          |          |          |          |          |          |          | Same             | >                  | >                  | >     | >     | >          |
| Demand - Monthly Total                |          |          |          |          |          |          |          |          |          | Same             | >                  | >                  | >     | >     | >          |
| Demand - Percent Factor - non P non Q |          |          |          |          |          |          |          |          |          | Same             | >                  | >                  | >     | >     | >          |
| Demand - Percent Factor - non Q       |          |          |          |          |          |          |          |          |          | Same             | >                  | >                  | >     | >     | >          |
| Usage Factors - Weekday Base          | 0.1919   | 0.1659   | 0.1396   | 0.0979   | 0.0741   | 0.0625   | 0.0589   | 0.0581   | 0.06     | First Year       | >                  | >                  | >     | >     | >          |
| Usage Factors - Weekday Heat          | 0.007448 |          |          |          |          |          |          |          |          | First Year       | >                  | >                  | >     | >     | >          |
| Usage Factors - Weekend Base          | 0.186298 | 0.160298 | 0.133998 | 0.092298 | 0.068498 | 0.056898 | 0.053298 | 0.052498 | 0.054398 | First Year       | >                  | >                  | >     | >     | >          |
| Usage Factors - Weekend Heat          | 0.007448 |          |          |          |          |          |          |          |          | First Year       | >                  | >                  | >     | >     | >          |
| *Base - Unreserved Dispatch (Pri 1)   |          |          |          |          |          |          |          |          |          | Same             | >                  | >                  | >     | >     | >          |
| *Base - Unreserved (Pri 2)            | 960      |          |          |          |          |          |          |          |          | Same             | >                  | >                  | >     | >     | >          |



# Weather

- Weather inputs for SENDOUT include:
  - Monte Carlo
  - Historical
  - Normal
- Monte Carlo inputs include mean, standard deviation, max, minimum, and distribution.
- Historical data is used to build weather profiles for Monte Carlo.
- Normal weather is the daily average of the 30-year most recent history (1989-2019).

# Weather Example – Monte Carlo

|                  | JAN<br>2014 | FEB<br>2014 | MAR<br>2014 | APR<br>2014 | MAY<br>2014 | JUN<br>2014 | JUL<br>2014 |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| HDD Mean         | 1031.8      | 804.1       | 639.6       | 453.9       | 254.2       | 92.6        | 10.3        |
| HDD Std Dev      | 145.4       | 133.1       | 84.4        | 93.0        | 72.2        | 40.4        | 15.2        |
| HDD Distribution | Normal      |             |             |             |             |             |             |
| HDD Max          | 1291        | 1242        | 841         | 641         | 426         | 170         | 75          |
| HDD Min          | 772         | 568         | 448         | 254         | 92          | 19          | 0           |
| CDD Mean         |             |             |             |             |             |             |             |
| CDD Std Dev      |             |             |             |             |             |             |             |
| CDD Distribution |             |             |             |             |             |             |             |
| CDD Max          |             |             |             |             |             |             |             |
| CDD Min          |             |             |             |             |             |             |             |
| Scaling Year     | Best Match  |             |             |             |             |             |             |

# Preliminary Modeling Results

| Demand Group        | No DSM (Dth) |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       |        |   |       |       |       |
|---------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|--------|---|-------|-------|-------|
|                     | 2020         | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037  | 2038  | 2039  |       |       |       |       |        |   |       |       |       |
| Sunnyside           | -            | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | 399   | 1,427 | 910   |       |       |       |       |        |   |       |       |       |
| Yakima Loop         | -            | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | 197   | 2,870 | -     |       |       |       |        |   |       |       |       |
| Kennewick Loop      | -            | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | 600   | 240   | 3,726 |       |       |       |        |   |       |       |       |
| Nyssa Ontario       | -            | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | 947  | 792  | 1,084 | 997   | 1,133 | -     |       |       |       |        |   |       |       |       |
| Longview South Loop | -            | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | 82    | 82    | -     |       |       |       |        |   |       |       |       |
| Bremerton Shelton   | -            | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | 1,603 | 528   | 4,302 | 4,774 |       |       |        |   |       |       |       |
| Sumas Loop          | -            | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | 1,306 | 1,553 | 4,603 | -     |       |       |        |   |       |       |       |
| Bend Loop           | -            | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | 542   | 2,158 | 3,773 | 4,290 | 7,005 | 8,620 | 10,236 |   |       |       |       |
| Walla Walla         | -            | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | -     | -     | -     | -     | -     | -     | -      | - | 1,464 | 2,524 | 2,690 |

| Demand Group        | DSM (Dth) |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |   |   |   |   |   |   |   |   |   |   |
|---------------------|-----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---|---|---|---|---|---|---|---|---|---|
|                     | 2020      | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 |   |   |   |   |   |   |   |   |   |   |
| Sunnyside           | -         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | - | - | - | - | - | - | - | - | - | - |
| Yakima Loop         | -         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | - | - | - | - | - | - | - | - | - | - |
| Kennewick Loop      | -         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | - | - | - | - | - | - | - | - | - | - |
| Nyssa Ontario       | -         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | - | - | - | - | - | - | - | - | - | - |
| Longview South Loop | -         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | - | - | - | - | - | - | - | - | - | - |
| Bremerton Shelton   | -         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | - | - | - | - | - | - | - | - | - | - |
| Sumas Loop          | -         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | - | - | - | - | - | - | - | - | - | - |
| Bend Loop           | -         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | - | - | - | - | - | - | - | - | - | - |
| Walla Walla         | -         | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | - | - | - | - | - | - | - | - | - | - |

■ Served     
 ■ Unserved     
 ■ Unserved Covered by 3rd Party Citygate Supply

## 2020 IRP Timeline

|                                  |           |  |                                  |                                    |
|----------------------------------|-----------|--|----------------------------------|------------------------------------|
| Wednesday, March 4, 2020         | OR        | TAG 5 slides distributed to stakeholders   |                                  |                                    |
| <b>Wednesday, March 11, 2020</b> | <b>OR</b> | <b>TAG 5: Final Integration Results, finalization of plan components, Proposed new 4-year Action Plan.</b> | <b>Salem, OR - 9 am to 12 pm</b> | <b>Meadow room at OPUC Offices</b> |
| Tuesday, May 12, 2020            | OR        | Draft of 2020 IRP distributed  |                                  |                                    |
| Friday, June 12, 2020            | OR        | Comments due on draft from all stakeholders  |                                  |                                    |
| Tuesday, June 30, 2020           | OR        | TAG 6, if needed   | WebEx Only                       |                                    |
| Friday, July 31, 2020            | OR        | IRP filing in Oregon   |                                  |                                    |



# Questions?



# Cascade Natural Gas Corporation

## 2020 Integrated Resource Plan Technical Advisory Group Meeting #4

Wednesday, Jan. 15th, 2020

Portland International Airport

Portland, OR





## OPUC Tag Meeting 4

|                         |  |
|-------------------------|--|
| <b>Date &amp; Time:</b> | 1/15/2020, 09:00 AM – 12:30 PM   |
| <b>Location:</b>        | Portland International Airport and Conference Center – Multnomah Room  |
| <b>In attendance:</b>   | Brian Robertson, Ashton Davis, Devin McGreal, Alyn Spector, Bruce Folsom, Brian Cunnington, Linda Offerdahl, Anna Kim (OPUC), Jack Cullen (ETO), Bob Jenks (CUB), Sudeshna Pal (CUB)                 |
| <b>Called in:</b>       | Mike Parvinen, Abbie Krebsbach, Kevin Connell, Eric Wood, Chanda Marek, Chris Robbins, Monica Cowlshaw, Carolyn Stone, Tom Pardee (Avista), Mark Iverson (Kinder Morgan), Chad Stokes (Cable Huston) |
| <b>Minutes by:</b>      | Brian Robertson  |

Brian Robertson kicked off the meeting by thanking everyone that showed up. Brian went over fire safety of the building, introductions and the agenda.

- Brian Robertson discussed what Renewable Natural Gas (RNG) is for slides 4-7.
- Cascade mentioned that the Carbon Intensity factor is a topic that is being discussed intently in both OR and WA. The Company is involved in these discussions.
- Brian Robertson then discussed regulatory matters regarding RNG. Cascade is involved in the AR 632 and UM 2030 dockets in Oregon. The Company is also aware of SB 98 in OR and HB 1257 in WA as well as a few other documents.

Brian Robertson asked a question about expectations in the IRP regarding an IRP chapter. Anna Kim said Cascade should follow SB 98 rules and also noted that our IRP will be filed prior to SB 98 rules go in effect. Bob Jenks said since Cascade is a small utility that there isn't a requirement to include RNG, but if Cascade plans to have RNG added as a resource then Cascade needs to introduce it in the IRP.

- Brian Cunnington then discussed market research, Cascade's RNG goals, steps Cascade has taken so far, and a description of several options the Company has in its service territory.
- Jack Cullen presented Energy Trust of Oregon's Energy Efficiency Resource Assessment (RA) and results.
- Jack discussed the purpose and background of the RA model. Bruce asked if the RA model and CPA, that's done in Washington, are the same. Jack said essentially, yes.

A question was asked regarding the discount rate and Cascade noted that the Company is required to use the after-tax marginal weighted-average cost of capital. Another question was asked if the discount rate was too high. The resource planning team said in our opinion, no.

- Jack Cullen continued presenting the RA Model inputs and results. Jack discussed the different types of carbon scenarios Cascade and ETO were going to model. Jack also talked about the impacts of ramp rates and how ramp rate changes would have a bigger impact on savings than carbon scenarios would.
- Devin McGreal gave a short presentation on the carbon scenario impacts from Cascade's perspective. Bob Jenks asked Cascade to also include a no carbon scenario.
- Devin continued and discussed SENDOUT® and Cascade's resource optimization process.
- Ashton Davis discussed SENDOUT Supply and Storage inputs.
- Brian Robertson then talked about the transportation, constraints, demand, weather, and price in regard to SENDOUT inputs.
- Brian then shared Cascade's preliminary results.
- Brian then discussed the remaining 2020 OR IRP schedule.

TAG 5 will take place on March 11<sup>th</sup>, 2020 at the OPUC offices in Salem, OR - Meadow room.

**The meeting was adjourned at 12:30 PM.**

# Cascade Natural Gas Corporation

## 2020 Integrated Resource Plan Technical Advisory Group Meeting #5

March 11, 2020

Oregon Public Utility Commission

Salem, OR



# Agenda

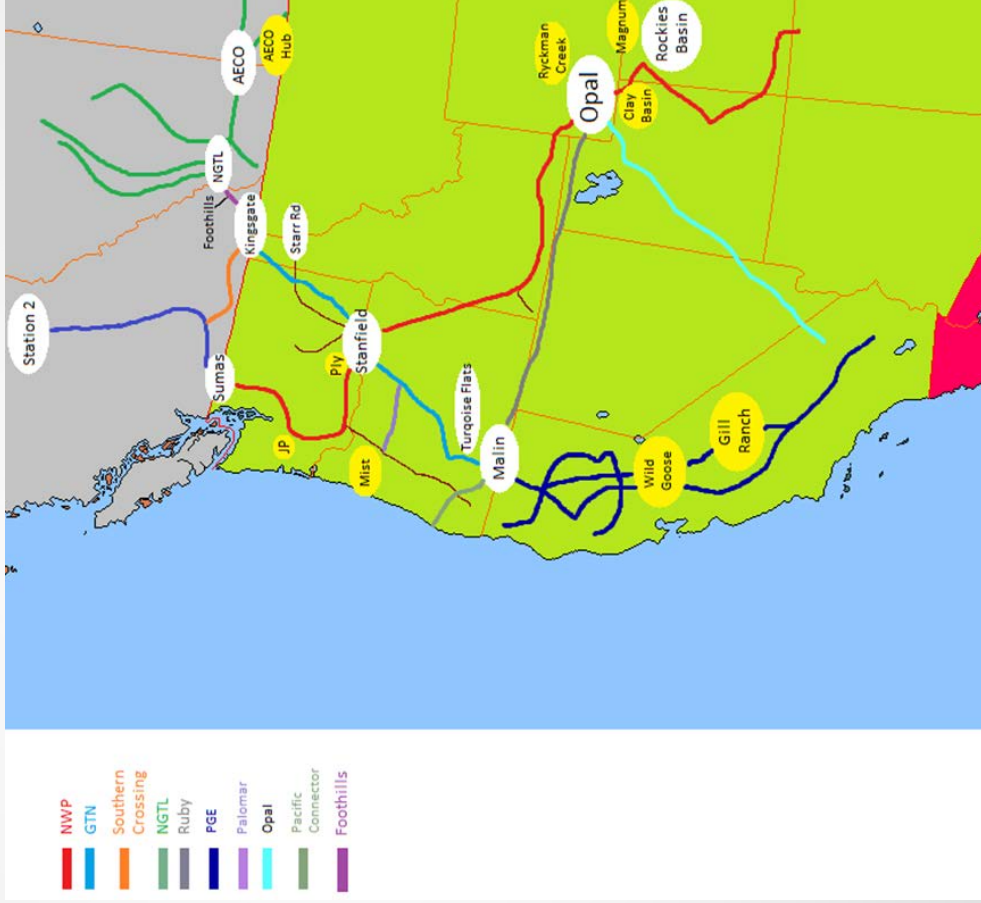
- **Introductions**
- **Safety Moment**
- **Summary of Alternative Resources**
- **Components and Ranking of Candidate Portfolios**
- **New Stochastic Methodology**
- **Scenario and Sensitivity Results**
- **Proposed Four-Year Action Plan**
- **2020 IRP Remaining Schedule**
- **Questions**

# Summary of Additional Resources

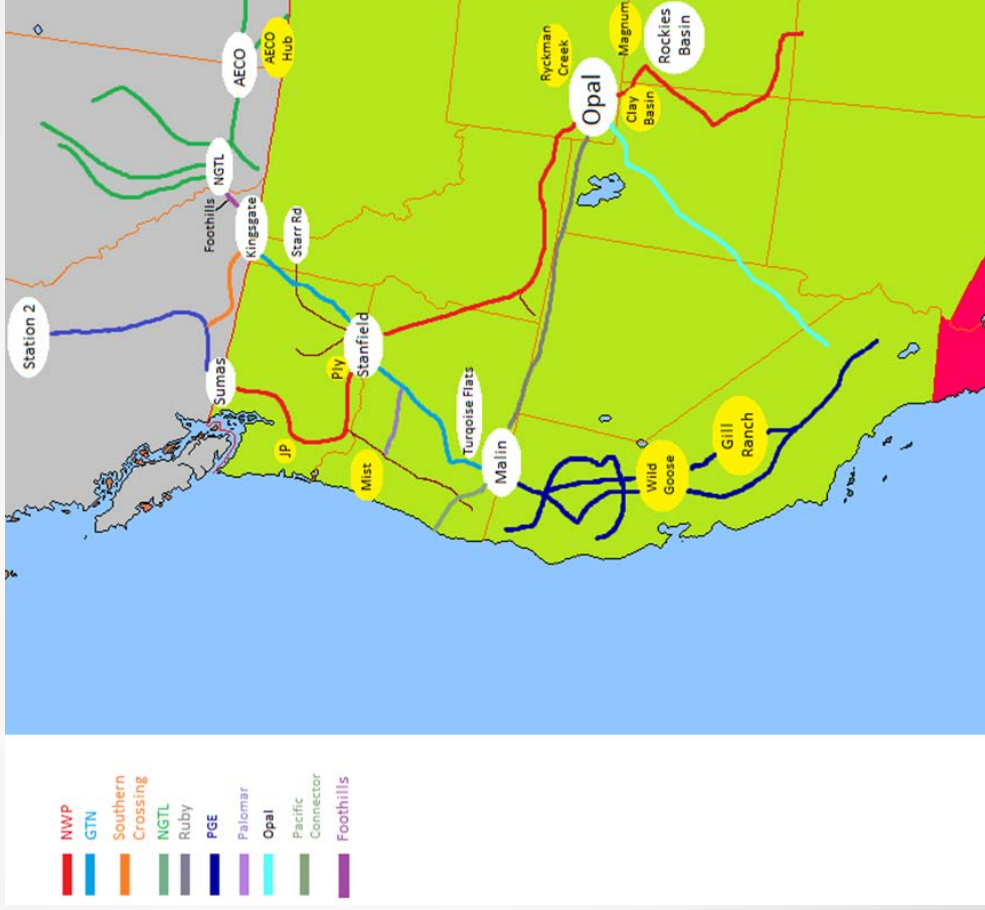


# Additional Potential Resources

- Incremental Transport – North to South
- Incremental Transport – Northwest Pipeline
- Incremental Transport – South to North
- Incremental Transport – Bilateral

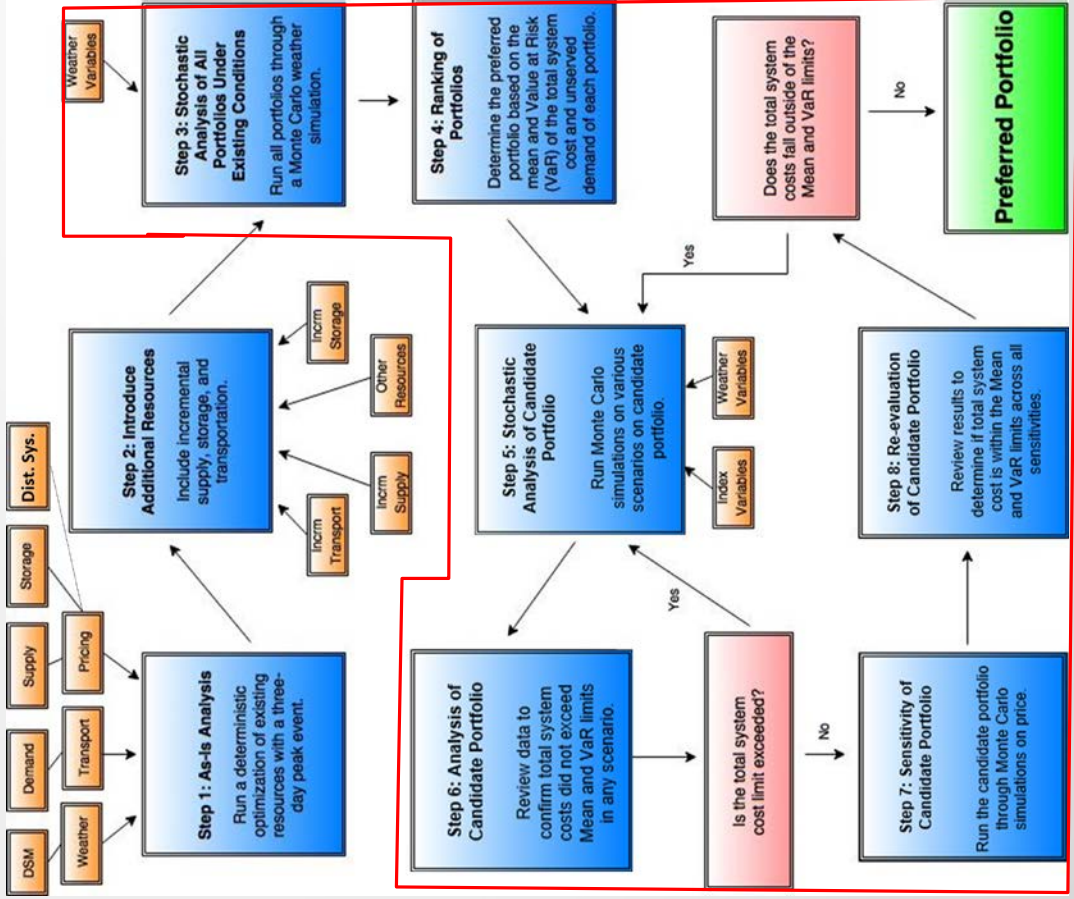






- Incremental Storage - North and East
- Incremental Storage - South and West
- Renewable Natural Gas

# Components of Candidate Portfolios



# Recap – As-Is Shortfalls (Dth)

| No DSM (Dth)        | 2020 | 2021  | 2022  | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034  | 2035  | 2036  | 2037  | 2038  | 2039   |   |
|---------------------|------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|--------|---|
| <b>Demand Group</b> |      |       |       |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |       |        |   |
| Sunnyside           | -    | -     | -     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | -     | -     | 399   | 1,427 | 910    | - |
| Yakima Loop         | -    | -     | -     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | -     | -     | 197   | 2,870 | -      | - |
| Kennewick Loop      | -    | -     | -     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | -     | -     | 600   | 240   | 3,726  | - |
| Nyssa Ontario       | -    | -     | -     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | 947   | 792   | 1,084 | 997   | 1,133  | - |
| Longview South Loop | -    | -     | -     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | -     | -     | 82    | 82    | 82     | - |
| Bremerton Shelton   | -    | -     | -     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | 1,603 | 528   | 4,939 | 4,302 | 4,774  | - |
| Sumas Loop          | -    | -     | -     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | -     | -     | 1,306 | 1,553 | 4,603  | - |
| Bend Loop           | -    | 1,154 | 2,769 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | 542  | 2,158 | 3,773 | 4,290 | 7,005 | 8,620 | 10,236 | - |
| Walla Walla         | -    | -     | -     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -     | -     | -     | 1,464 | 2,524 | 2,690  | - |

# List of Candidate Portfolios

- All-In Portfolio
- All-In less DSM option
- GTN Only Portfolio
- GTN Plus Storage Portfolio
- NWP Only Portfolio
- NWP Plus Storage Portfolio
- Storage Only Portfolio

# All-In Portfolio

- Best deterministic mix of all alternative resources considered:
  - Incremental Transport – North to South
  - Incremental Transport – Northwest Pipeline
  - Incremental Transport – South to North
  - Incremental Transport – Bilateral
  - Incremental Storage – North and East
  - Incremental Storage – South and West
  - DSM

# All-In Portfolio – SENDOUT®

## Suggested Resource Mix

- DSM – 254,620 dth in 2020 ramping up to a cumulative figure of 6,072,310 dth in 2039 for Cascade’s service territory. On peak day the impact is 2,350 dth in 2020 ramping up to a cumulative figure of 54,530 dth in 2039.
- 3<sup>rd</sup> party citygate supply – 1,160 dth in 2022.

# All-In less DSM Portfolio

- Best deterministic mix of all alternative resources considered:
  - Incremental Transport – North to South
  - Incremental Transport – Northwest Pipeline
  - Incremental Transport – South to North
  - Incremental Transport – Bilateral
  - Incremental Storage – North and East
  - Incremental Storage – South and West



# All-In less DSM Portfolio – SENDOUT® Suggested Resource Mix

- Incremental GTN North to South – 2,506 dth by 2029 and 9,976 dth by 2039.
- Incremental I-5 mainline – 4,555 dth by 2039.
- Spokane Lateral Expansion – 8,865 dth by 2039.
- Wenatchee Lateral Expansion – 1,173 dth by 2039.

# GTN Only Portfolio

- Best deterministic mix of all potential resources available on GTN:
- Incremental Transport – North to South
- Incremental Transport – South to North
- Incremental Transport – Bilateral via Southern Crossing



# GTN Only Portfolio – SENDOUT® Suggested Resource Mix

- Incremental GTN North to South – 2,506 dth by 2029 and 9,976 dth by 2039.

# GTN Plus Storage Portfolio

- Best deterministic mix of all potential resource available on GTN plus storage:
  - Incremental Transport – North to South on GTN
  - Incremental Transport – South to North on GTN
  - Incremental Transport – Bilateral via Southern Crossing
  - Incremental Storage – North and East
  - Incremental Storage – South and West

# GTN Plus Storage Portfolio – SENDOUT® Suggested Resource Mix

- Incremental GTN North to South – 2,506 dth by 2029 and 9,976 dth by 2039.
- Spire Storage – 1,000 Dth beginning in 2020.

# NWP Only Portfolio

- Best deterministic mix of all potential resources available on NWP:
  - Incremental Transport – North to South
  - Incremental Transport – Northwest Pipeline
  - Incremental Transport – Bilateral via Trail West

# NWP Only Portfolio – SENDOUT® Suggested Resource Mix

- Spokane Lateral Expansion – 14,296 dth by 2039.
- Wenatchee Lateral Expansion – 301 dth by 2039.

# NWP Plus Storage Portfolio

- Best deterministic mix of all potential resources available on NWP plus Storage:
  - Incremental Transport – North to South
  - Incremental Transport – Northwest Pipeline
  - Incremental Transport – Bilateral via Trail West
  - Incremental Storage – North and East
  - Incremental Storage – South and West



# NWP Plus Storage Portfolio – SENDOUT® Suggested Resource Mix

- Spokane Lateral Expansion – 10,364 dth by 2039.
- Wenatchee Lateral Expansion – 4,233 dth by 2039.
- Spire Storage – 1,000 Dth beginning in 2020.

# Storage Only Portfolio

- Best deterministic mix of all potential storage resources available:
  - Incremental Storage – North and East
  - Incremental Storage – South and West

# Storage Only Portfolio – SENDOUT® Suggested Resource Mix

- Spire Storage – 1,000 Dth beginning in 2020.

# Summary of – SENDOUT® Suggested Resources by Portfolio

|                           | All-In Less DSM | All-In | NWP Only | NWP + Storage | GTN | GTN + Storage | Storage Only |
|---------------------------|-----------------|--------|----------|---------------|-----|---------------|--------------|
| Incremental NGTL          |                 |        |          |               |     |               |              |
| Incremental Foothills     |                 |        |          |               |     |               |              |
| Incremental GTN N/S       |                 |        |          |               |     |               |              |
| I-5 Mainline Exp.         |                 |        |          |               |     |               |              |
| Wenatchee Lateral Exp.    |                 |        |          |               |     |               |              |
| Spokane Lateral Exp.      |                 |        |          |               |     |               |              |
| Eastern OR Mainline Exp.  |                 |        |          |               |     |               |              |
| Incremental Opal          |                 |        |          |               |     |               |              |
| Incremental GTN S/N       |                 |        |          |               |     |               |              |
| Incremental Ruby          |                 |        |          |               |     |               |              |
| T-South Southern Crossing |                 |        |          |               |     |               |              |
| Trail West                |                 |        |          |               |     |               |              |
| Pacific Connector         |                 |        |          |               |     |               |              |
| Spire Storage             |                 |        |          |               |     |               |              |
| AECO Hub Storage          |                 |        |          |               |     |               |              |
| Clay Basin Storage        |                 |        |          |               |     |               |              |
| Gill Ranch Storage        |                 |        |          |               |     |               |              |
| Wild Goose Storage        |                 |        |          |               |     |               |              |
| Mist Storage              |                 |        |          |               |     |               |              |
| DSM                       |                 |        |          |               |     |               |              |

Legend

- Selected resource for the portfolio
- Considered but not selected resource
- Not considered for the portfolio

# Methodology Behind Ranking of Portfolios

- New to the 2018 OR IRP, Cascade will be using deterministic results to identify the intrinsic value of a portfolio, and Value at Risk (VaR) analysis to capture the extrinsic value.
- Additionally, portfolios will be ranked primarily on their peak day unserved demand, and secondarily on their total system costs.
- Deterministic results are given 75% weight, and stochastic results 25% weight. This is known as the risk-adjusted cost metric.

# Final Ranking of Portfolios

| Portfolio       | Deterministic          |                           | Stochastic             |                           | Risk Adjusted Results                |   |
|-----------------|------------------------|---------------------------|------------------------|---------------------------|--------------------------------------|---|
|                 | Unserviced Demand (DT) | Total System Cost (\$000) | Unserviced Demand (DT) | Total System Cost (\$000) | Risk Adjusted Unserviced Demand (DT) | Risk Adjusted Total System Cost (\$000) |
| All-in          | -                      | 4,279,132                 | 0                      | 4,398,492                 | -                                    | 4,308,972                               |
| All-in Less DSM | -                      | 4,282,291                 | 0                      | 4,422,989                 | -                                    | 4,317,466                               |
| NWP + Storage   | 13,686                 | 4,299,105                 | 0                      | 4,422,992                 | 10,264.50                            | 4,330,076                               |
| NWP             | 13,686                 | 4,301,075                 | 0                      | 4,424,828                 | 10,264.50                            | 4,332,013                               |
| GTN + Storage   | 18,179                 | 4,294,023                 | 0                      | 4,437,641                 | 13,634.25                            | 4,329,928                               |
| GTN             | 18,179                 | 4,295,876                 | 0                      | 4,439,678                 | 13,634.25                            | 4,331,827                               |
| Storage Only    | 28,155                 | 4,282,291                 | 0                      | 4,437,522                 | 21,116.25                            | 4,321,099                               |

# Top Ranked Candidate Portfolio Components

- DSM – 254,6200 dth in 2020 ramping up to a cumulative of 6,072,310 dth in 2039 for Cascade’s service territory.
- 3<sup>rd</sup> party citygate supply – 1,160 dth in 2022.

# Unserved for Top Ranked Candidate Portfolio

| DSM (Dth)           | 2020 | 2021 | 2022  | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 |  |  |
|---------------------|------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|--|
| <b>Demand Group</b> |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |
| Sunnyside           |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |
| Yakima Loop         |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |
| Kennewick Loop      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |
| Nyssa Ontario       |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |
| Longview South Loop |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |
| Bremerton Shelton   |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |
| Sumas Loop          |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |
| Bend Loop           |      |      | 1,160 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |
| Walla Walla         |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |

Legend:   
■ Served   
■ Unserved   
■ Unserved Covered by 3rd Party Citygate Supply



# New Stochastic Methodology

# Stochastic Weather Methodology

- In previous IRPs, Cascade used the Monte Carlo functionality within SENDOUT® to run its stochastic analyses.
- SENDOUT® has computational limitations related to the number of draws it can perform, and the time it takes to complete those draws.
- For the 2020 IRP, Cascade has enhanced its methodology to allow for a more robust Monte Carlo simulation.

# Cascade's New Methodology

- This year, Cascade will be performing a 10,000 draw Monte Carlo Simulation of weather using Excel and R.
- For each weather location Cascade records daily mean temperatures, standard deviations, and the largest 1 day jump to have historically occurred in that month.
- Cascade also records the correlations on a monthly level of each weather station to each other. This data is all loaded into R.

# Cascade's New Methodology

- First, Cascade runs 1 draw of its Monte Carlo simulation for its first weather location.
- The normal random seed used each day for that draw is then run through a Cholesky decomposition matrix, which uses the correlations between each location to correlate the random variables for that first draw across all weather locations.
- This process is repeated 10,000 times, with the calculated HDDs from each draw stored in a separate matrix.

# Cholesky Decomposition Matrix - January

|             | Baker City | Bellingham | Bremerton | Pendleton | Redmond    | Walla Walla | Yakima    |
|-------------|------------|------------|-----------|-----------|------------|-------------|-----------|
| Baker City  | 1          |            |           |           |            |             |           |
| Bellingham  | 0.6338301  | 0.7734723  |           |           |            |             |           |
| Bremerton   | 0.6584770  | 0.5837664  | 0.4749998 |           |            |             |           |
| Pendleton   | 0.7024465  | 0.3681832  | 0.0469737 | 0.6072920 |            |             |           |
| Redmond     | 0.7173640  | 0.3985243  | 0.1196151 | 0.2324631 | 0.5081539  |             |           |
| Walla Walla | 0.7105065  | 0.3561187  | 0.0338146 | 0.5396395 | 0.0173972  | 0.2751418   |           |
| Yakima      | 0.6697351  | 0.3483110  | 0.0817184 | 0.3160165 | -0.0036761 | 0.1685445   | 0.5432948 |

# Cascade's New Methodology

- Cascade calculates a system weighted HDD for each draw, identifying the draw that results in the 99<sup>th</sup> percentile of stochastic weather.
- The daily HDDs of each weather location in this draw are then loaded into SENDOUT<sup>®</sup>, which allows the Company to capture the costs and unserved demand of a given portfolio under extreme conditions.
- A similar process is undertaken for Monte Carlo simulations on price.

# Stochastic Price Methodology

- Similar to weather, Cascade used the Monte Carlo functionality within SENDOUT® to run its stochastic analyses in previous IRPs.
- Due to the SENDOUT® computational limitations as mentioned above, Cascade has taken the analysis outside of SENDOUT and has enhanced the methodology to allow for a more robust Monte Carlo simulation.

# Cascade's New Methodology

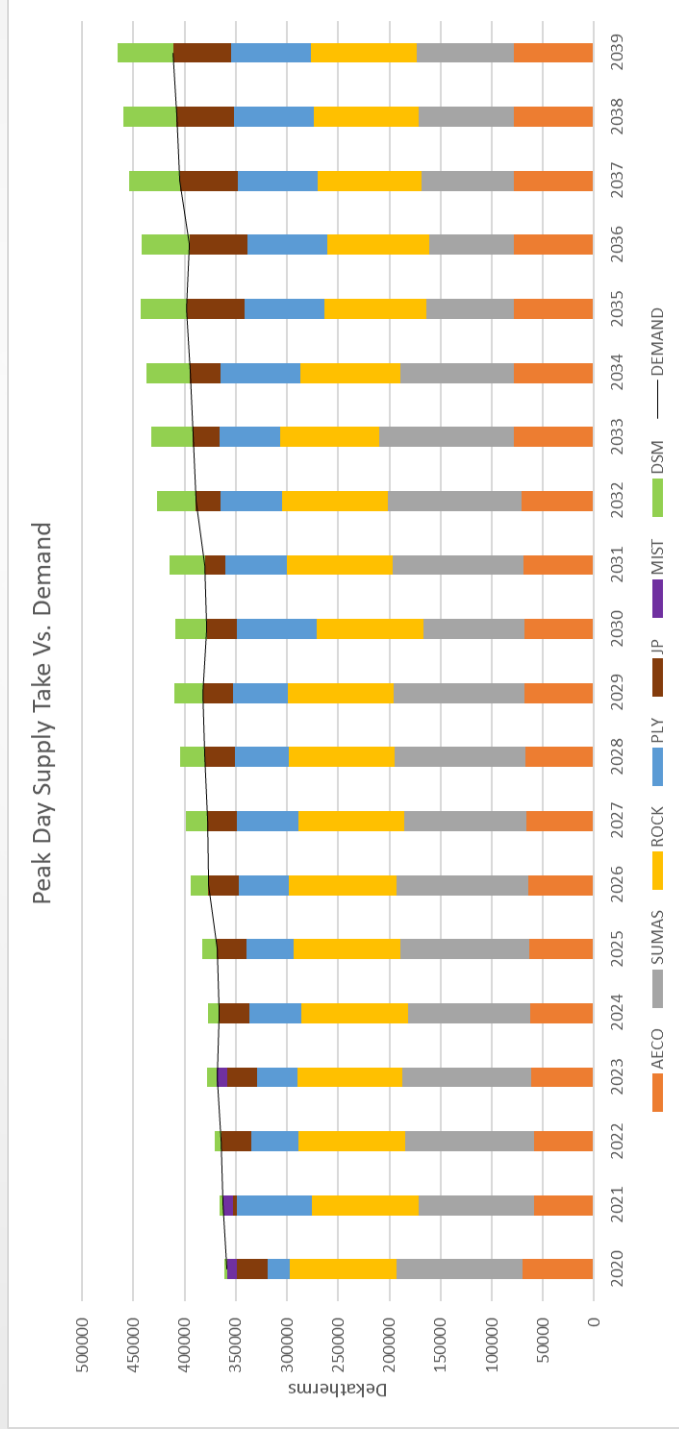
- This year, Cascade will be performing a 10,000 draw Monte Carlo Simulation of price using Excel and R.
- Cascade models price movements with a Geometric Brownian Motion stochastic process. For each of its 10,000 draws, the month over month price change is determined by 2 elements: a drift term and a shock term.
  - The drift term is the expected movement of NYMEX, derived from the Company's price forecast.
  - The shock term is the main stochastic element, which takes the month over month return variance and multiplies it by a random normal variable to create a normal distribution of price movements for a given month, and a lognormal distribution of prices.
- Similar to how weather is correlated between weather stations, Cascade correlates the supply basins using the Cholesky decomposition matrix.



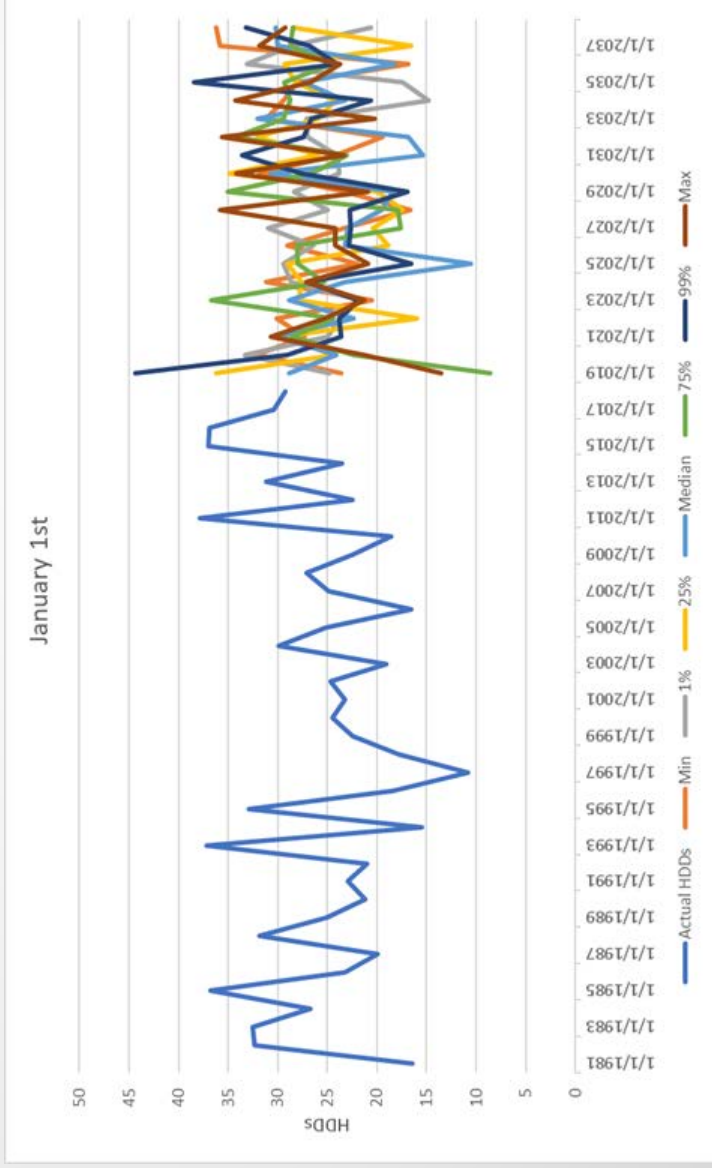
# Scenario and Sensitivity Results



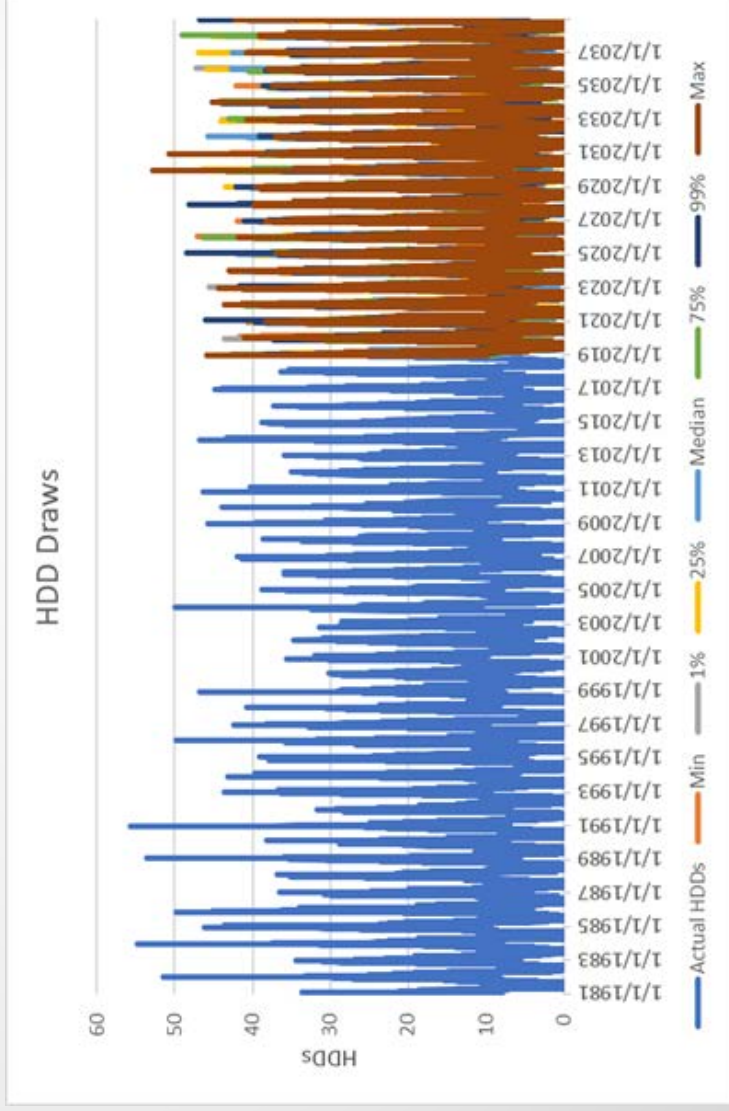
# Peak Day Take Vs. Demand



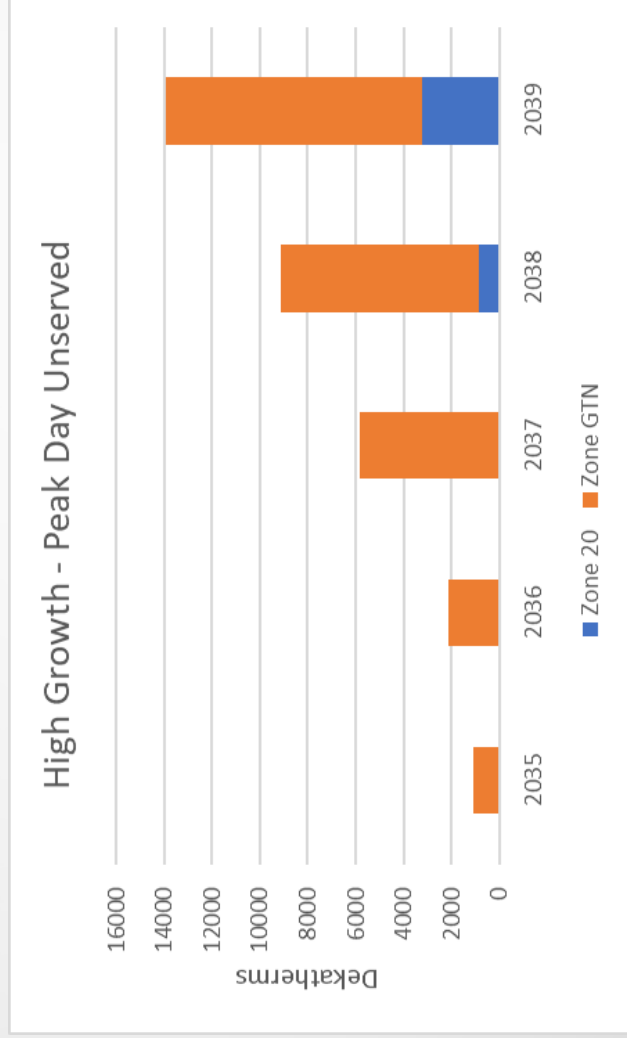
# HDD Draw Graph – January 1<sup>st</sup>



# HDD Draw Graph – All Days



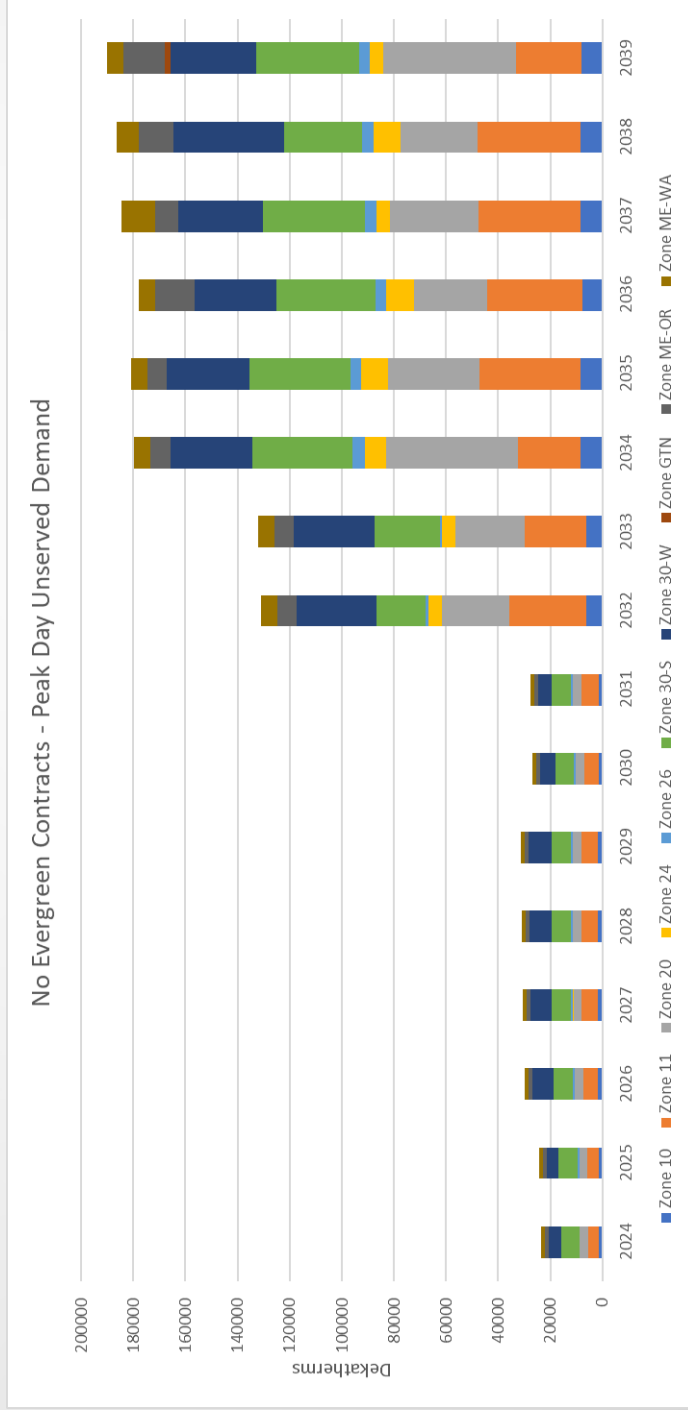
# High Growth – Peak Day Unserved Demand



# High Growth – Discussion

- In this scenario, the Company identifies minor potential shortfalls in Oregon and Central Washington, starting in 2035, under stochastic conditions.
- This does not invalidate the top ranked candidate portfolio, but provides a point of reference if weather and growth are unexpectedly high.
- Total system cost for this scenario was \$4.63B, which does not exceed the VaR limit.

# No Evergreen – Peak Day Unserviced Demand



# No Evergreen Contracts – Discussion

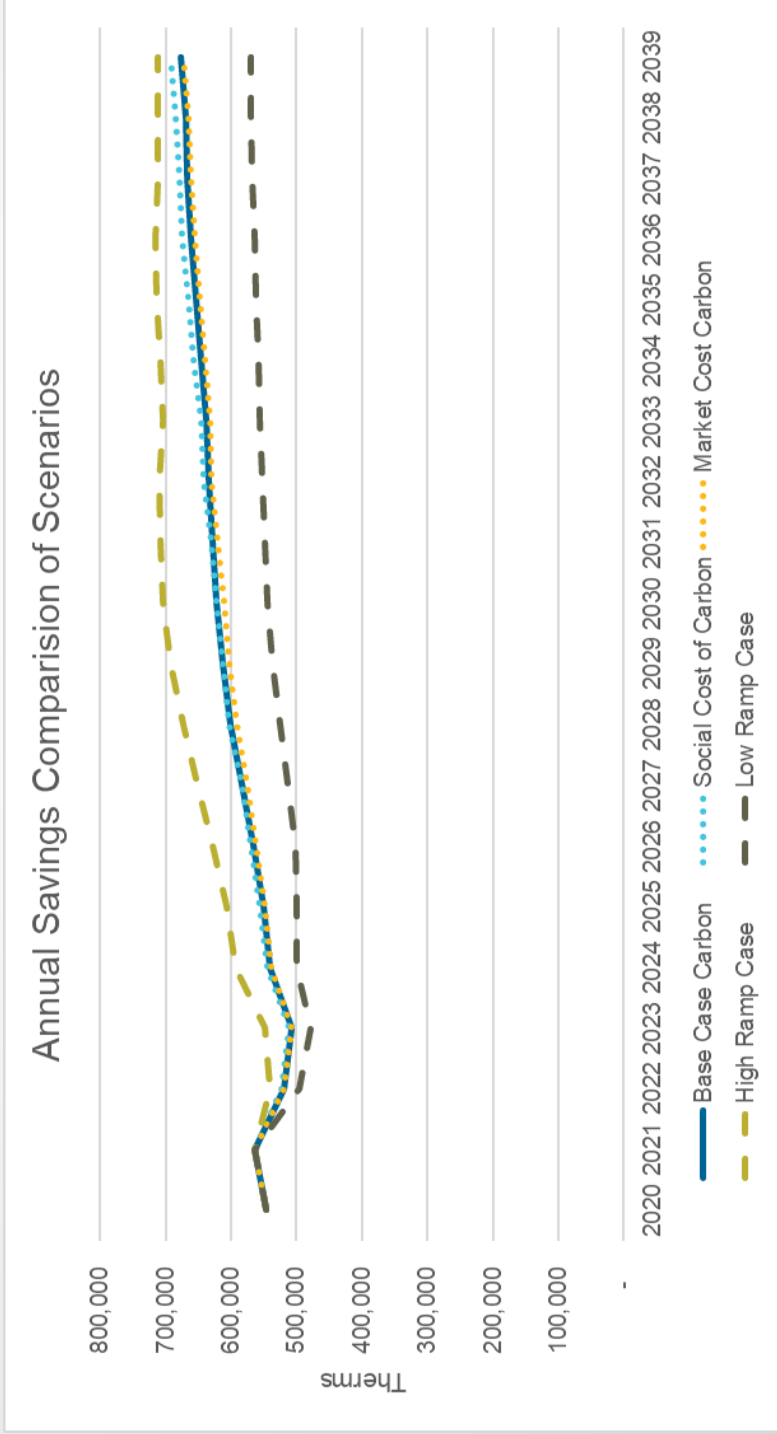
- In this scenario, the Company identifies potential shortfalls across its service area starting in 2024 under stochastic conditions.
- This does not invalidate the top ranked candidate portfolio, but rather reinforces Cascade’s practice of modeling and evaluating each of its contracts prior to their expiration.
- Without access to a significant portion of its contracts, SENDOUT® found the optimization to be infeasible.



# Carbon Sensitivity Discussion

- Cascade will include an analysis of three carbon sensitivities in its IRP, as discussed in TAG 4:
  - Social Cost of Carbon
  - House of Representatives Market Choice
  - No Carbon
- New to the 2020 OR IRP, Cascade will be including a stochastic carbon analysis. On January of each year, each draw allows for the possibility of a random carbon forecast to be included in the forecasted price of gas. If a carbon forecast is selected, the draw stays on that carbon path for the duration of the planning horizon.
- Cascade's modeling has determined that its conservation programs are robust and comprehensive enough to meet projected DSM savings even at a lower than expected carbon future.

# CPA Comparison: Scenarios vs Ramp Rate



# Scenario/Sensitivities versus Cost Limit

| Scenario                      | Total System Cost (\$000) | Unreserved Start Year |
|-------------------------------|---------------------------|-----------------------|
| <b>VaR Limit</b>              | <b>5,367,644</b>          | N/A                   |
| No Carbon Forecast            | 4,067,388                 | N/A                   |
| SCC Carbon Forecast           | 4,291,633                 | N/A                   |
| Market Choice Carbon Forecast | 4,219,313                 | N/A                   |
| Price Forecast High           | 4,348,336                 | N/A                   |
| Environmental Adder 0%        | 4,200,421                 | N/A                   |
| Environmental Adder 20%       | 4,402,809                 | N/A                   |
| Environmental Adder 30%       | 4,498,902                 | N/A                   |
| No Evergreen                  | N/A*                      | 2024                  |
| Low Growth                    | 4,094,227                 | N/A                   |
| High Growth                   | 4,627,197                 | 2035                  |
| Limit BC                      | 4,470,642                 | N/A                   |
| No BC                         | N/A*                      | 2020                  |
| Limit Alberta                 | 4,234,825                 | N/A                   |
| No Alberta                    | 4,441,634                 | 2020                  |
| No Rockies                    | 4,543,428                 | 2021                  |
| Limit Rockies                 | 4,259,653                 | N/A                   |
| Limit Canada                  | 4,419,800                 | N/A                   |
| No Canada                     | N/A*                      | 2020                  |
| No Plymouth                   | 4,384,592                 | 2037                  |
| Limit Plymouth                | 4,372,424                 | N/A                   |
| Limit JP                      | 4,397,880                 | N/A                   |
| No JP                         | 4,421,787                 | N/A                   |
| Limit Mist                    | 4,338,902                 | N/A                   |
| No Mist                       | 4,339,958                 | N/A                   |

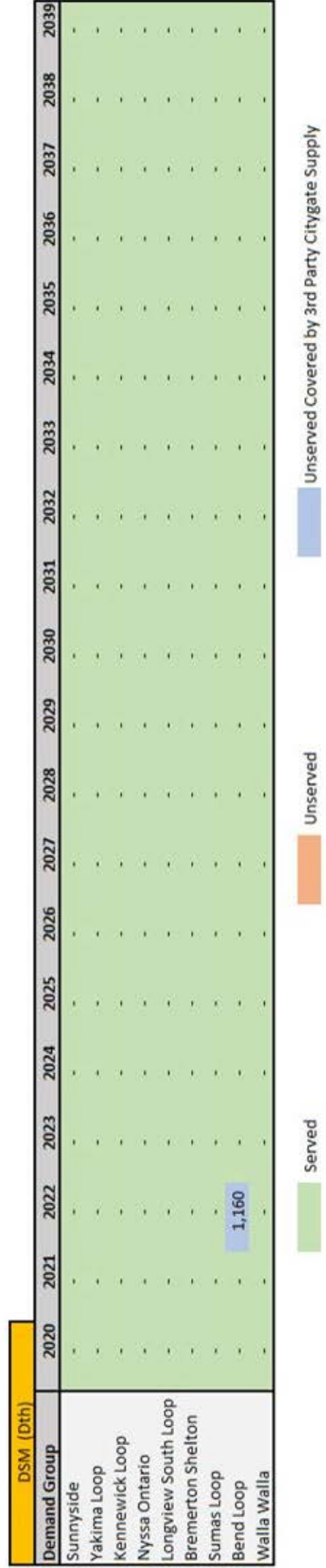
\* Note - SENDOUT® is unable to calculate costs for infeasible

Scenarios/Sensitivities

# Conclusion

- Cascade has identified potential shortfalls at the gates served by GTN in Oregon, starting in 2033.
- The top-ranking candidate portfolio included DSM and 3<sup>rd</sup> party citygate deliveries.
- Under expected conditions, this portfolio would eliminate the potential GTN shortfall.
- Additionally, the top-ranked portfolio, which is the all-in portfolio, passes all scenario and sensitivity testing. It is Cascade's Preferred Portfolio.

# Preferred Portfolio Results



# Proposed Four-Year Action Plan



# Environmental Policy

- Continue to support the City of Bend's Climate Action Plan efforts which were approved by the City Council on December 4, 2019.
- Participate in City of Bellingham Climate Action Plan discussions.
- Monitor service areas for potential GHG reduction goal development relating to energy delivery and supply.
- Monitor carbon pricing and policy developments nationally and statewide (i.e., OR ballot measure, 2020 carbon tax or cap and trade bills, Social Cost of Carbon, Market Choice, The Clean Future Act, etc.).
- Monitor federal and state GHG regulation development for energy industry.
- Continuation of our current emission reduction and monitoring endeavors (i.e., Methane Challenge Program, Renewable Natural Gas studies).

# DSM

- The Company will examine the impact that changes such as revised building codes, OPUC exemptions granted for non-cost-effective measures, and changes to avoided cost calculations may have on the Company's long- and short-term conservation potential. Success shall be measured by the following:
  - The Company shall hold at least one meeting with the Energy Trust to discuss any changes that might affect the Company's energy efficiency therm savings targets, and, if applicable, what actions may need to be taken to comply with or adapt to the changes.
  - Cascade will provide a summary of its meeting with the Energy Trust in its 2021 IRP Annual Update. In compliance with OAR 860-021-0400(9), the Company will file an update as soon as is reasonably possible if any changes result in a significant deviation from the 2020 IRP.
- The Company will work with the Energy Trust of Oregon to identify potential areas for expanded engagement in support of local communities' climate action planning goals. These discussions could include consideration of biogas engagement where cost-effective and regulatorily permitted. Findings on how to best support local climate plans will be included in the next IRP.



# DSM (Cont'd)

- Cascade will strive to acquire the following amount of cost-effective gas therm savings over the next two years:

|                   | 2020             | 2021             |
|-------------------|------------------|------------------|
| <b>Oregon</b>     | 547,244          | 563,251          |
| <b>Washington</b> | 726,625          | 853,253          |
| <b>Total</b>      | <b>1,273,869</b> | <b>1,416,504</b> |

- The Company will acquire cost-effective therm savings by partnering with Energy Trust in Oregon and by delivering programs under the oversight of the Company's Conservation Advisory Group in Washington. Short-term annual therm savings targets are refined annually in Oregon by the Energy Trust through the budgeting process and in Cascade's Conservation Plan, which the Company files each December 1<sup>st</sup> in Washington.

# Demand

- Include wind in the stochastic weather analysis.
- Look into a new methodology of peak day. Cascade's peak day is currently the coldest day in past 30 years. Beginning with the 2022 IRP, Cascade's current peak day will fall outside of the 30-year range.

# Resource Planning

- Cascade recognizes the importance of gathering best practices from its fellow local distribution companies (LDCs). To that end, the Company will participate in the IRP process of at least three regional utilities over the course of the next two years with the objective of incorporating aspects that may enhance Cascade's IRP.
- Cascade will continue to work with Northwest Pipeline to pursue opportunities to better align MDDOs contract delivery rights at no incremental costs to customers through the use of segmentation or other.
- Cascade will determine if the temporary Jackson Prairie account JP3 release from PSE should be made permanent.
- Cascade will continue to work on developing scenarios to replicate potential supply and transport impacts for pipeline operational flow orders (OFO) and consideration of other strategies to minimize OFO impacts.
- To better improve the alignment of resources/costs between the PGA and the IRP, Cascade will continue to develop SENDOUT direct models for gas cost workbooks provided to commissions during PGA filings.
- Cascade will develop more scenarios to specifically address potential Canadian supply market changes such as diversion of Station 2 supplies to LNG and/or NGTL-, impact of the new federal fuel charge on the price and potential switching of supply basins utilization/needs of upstream pipeline transportation over time.

# Distribution System Planning

- Cascade has identified engineering projects to be put into the IRP. The projects as well as the costs will be provided in the draft IRP under confidential treatment.

# Remaining Schedule

| Date (Subject to change) | State | Process Element                             |
|--------------------------|-------|---|
| Tuesday, May 12, 2020    | OR    | Draft of 2020 OR IRP distributed            |
| Friday, June 12, 2020    | OR    | Comments due on draft from all stakeholders |
| Tuesday, June 30, 2020   | OR    | TAG 6, if needed                            |
| Friday, July 31, 2020    | OR    | IRP filing in Oregon                        |

## ADDITIONAL QUESTIONS?

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Bruce Folsom - Consultant

# Cascade Natural Gas Corporation

## 2020 Integrated Resource Plan Technical Advisory Group Meeting #5

March 11, 2020

Oregon Public Utility Commission

Salem, OR





## OPUC Tag Meeting 4

|                         |  |
|-------------------------|--|
| <b>Date &amp; Time:</b> | 3/11/2020, 09:00 AM – 10:30 PM   |
| <b>Location:</b>        | OPUC offices in Salem, OR – Meadow Room  |
| <b>In attendance:</b>   | Brian Robertson, Ashton Davis, Devin McGreal, Alyn Spector, Mike Parvinen, Mark Sellers-Vaughn, Nicholas Colombo (OPUC)  |
| <b>Called in:</b>       | Kevin Connell, Eric Wood, Bruce Folsom, Carolyn Stone, Tom Pardee (Avista), Sudeshna Pal (CUB), Mike Paruszkiewicz (NWN) |
| <b>Minutes by:</b>      | Brian Robertson  |

Brian Robertson kicked off the meeting by thanking everyone that showed up. Brian went over fire safety of the building, introductions and the agenda.

- Brian Robertson quickly summarized alternative resources options Cascade has to add on the upstream side.
- Brian then reviewed Cascade's Supply Resource Optimization Process that was presented at TAG 4. This was discussed in depth as it was Nicholas' first exposure to Cascade's process. Brian also recapped Cascade's potential shortfalls from the as-is case.
- Ashton Davis then discussed Cascade's list of candidate portfolios. Cascade's candidate portfolios are as such:
  - All-In
  - All-In less DSM
  - GTN transportation Only
  - GTN Plus Storage
  - NWP transportation Only
  - NWP Plus Storage
  - Storage Only

Brian asked if there were any suggestion for other portfolios. Nicholas said it would be a good idea to add an RNG portfolio in future IRPs.

- Devin McGreal presented the methodology behind ranking of portfolios. Devin also discussed the risk-adjusted cost metric that Cascade utilizes to rank portfolios. Devin then shared the portfolios and their ranking.
- Devin discussed the top ranked candidate portfolio components and how it solves shortfalls.



- Brian then discussed the new stochastic methodology Cascade used for the weather and price Monte Carlo simulations. For weather, Cascade utilized the Cholesky Decomposition Matrix (CDM). For price, Cascade utilized the Geometric Brownian Motion as well as the CDM.
- Devin then presented the Company's Scenario and Sensitivity Results. This included a discussion on High Growth and No Evergreen results. Both cases showed unserved demand, which was a red flag to Cascade. In both cases, Cascade found that these are scenario's that the Company will want to monitor but it does not cause us to reject the candidate portfolio.
- Devin shared the unserved and cost results of all the scenarios and sensitivities discussed earlier.
- In Conclusion, the Company is satisfied with the results that all shortfalls will be served by DSM and 3<sup>rd</sup> party citygate deliveries. Cascade presented a slide showing Cascade does not anticipate any shortfalls under the preferred portfolio.
- Alan Spector discussed the four-year action plan for Environmental Policy as well as DSM.
- Brian Robertson discussed the four-year action plan for Demand, Resource Planning, and Distribution System Planning.
- Brian discussed the remaining 2020 OR IRP schedule and adjourned the meeting.

Cascade will file the draft IRP on May 12 and has a TAG 6 scheduled for June 30<sup>th</sup>, if needed.

**The meeting was adjourned at 10:30 PM.**

Appendix B  
Demand Forecast  
2020 OR IRP

## **Appendix B - Introduction**

The purpose of this document is to show the demand for Cascade's system at a very detailed level. Pages 3-158 provide a low, expected, and high forecast for annual demand, peak day demand, usage by customer class, and customer count growth by class. There are also graphs that show the therm and customer growth. These are done at the citygate, pipeline zone, district, state, and system level. Pages 159-253 further break down the demand for the low, expected, and high forecast at the citygate, pipeline zone, district, state, and system level.

Cascade Natural Gas  
2020 IRP Demand Forecast Summary Tables

| 7th Day School               |         |          |        |          |          |        |         |          |        |               |          |        |
|------------------------------|---------|----------|--------|----------|----------|--------|---------|----------|--------|---------------|----------|--------|
| Annual Requirements (Therms) |         |          |        |          |          |        |         |          |        |               |          |        |
|                              | Low     |          |        | Expected |          |        | High    |          |        | Annual Change |          |        |
|                              | Heating | BaseLoad | Total  | Heating  | BaseLoad | Total  | Heating | BaseLoad | Total  | Low           | Expected | High   |
|                              | Heating | BaseLoad | Total  | Heating  | BaseLoad | Total  | Heating | BaseLoad | Total  | Low           | Expected | High   |
| 2020                         | 19,757  | 10,064   | 29,821 | 20,001   | 10,064   | 30,065 | 20,058  | 10,064   | 30,122 | 0.00%         | 0.00%    | 0.00%  |
| 2021                         | 19,401  | 10,318   | 29,719 | 19,670   | 10,318   | 29,987 | 19,832  | 10,318   | 30,150 | -1.80%        | 2.52%    | -0.34% |
| 2022                         | 19,516  | 10,105   | 29,621 | 19,882   | 10,105   | 29,987 | 20,141  | 10,105   | 30,246 | 0.59%         | -2.06%   | -0.33% |
| 2023                         | 19,483  | 10,067   | 29,550 | 19,920   | 10,067   | 29,987 | 20,131  | 10,067   | 30,197 | -0.17%        | -0.38%   | -0.24% |
| 2024                         | 19,513  | 10,095   | 29,608 | 19,970   | 10,095   | 30,065 | 20,178  | 10,095   | 30,272 | 0.16%         | 0.27%    | 0.20%  |
| 2025                         | 19,430  | 10,096   | 29,526 | 19,892   | 10,096   | 29,987 | 20,101  | 10,096   | 30,197 | -0.43%        | 0.01%    | -0.28% |
| 2026                         | 19,351  | 10,066   | 29,417 | 19,921   | 10,066   | 29,987 | 20,220  | 10,066   | 30,286 | -0.41%        | -0.29%   | -0.37% |
| 2027                         | 19,121  | 10,320   | 29,440 | 19,667   | 10,320   | 29,986 | 20,008  | 10,320   | 30,328 | -1.19%        | 2.52%    | 0.08%  |
| 2028                         | 19,395  | 10,064   | 29,459 | 20,001   | 10,064   | 30,065 | 20,295  | 10,064   | 30,359 | 1.44%         | -2.48%   | 0.06%  |
| 2029                         | 19,303  | 10,065   | 29,368 | 19,922   | 10,065   | 29,987 | 20,215  | 10,065   | 30,280 | -0.48%        | 0.01%    | -0.31% |
| 2030                         | 19,167  | 10,097   | 29,263 | 19,890   | 10,097   | 29,987 | 20,277  | 10,097   | 30,374 | -0.71%        | 0.31%    | -0.36% |
| 2031                         | 19,150  | 10,098   | 29,248 | 19,889   | 10,098   | 29,986 | 20,276  | 10,098   | 30,374 | -0.09%        | 0.01%    | -0.05% |
| 2032                         | 19,029  | 10,317   | 29,346 | 19,748   | 10,317   | 30,065 | 20,182  | 10,317   | 30,499 | -0.63%        | 2.17%    | 0.34%  |
| 2033                         | 19,158  | 10,104   | 29,262 | 19,884   | 10,104   | 29,987 | 20,314  | 10,104   | 30,418 | 0.68%         | -2.06%   | -0.28% |
| 2034                         | 19,049  | 10,066   | 29,115 | 19,921   | 10,066   | 29,987 | 20,395  | 10,066   | 30,461 | -0.57%        | -0.38%   | -0.50% |
| 2035                         | 19,024  | 10,067   | 29,091 | 19,919   | 10,067   | 29,986 | 20,393  | 10,067   | 30,460 | -0.13%        | 0.01%    | -0.08% |
| 2036                         | 19,057  | 10,095   | 29,152 | 19,970   | 10,095   | 30,065 | 20,444  | 10,095   | 30,539 | 0.17%         | 0.27%    | 0.21%  |
| 2037                         | 19,545  | 9,520    | 29,065 | 20,467   | 9,520    | 29,987 | 20,941  | 9,520    | 30,460 | 2.56%         | -5.69%   | -0.30% |
| 2038                         | 18,684  | 10,319   | 29,003 | 19,668   | 10,319   | 29,987 | 20,284  | 10,319   | 30,603 | -4.40%        | 8.39%    | -0.21% |
| 2039                         | 18,879  | 10,106   | 28,985 | 19,881   | 10,106   | 29,987 | 20,497  | 10,106   | 30,603 | 1.04%         | -2.06%   | -0.06% |

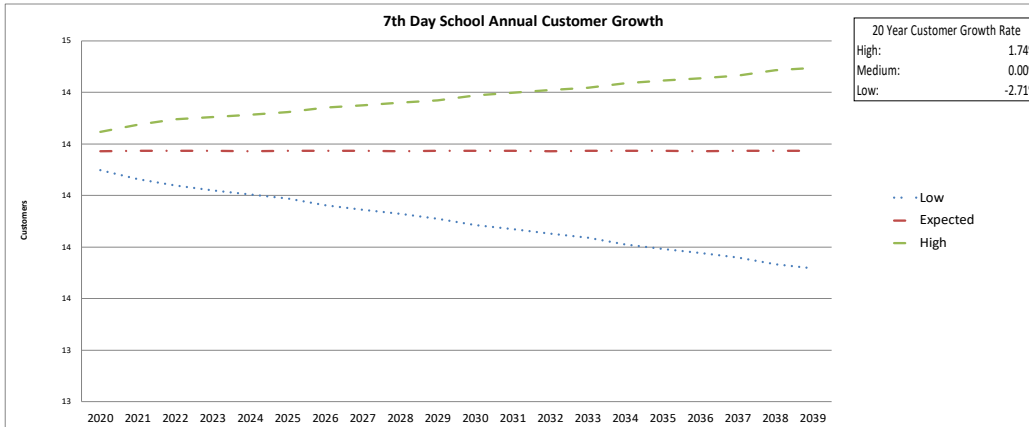
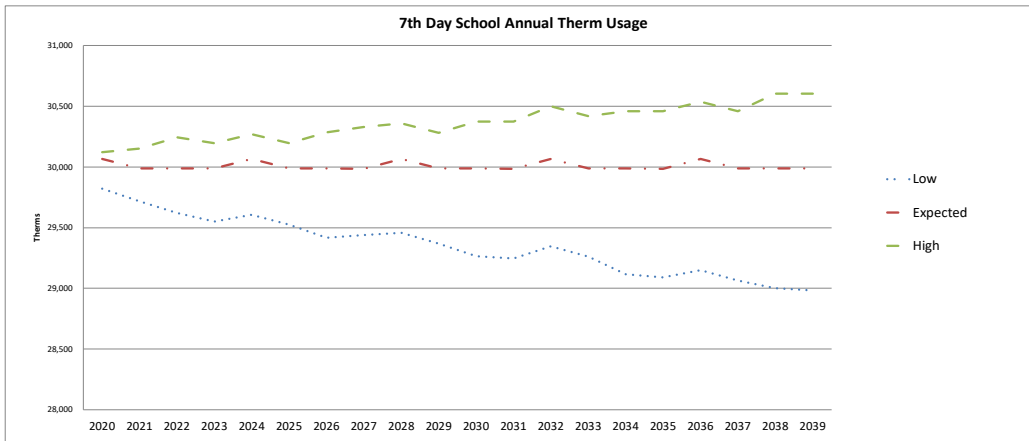
| Peak Day - BaseLoad |                |      |       |                |      |       |                |      |       |               |          |        |
|---------------------|----------------|------|-------|----------------|------|-------|----------------|------|-------|---------------|----------|--------|
|                     | Low            |      |       | Expected       |      |       | High           |      |       | Annual Change |          |        |
|                     | Daily BaseLoad | Peak | Total | Daily BaseLoad | Peak | Total | Daily BaseLoad | Peak | Total | Low           | Expected | High   |
| 2020                | 28             | 100  | 127   | 28             | 101  | 128   | 28             | 104  | 131   | 0.00%         | 0.00%    | 0.00%  |
| 2021                | 28             | 99   | 127   | 28             | 100  | 128   | 28             | 103  | 131   | 2.52%         | -0.78%   | -0.07% |
| 2022                | 28             | 99   | 127   | 28             | 101  | 128   | 28             | 104  | 131   | -2.06%        | 0.26%    | -0.26% |
| 2023                | 28             | 99   | 127   | 28             | 101  | 128   | 28             | 104  | 131   | -0.38%        | 0.02%    | -0.07% |
| 2024                | 28             | 99   | 127   | 28             | 101  | 129   | 28             | 104  | 132   | 0.27%         | 0.03%    | 0.08%  |
| 2025                | 28             | 99   | 127   | 28             | 101  | 129   | 28             | 104  | 132   | 0.01%         | 0.03%    | 0.02%  |
| 2026                | 28             | 99   | 126   | 28             | 101  | 128   | 28             | 104  | 132   | -0.29%        | -0.55%   | -0.50% |
| 2027                | 28             | 98   | 126   | 28             | 100  | 128   | 28             | 103  | 132   | 2.52%         | -0.79%   | -0.07% |
| 2028                | 28             | 98   | 126   | 28             | 101  | 128   | 28             | 104  | 131   | -2.48%        | 0.75%    | 0.02%  |
| 2029                | 28             | 98   | 125   | 28             | 101  | 128   | 28             | 104  | 131   | 0.01%         | -0.09%   | -0.07% |
| 2030                | 28             | 98   | 126   | 28             | 101  | 129   | 28             | 104  | 132   | 0.31%         | -0.34%   | -0.20% |
| 2031                | 28             | 98   | 126   | 28             | 101  | 129   | 28             | 104  | 132   | 0.01%         | 0.03%    | 0.02%  |
| 2032                | 28             | 97   | 125   | 28             | 100  | 128   | 28             | 103  | 132   | 2.17%         | -0.89%   | -0.22% |
| 2033                | 28             | 98   | 126   | 28             | 101  | 128   | 28             | 104  | 132   | -2.06%        | 0.63%    | 0.02%  |
| 2034                | 28             | 98   | 125   | 28             | 101  | 128   | 28             | 104  | 132   | -0.38%        | -0.34%   | -0.35% |
| 2035                | 28             | 97   | 125   | 28             | 101  | 128   | 28             | 104  | 132   | 0.01%         | -0.09%   | -0.07% |
| 2036                | 28             | 98   | 125   | 28             | 101  | 129   | 28             | 104  | 132   | 0.27%         | 0.15%    | 0.18%  |
| 2037                | 26             | 99   | 125   | 26             | 102  | 128   | 26             | 106  | 132   | -5.69%        | 1.33%    | -0.22% |
| 2038                | 28             | 96   | 125   | 28             | 100  | 128   | 28             | 104  | 132   | 8.39%         | -2.66%   | -0.35% |
| 2039                | 28             | 97   | 125   | 28             | 101  | 128   | 28             | 104  | 132   | -2.06%        | 0.64%    | 0.02%  |

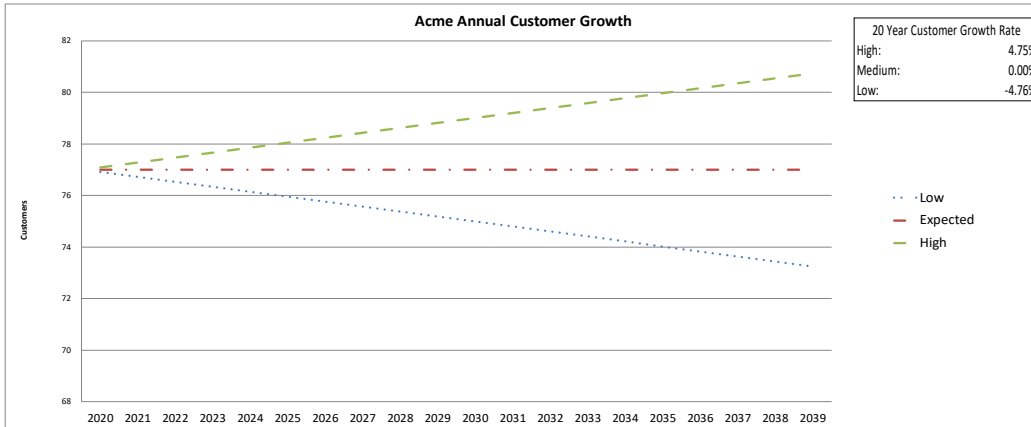
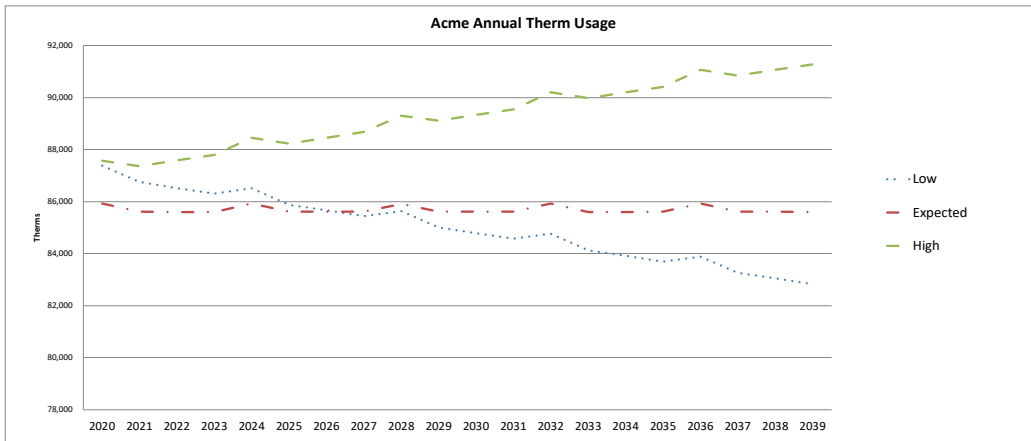
| Therms Usage by Class |       |         |        |          |         |        |       |         |        |               |          |        |
|-----------------------|-------|---------|--------|----------|---------|--------|-------|---------|--------|---------------|----------|--------|
|                       | Low   |         |        | Expected |         |        | High  |         |        | Annual Change |          |        |
|                       | Res   | Com/Ind | Total  | Res      | Com/Ind | Total  | Res   | Com/Ind | Total  | Low           | Expected | High   |
| 2020                  | 8,778 | 21,043  | 29,821 | 8,817    | 21,248  | 30,065 | 8,800 | 21,323  | 30,122 | 0.00%         | 0.00%    | 0.00%  |
| 2021                  | 8,733 | 20,986  | 29,719 | 8,793    | 21,194  | 29,987 | 8,798 | 21,352  | 30,150 | -0.52%        | -0.27%   | -0.34% |
| 2022                  | 8,711 | 20,910  | 29,621 | 8,793    | 21,194  | 29,987 | 8,820 | 21,426  | 30,246 | -0.25%        | -0.36%   | -0.33% |
| 2023                  | 8,689 | 20,861  | 29,550 | 8,793    | 21,193  | 29,987 | 8,842 | 21,356  | 30,197 | -0.25%        | -0.24%   | -0.24% |
| 2024                  | 8,690 | 20,917  | 29,608 | 8,817    | 21,248  | 30,065 | 8,887 | 21,385  | 30,272 | 0.01%         | 0.27%    | 0.20%  |
| 2025                  | 8,645 | 20,880  | 29,526 | 8,793    | 21,194  | 29,987 | 8,886 | 21,311  | 30,197 | -0.52%        | 0.18%    | -0.38% |
| 2026                  | 8,623 | 20,794  | 29,417 | 8,793    | 21,194  | 29,987 | 8,908 | 21,379  | 30,286 | -0.25%        | -0.41%   | -0.37% |
| 2027                  | 8,602 | 20,839  | 29,440 | 8,793    | 21,193  | 29,986 | 8,930 | 21,398  | 30,328 | -0.25%        | 0.22%    | 0.08%  |
| 2028                  | 8,602 | 20,857  | 29,459 | 8,816    | 21,249  | 30,065 | 8,975 | 21,384  | 30,359 | 0.01%         | 0.09%    | 0.06%  |
| 2029                  | 8,558 | 20,810  | 29,368 | 8,793    | 21,194  | 29,987 | 8,973 | 21,307  | 30,280 | -0.52%        | -0.23%   | -0.31% |
| 2030                  | 8,536 | 20,727  | 29,263 | 8,793    | 21,194  | 29,987 | 8,995 | 21,379  | 30,374 | -0.26%        | -0.40%   | -0.36% |
| 2031                  | 8,514 | 20,734  | 29,248 | 8,793    | 21,193  | 29,986 | 9,017 | 21,357  | 30,374 | -0.26%        | 0.03%    | -0.05% |
| 2032                  | 8,515 | 20,831  | 29,346 | 8,817    | 21,248  | 30,065 | 9,063 | 21,436  | 30,499 | 0.01%         | 0.47%    | 0.34%  |
| 2033                  | 8,470 | 20,792  | 29,262 | 8,793    | 21,194  | 29,987 | 9,061 | 21,357  | 30,418 | -0.52%        | -0.19%   | -0.28% |
| 2034                  | 8,448 | 20,667  | 29,115 | 8,793    | 21,194  | 29,987 | 9,083 | 21,378  | 30,461 | -0.26%        | -0.60%   | -0.50% |
| 2035                  | 8,426 | 20,665  | 29,091 | 8,793    | 21,193  | 29,986 | 9,105 | 21,355  | 30,460 | -0.26%        | -0.01%   | -0.08% |
| 2036                  | 8,427 | 20,725  | 29,152 | 8,817    | 21,248  | 30,065 | 9,151 | 21,387  | 30,539 | 0.01%         | 0.29%    | 0.21%  |
| 2037                  | 8,382 | 20,682  | 29,065 | 8,793    | 21,194  | 29,987 | 9,149 | 21,312  | 30,460 | -0.53%        | -0.21%   | -0.30% |
| 2038                  | 8,361 | 20,642  | 29,003 | 8,793    | 21,194  | 29,987 | 9,171 | 21,433  | 30,603 | -0.26%        | -0.19%   | -0.21% |
| 2039                  | 8,339 | 20,646  | 28,985 | 8,793    | 21,193  | 29,987 | 9,193 | 21,410  | 30,603 | -0.26%        | 0.02%    | -0.06% |

| Customer Count Forecast |     |         |       |          |         |       |      |         |       |               |          |        |
|-------------------------|-----|---------|-------|----------|---------|-------|------|---------|-------|---------------|----------|--------|
|                         | Low |         |       | Expected |         |       | High |         |       | Annual Change |          |        |
|                         | Res | Com/Ind | Total | Res      | Com/Ind | Total | Res  | Com/Ind | Total | Low           | Expected | High   |
| 2020                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | 0.00%         | 0.00%    | 0.00%  |
| 2021                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.25%        | -0.25%   | -0.25% |
| 2022                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.25%        | -0.05%   | -0.17% |
| 2023                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.25%        | 0.01%    | -0.14% |
| 2024                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.25%        | 0.05%    | -0.12% |
| 2025                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.25%        | 0.08%    | -0.11% |
| 2026                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.25%        | -0.12%   | -0.20% |
| 2027                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.25%        | 0.04%    | -0.13% |
| 2028                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | 0.00%         | 0.10%    | 0.10%  |
| 2029                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.26%        | 0.01%    | -0.14% |
| 2030                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.26%        | -0.10%   | -0.19% |
| 2031                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.26%        | 0.08%    | -0.11% |
| 2032                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.26%        | 0.03%    | -0.13% |
| 2033                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.26%        | 0.07%    | -0.11% |
| 2034                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.26%        | -0.08%   | -0.18% |
| 2035                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.26%        | 0.03%    | -0.13% |
| 2036                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.26%        | 0.07%    | -0.11% |
| 2037                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.26%        | 0.05%    | -0.12% |
| 2038                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.26%        | -0.11%   | -0.19% |
| 2039                    | 8   | 6       | 14    | 8        | 6       | 14    | 8    | 6       | 14    | -0.26%        | 0.07%    | -0.12% |



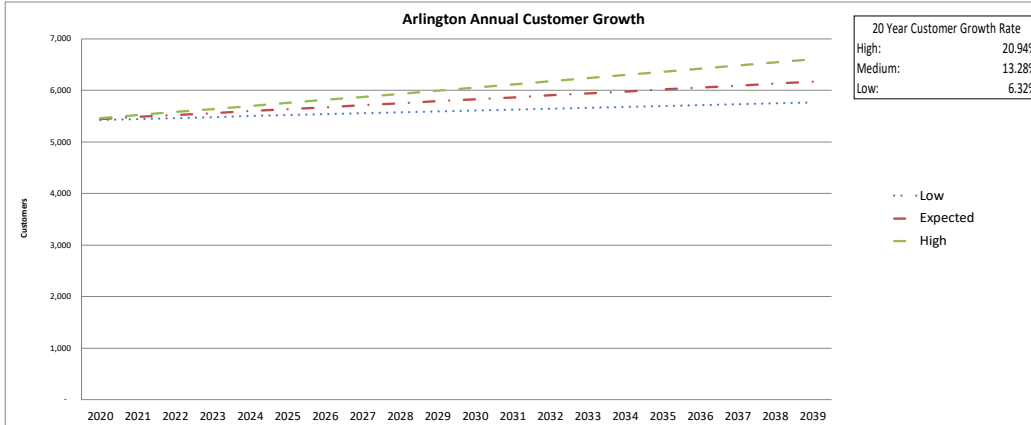
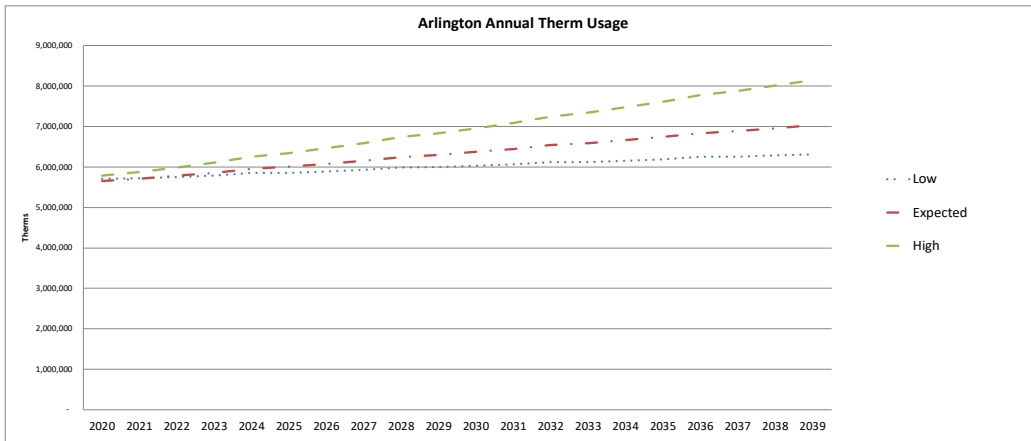




Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Table with multiple sections: Arlington Annual Requirements (Therms), Annual Change, Peak Day - BaseLoad, Thermo Usage by Class, and Customer Count Forecast. Each section contains detailed data for years 2020-2039 across various metrics like Heating, BaseLoad, Total, and Com/In/d.





Cascade Natural Gas
2020 IRP Demand Forecast Summary Tables

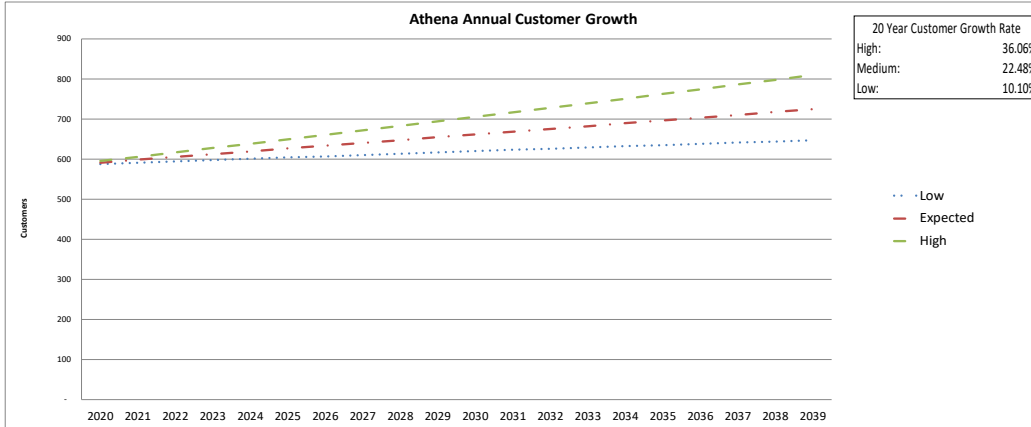
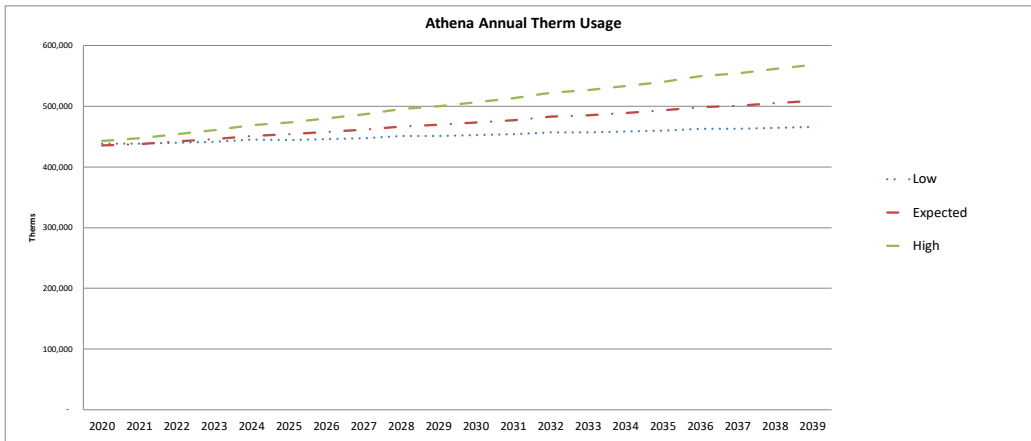
Athena

Table with columns: Annual Requirements (Therms) and Annual Change. Sub-headers include Low, Expected, High for Heating, BaseLoad, and Total. Data rows include years 2020-2039 and percentage changes.

Table with columns: Peak Day - BaseLoad and Annual Change. Sub-headers include Low, Expected, High for Base, Peak, and Total. Data rows include years 2020-2039 and percentage changes.

Table with columns: Therms Usage by Class and Annual Change. Sub-headers include Low, Expected, High for Res, Com/Ind, and Total. Data rows include years 2020-2039 and percentage changes.

Table with columns: Customer Count Forecast and Annual Change. Sub-headers include Low, Expected, High for Res, Com/Ind, and Total. Data rows include years 2020-2039 and percentage changes.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

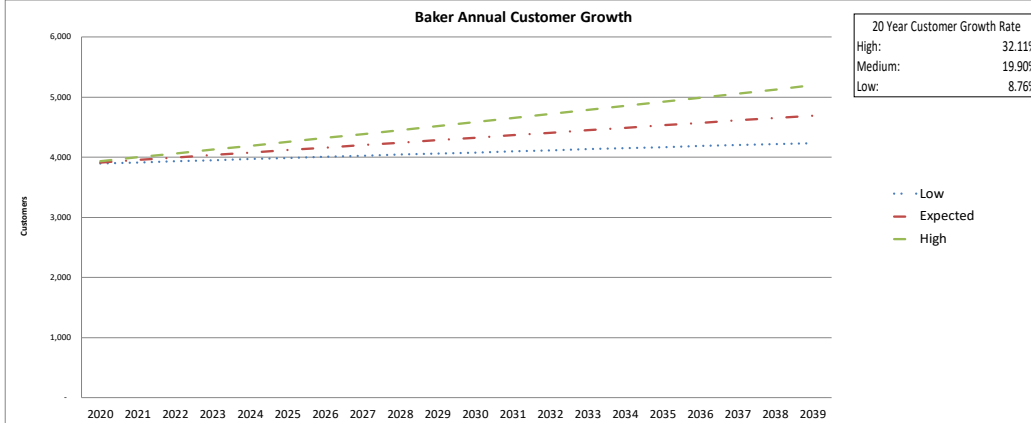
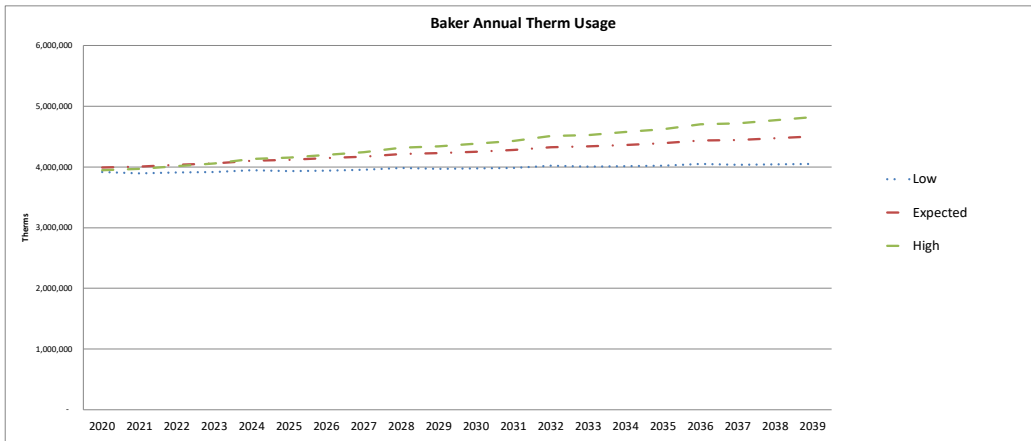
Baker

Table with columns for Annual Requirements (Therms) and Annual Change. Rows include years 2020-2039 and metrics for Heating, BaseLoad, and Total under Low, Expected, and High scenarios.

Table with columns for Peak Day - BaseLoad and Annual Change. Rows include years 2020-2039 and metrics for Base, Peak, and Total under Low, Expected, and High scenarios.

Table with columns for Therms Usage by Class and Annual Change. Rows include years 2020-2039 and metrics for Res, Com/Ind, and Total under Low, Expected, and High scenarios.

Table with columns for Customer Count Forecast and Annual Change. Rows include years 2020-2039 and metrics for Res, Com/Ind, and Total under Low, Expected, and High scenarios.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Bend Loop

Table with columns: Heating, Low, Expected, High, Total. Rows 2020-2039. Sub-headers: Annual Requirements (Therms).

Table with columns: Heating, Low, Expected, High, Total. Rows 2020-2039. Sub-headers: Annual Change.

Table with columns: Daily Base/Load, Peak, Total. Rows 2020-2039. Sub-headers: Peak Day - Base/Load.

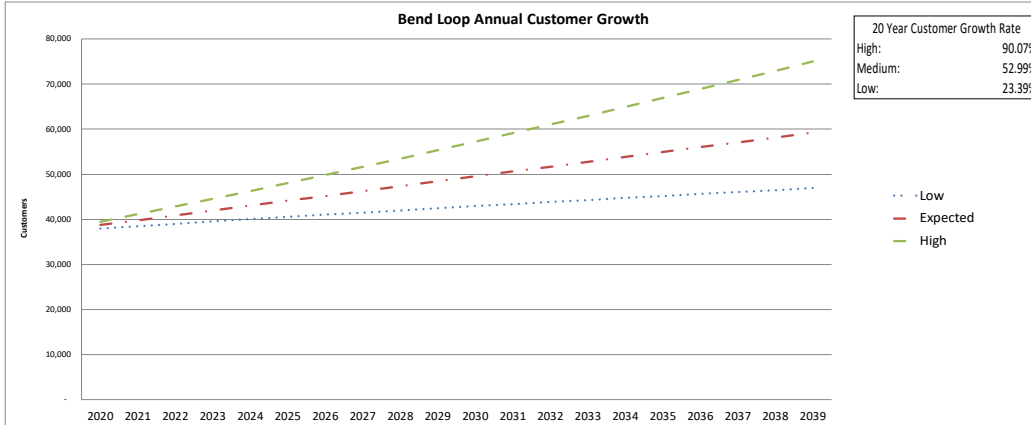
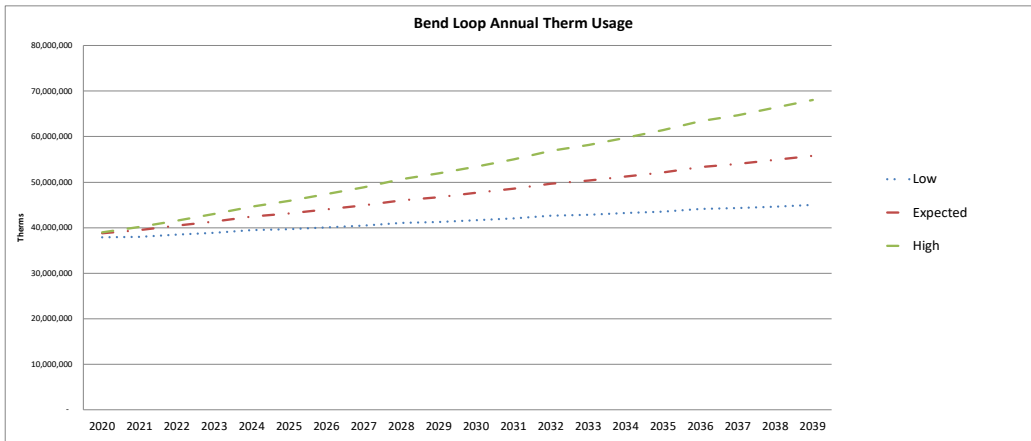
Table with columns: Base, Low, Expected, High, Total. Rows 2020-2039. Sub-headers: Annual Change.

Table with columns: Res, Com/In/d, Total. Rows 2020-2039. Sub-headers: Therms Usage by Class.

Table with columns: Res, Com/In/d, Total. Rows 2020-2039. Sub-headers: Annual Change.

Table with columns: Res, Com/In/d, Total. Rows 2020-2039. Sub-headers: Customer Count Forecast.

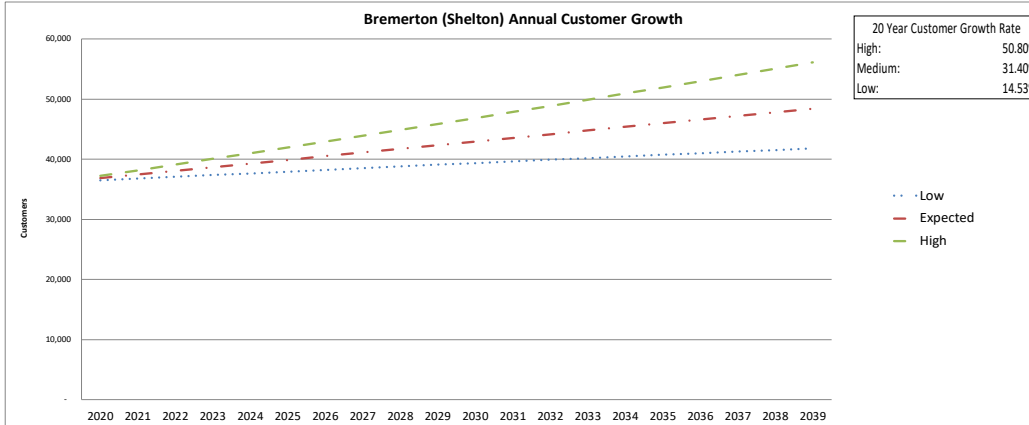
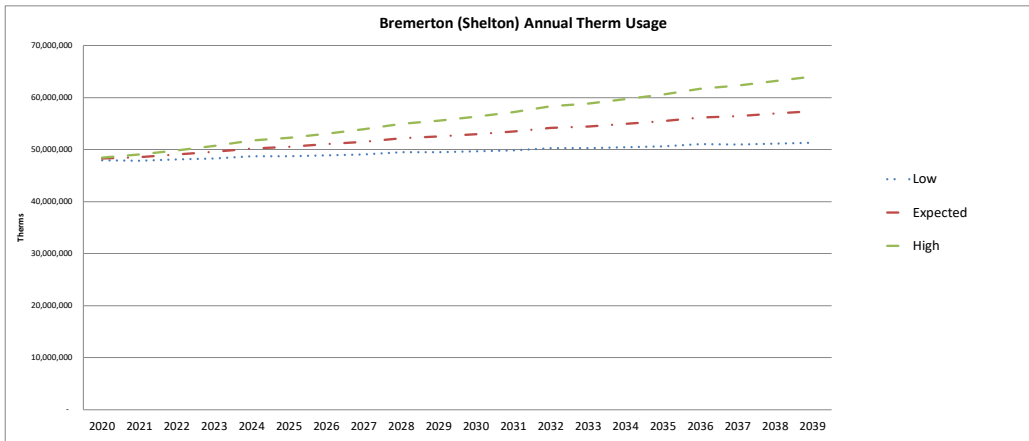
Table with columns: Res, Com/In/d, Total. Rows 2020-2039. Sub-headers: Annual Change.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

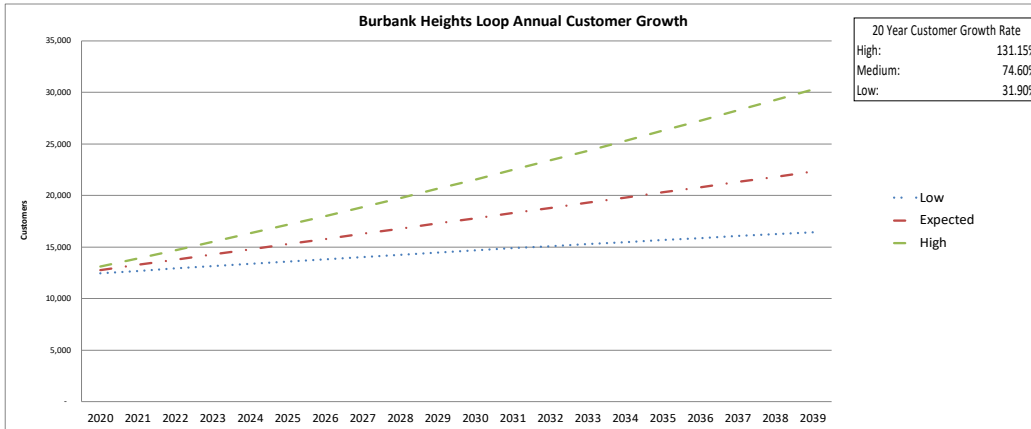
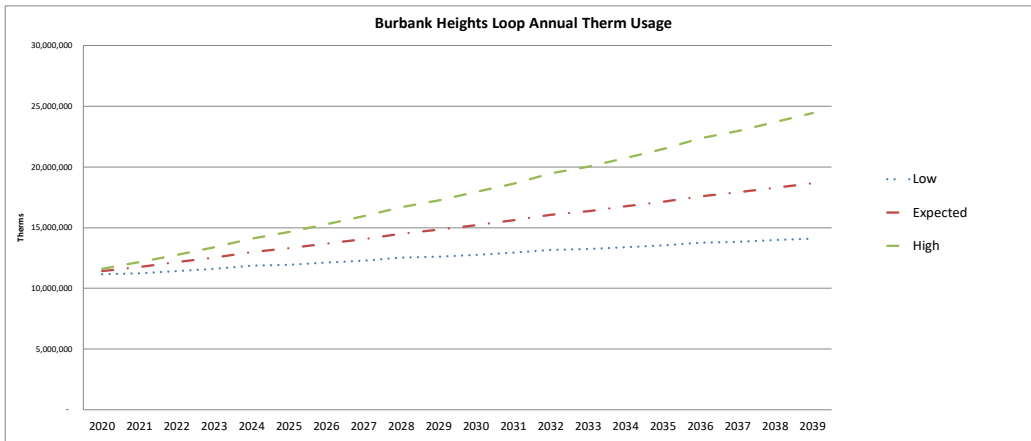
Table with 4 main sections: Annual Requirements (Therms), Annual Change, Peak Day - BaseLoad, and Thermo Usage by Class. Each section contains multiple columns for Low, Expected, and High scenarios across various years (2020-2039).





Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Table with multiple sections: Burbank Heights Loop (Annual Requirements, Annual Change, Peak Day - BaseLoad), Thermo Usage by Class (Annual Change), and Customer Count Forecast (Annual Change). Each section contains detailed data for years 2020-2039 across various metrics like Heating, BaseLoad, and Total.



Cascade Natural Gas  
2020 IRP Demand Forecast Summary Tables

| Castle Rock                  |          |        |          |          |        |         |          |        |               |          |        |        |
|------------------------------|----------|--------|----------|----------|--------|---------|----------|--------|---------------|----------|--------|--------|
| Annual Requirements (Therms) |          |        |          |          |        |         |          |        |               |          |        |        |
| Low                          |          |        | Expected |          |        | High    |          |        | Annual Change |          |        |        |
| Heating                      | BaseLoad | Total  | Heating  | BaseLoad | Total  | Heating | BaseLoad | Total  | Heating       | BaseLoad | Total  |        |
| 2020                         | 83,279   | 90,244 | 173,522  | 84,659   | 90,244 | 174,903 | 86,248   | 90,244 | 176,492       | 0.00%    | 0.00%  | 0.00%  |
| 2021                         | 82,476   | 90,179 | 172,655  | 84,149   | 90,179 | 174,329 | 85,756   | 90,179 | 175,936       | -0.96%   | -0.07% | -0.50% |
| 2022                         | 82,532   | 90,115 | 172,647  | 84,218   | 90,115 | 174,333 | 85,829   | 90,115 | 175,944       | 0.07%    | -0.07% | 0.00%  |
| 2023                         | 82,508   | 90,119 | 172,627  | 84,213   | 90,119 | 174,332 | 85,829   | 90,119 | 175,948       | -0.03%   | 0.00%  | -0.01% |
| 2024                         | 83,134   | 90,175 | 173,310  | 84,728   | 90,175 | 174,903 | 86,485   | 90,175 | 176,660       | 0.76%    | 0.06%  | 0.40%  |
| 2025                         | 82,352   | 90,248 | 172,600  | 84,081   | 90,248 | 174,329 | 85,714   | 90,248 | 175,963       | -0.94%   | 0.08%  | -0.41% |
| 2026                         | 82,328   | 90,252 | 172,581  | 84,075   | 90,252 | 174,327 | 85,713   | 90,252 | 175,966       | -0.03%   | 0.00%  | -0.01% |
| 2027                         | 82,379   | 90,188 | 172,567  | 84,138   | 90,188 | 174,326 | 85,784   | 90,188 | 175,972       | 0.06%    | -0.07% | -0.01% |
| 2028                         | 83,149   | 90,107 | 173,255  | 84,809   | 90,107 | 174,915 | 86,583   | 90,107 | 176,689       | 0.93%    | -0.09% | 0.40%  |
| 2029                         | 82,424   | 90,111 | 172,535  | 84,218   | 90,111 | 174,329 | 85,869   | 90,111 | 175,980       | -0.87%   | 0.00%  | -0.42% |
| 2030                         | 82,330   | 90,184 | 172,514  | 84,144   | 90,184 | 174,327 | 85,802   | 90,184 | 175,985       | -0.11%   | 0.08%  | -0.01% |
| 2031                         | 82,238   | 90,257 | 172,495  | 84,069   | 90,257 | 174,326 | 85,734   | 90,257 | 175,991       | -0.11%   | 0.08%  | -0.01% |
| 2032                         | 83,009   | 90,175 | 173,184  | 84,728   | 90,175 | 174,903 | 86,526   | 90,175 | 176,701       | 0.94%    | -0.09% | 0.40%  |
| 2033                         | 82,365   | 90,111 | 172,476  | 84,224   | 90,111 | 174,335 | 85,896   | 90,111 | 176,007       | -0.78%   | -0.07% | -0.41% |
| 2034                         | 82,340   | 90,115 | 172,455  | 84,218   | 90,115 | 174,333 | 85,899   | 90,115 | 176,014       | -0.03%   | 0.00%  | -0.01% |
| 2035                         | 82,312   | 90,119 | 172,431  | 84,207   | 90,119 | 174,326 | 85,890   | 90,119 | 176,009       | -0.03%   | 0.00%  | -0.01% |
| 2036                         | 82,877   | 90,244 | 173,121  | 84,659   | 90,244 | 174,903 | 86,476   | 90,244 | 176,720       | 0.69%    | 0.14%  | 0.40%  |
| 2037                         | 82,154   | 90,248 | 172,402  | 84,081   | 90,248 | 174,329 | 85,773   | 90,248 | 176,021       | -0.87%   | 0.00%  | -0.42% |
| 2038                         | 82,207   | 90,184 | 172,391  | 84,144   | 90,184 | 174,327 | 85,847   | 90,184 | 176,031       | 0.06%    | -0.07% | -0.01% |
| 2039                         | 82,259   | 90,119 | 172,378  | 84,213   | 90,119 | 174,332 | 85,923   | 90,119 | 176,042       | 0.06%    | -0.07% | -0.01% |

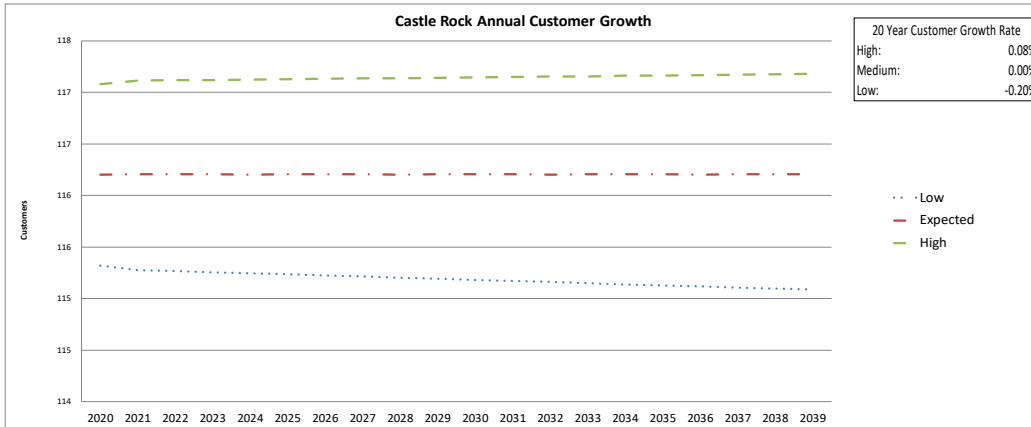
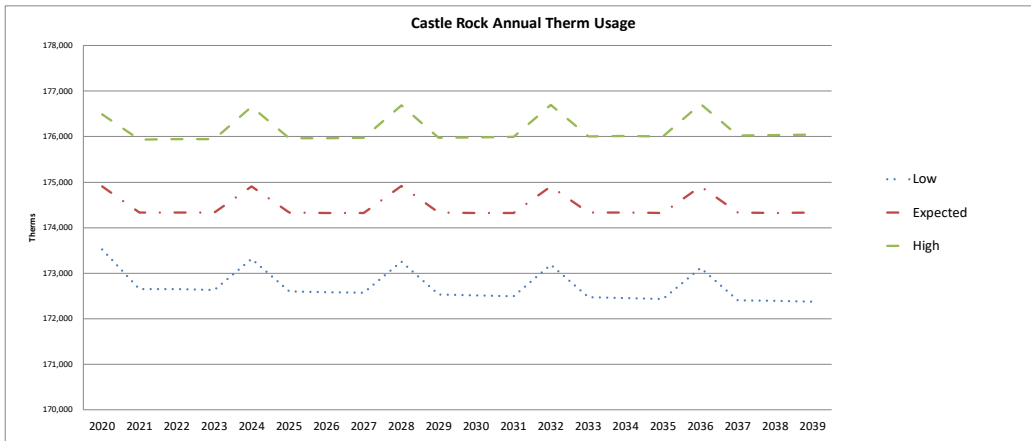
| Peak Day - BaseLoad |      |       |                |      |       |                |      |       |               |        |        |        |
|---------------------|------|-------|----------------|------|-------|----------------|------|-------|---------------|--------|--------|--------|
| Low                 |      |       | Expected       |      |       | High           |      |       | Annual Change |        |        |        |
| Daily BaseLoad      | Peak | Total | Daily BaseLoad | Peak | Total | Daily BaseLoad | Peak | Total | Base          | Peak   | Total  |        |
| 2020                | 247  | 1,059 | 1,306          | 247  | 1,126 | 1,373          | 247  | 1,041 | 1,288         | 0.00%  | 0.00%  | 0.00%  |
| 2021                | 247  | 1,059 | 1,306          | 247  | 1,126 | 1,373          | 247  | 1,041 | 1,288         | -0.07% | 0.02%  | 0.00%  |
| 2022                | 247  | 1,059 | 1,306          | 247  | 1,126 | 1,373          | 247  | 1,041 | 1,288         | -0.07% | 0.02%  | 0.00%  |
| 2023                | 247  | 1,059 | 1,306          | 247  | 1,126 | 1,373          | 247  | 1,041 | 1,288         | 0.00%  | 0.00%  | 0.00%  |
| 2024                | 247  | 1,065 | 1,312          | 247  | 1,132 | 1,379          | 247  | 1,047 | 1,294         | 0.00%  | 0.57%  | 0.48%  |
| 2025                | 247  | 1,065 | 1,312          | 247  | 1,132 | 1,379          | 247  | 1,046 | 1,294         | 0.08%  | -0.02% | 0.00%  |
| 2026                | 247  | 1,059 | 1,306          | 247  | 1,126 | 1,373          | 247  | 1,040 | 1,288         | 0.00%  | -0.56% | -0.45% |
| 2027                | 247  | 1,059 | 1,306          | 247  | 1,126 | 1,373          | 247  | 1,040 | 1,287         | -0.07% | 0.02%  | 0.00%  |
| 2028                | 247  | 1,059 | 1,306          | 247  | 1,126 | 1,373          | 247  | 1,041 | 1,287         | -0.09% | 0.02%  | 0.00%  |
| 2029                | 247  | 1,059 | 1,306          | 247  | 1,126 | 1,373          | 247  | 1,040 | 1,287         | 0.00%  | 0.00%  | 0.00%  |
| 2030                | 247  | 1,065 | 1,312          | 247  | 1,132 | 1,379          | 247  | 1,046 | 1,293         | 0.08%  | 0.55%  | 0.46%  |
| 2031                | 247  | 1,065 | 1,312          | 247  | 1,132 | 1,379          | 247  | 1,045 | 1,293         | 0.08%  | -0.02% | 0.00%  |
| 2032                | 247  | 1,060 | 1,307          | 247  | 1,126 | 1,373          | 247  | 1,040 | 1,287         | -0.09% | -0.52% | -0.44% |
| 2033                | 247  | 1,060 | 1,307          | 247  | 1,126 | 1,373          | 247  | 1,040 | 1,287         | -0.07% | 0.02%  | 0.00%  |
| 2034                | 247  | 1,060 | 1,307          | 247  | 1,126 | 1,373          | 247  | 1,040 | 1,287         | 0.00%  | 0.00%  | 0.00%  |
| 2035                | 247  | 1,060 | 1,307          | 247  | 1,126 | 1,373          | 247  | 1,039 | 1,286         | 0.00%  | 0.00%  | 0.00%  |
| 2036                | 247  | 1,065 | 1,313          | 247  | 1,132 | 1,379          | 247  | 1,045 | 1,292         | 0.14%  | 0.54%  | 0.46%  |
| 2037                | 247  | 1,059 | 1,307          | 247  | 1,126 | 1,373          | 247  | 1,039 | 1,286         | 0.00%  | -0.56% | -0.45% |
| 2038                | 247  | 1,060 | 1,307          | 247  | 1,126 | 1,373          | 247  | 1,039 | 1,286         | -0.07% | 0.02%  | 0.00%  |
| 2039                | 247  | 1,060 | 1,307          | 247  | 1,126 | 1,373          | 247  | 1,039 | 1,286         | -0.07% | 0.03%  | 0.01%  |

| Therms Usage by Class |         |         |          |         |         |         |         |         |               |         |        |        |
|-----------------------|---------|---------|----------|---------|---------|---------|---------|---------|---------------|---------|--------|--------|
| Low                   |         |         | Expected |         |         | High    |         |         | Annual Change |         |        |        |
| Res                   | Com/Ind | Total   | Res      | Com/Ind | Total   | Res     | Com/Ind | Total   | Res           | Com/Ind | Total  |        |
| 2020                  | 36,160  | 137,363 | 173,522  | 36,208  | 138,695 | 174,903 | 36,361  | 140,131 | 176,492       | 0.00%   | 0.00%  | 0.00%  |
| 2021                  | 35,984  | 136,671 | 172,655  | 36,078  | 138,251 | 174,329 | 36,190  | 139,746 | 175,936       | -0.49%  | -0.50% | -0.50% |
| 2022                  | 35,981  | 136,665 | 172,647  | 36,078  | 138,255 | 174,333 | 36,192  | 139,752 | 175,944       | -0.01%  | 0.00%  | 0.00%  |
| 2023                  | 35,976  | 136,651 | 172,627  | 36,077  | 138,255 | 174,332 | 36,192  | 139,756 | 175,948       | -0.01%  | -0.01% | -0.01% |
| 2024                  | 36,146  | 137,163 | 173,310  | 36,208  | 138,695 | 174,903 | 36,364  | 140,296 | 176,660       | 0.47%   | 0.37%  | 0.40%  |
| 2025                  | 35,972  | 136,628 | 172,600  | 36,078  | 138,251 | 174,329 | 36,195  | 139,767 | 175,963       | -0.48%  | -0.39% | -0.41% |
| 2026                  | 35,968  | 136,613 | 172,581  | 36,077  | 138,250 | 174,327 | 36,195  | 139,770 | 175,966       | -0.01%  | -0.01% | 0.00%  |
| 2027                  | 35,963  | 136,604 | 172,567  | 36,076  | 138,250 | 174,326 | 36,196  | 139,776 | 175,972       | -0.01%  | -0.01% | 0.00%  |
| 2028                  | 36,134  | 137,121 | 173,255  | 36,210  | 138,705 | 174,915 | 36,371  | 140,319 | 176,689       | 0.48%   | 0.38%  | 0.40%  |
| 2029                  | 35,956  | 136,578 | 172,535  | 36,078  | 138,251 | 174,329 | 36,199  | 139,781 | 175,980       | -0.49%  | -0.40% | -0.42% |
| 2030                  | 35,953  | 136,561 | 172,514  | 36,077  | 138,250 | 174,327 | 36,200  | 139,785 | 175,985       | -0.01%  | -0.01% | -0.01% |
| 2031                  | 35,949  | 136,546 | 172,495  | 36,076  | 138,250 | 174,326 | 36,201  | 139,789 | 175,991       | -0.01%  | -0.01% | -0.01% |
| 2032                  | 36,119  | 137,065 | 173,184  | 36,208  | 138,695 | 174,903 | 36,374  | 140,327 | 176,701       | 0.47%   | 0.38%  | 0.40%  |
| 2033                  | 35,946  | 136,530 | 172,476  | 36,078  | 138,256 | 174,335 | 36,204  | 139,803 | 176,007       | -0.48%  | -0.39% | -0.41% |
| 2034                  | 35,941  | 136,514 | 172,455  | 36,078  | 138,255 | 174,333 | 36,205  | 139,808 | 176,014       | -0.01%  | -0.01% | -0.01% |
| 2035                  | 35,936  | 136,495 | 172,431  | 36,076  | 138,250 | 174,326 | 36,205  | 139,805 | 176,009       | -0.01%  | -0.01% | -0.01% |
| 2036                  | 36,105  | 137,016 | 173,121  | 36,208  | 138,695 | 174,903 | 36,379  | 140,341 | 176,720       | 0.47%   | 0.38%  | 0.40%  |
| 2037                  | 35,930  | 136,472 | 172,402  | 36,078  | 138,251 | 174,329 | 36,207  | 139,814 | 176,021       | -0.48%  | -0.40% | -0.42% |
| 2038                  | 35,926  | 136,465 | 172,391  | 36,077  | 138,250 | 174,327 | 36,209  | 139,821 | 176,031       | -0.01%  | -0.01% | -0.01% |
| 2039                  | 35,923  | 136,455 | 172,378  | 36,077  | 138,255 | 174,332 | 36,211  | 139,832 | 176,042       | -0.01%  | -0.01% | -0.01% |

| Customer Count Forecast |         |       |          |         |       |      |         |       |               |         |        |        |
|-------------------------|---------|-------|----------|---------|-------|------|---------|-------|---------------|---------|--------|--------|
| Low                     |         |       | Expected |         |       | High |         |       | Annual Change |         |        |        |
| Res                     | Com/Ind | Total | Res      | Com/Ind | Total | Res  | Com/Ind | Total | Res           | Com/Ind | Total  |        |
| 2020                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | 0.00%   | 0.00%  | 0.00%  |
| 2021                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.08% | -0.04% |
| 2022                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |
| 2023                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |
| 2024                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |
| 2025                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |
| 2026                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |
| 2027                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |
| 2028                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |
| 2029                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |
| 2030                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |
| 2031                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |
| 2032                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | 0.00%  | -0.01% |
| 2033                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |
| 2034                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |
| 2035                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |
| 2036                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | 0.00%  | -0.01% |
| 2037                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |
| 2038                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |
| 2039                    | 68      | 47    | 115      | 68      | 48    | 116  | 69      | 48    | 117           | -0.01%  | -0.01% | -0.01% |



Cascade Natural Gas  
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| Chemult                      |          |        |          |          |        |         |          |        |               |          |        |        |
|------------------------------|----------|--------|----------|----------|--------|---------|----------|--------|---------------|----------|--------|--------|
| Annual Requirements (Therms) |          |        |          |          |        |         |          |        |               |          |        |        |
| Low                          |          |        | Expected |          |        | High    |          |        | Annual Change |          |        |        |
| Heating                      | BaseLoad | Total  | Heating  | BaseLoad | Total  | Heating | BaseLoad | Total  | Heating       | BaseLoad | Total  |        |
| 2020                         | 33,543   | 20,534 | 54,077   | 34,198   | 20,534 | 54,732  | 33,667   | 20,534 | 54,201        | 0.00%    | 0.00%  | 0.00%  |
| 2021                         | 33,141   | 20,560 | 53,702   | 33,950   | 20,560 | 54,511  | 33,535   | 20,560 | 54,095        | -1.20%   | 0.13%  | -0.69% |
| 2022                         | 33,016   | 20,549 | 53,565   | 33,960   | 20,549 | 54,508  | 33,679   | 20,549 | 54,227        | -0.38%   | -0.06% | -0.25% |
| 2023                         | 32,882   | 20,549 | 53,431   | 33,959   | 20,549 | 54,508  | 33,814   | 20,549 | 54,363        | -0.41%   | 0.00%  | -0.25% |
| 2024                         | 32,975   | 20,560 | 53,535   | 34,173   | 20,560 | 54,733  | 34,182   | 20,560 | 54,742        | 0.28%    | 0.06%  | 0.20%  |
| 2025                         | 32,629   | 20,534 | 53,163   | 33,976   | 20,534 | 54,511  | 34,100   | 20,534 | 54,635        | -1.05%   | -0.13% | -0.70% |
| 2026                         | 32,493   | 20,534 | 53,028   | 33,976   | 20,534 | 54,511  | 34,234   | 20,534 | 54,769        | -0.42%   | 0.00%  | -0.25% |
| 2027                         | 32,332   | 20,561 | 52,893   | 33,950   | 20,561 | 54,510  | 34,343   | 20,561 | 54,904        | -0.50%   | 0.13%  | -0.25% |
| 2028                         | 32,442   | 20,548 | 52,990   | 34,180   | 20,548 | 54,729  | 34,731   | 20,548 | 55,279        | 0.34%    | -0.06% | 0.18%  |
| 2029                         | 32,057   | 20,568 | 52,624   | 33,943   | 20,568 | 54,511  | 34,606   | 20,568 | 55,174        | -1.19%   | 0.09%  | -0.69% |
| 2030                         | 31,928   | 20,561 | 52,489   | 33,950   | 20,561 | 54,511  | 34,747   | 20,561 | 55,307        | -0.40%   | -0.03% | -0.26% |
| 2031                         | 31,820   | 20,535 | 52,355   | 33,976   | 20,535 | 54,510  | 34,909   | 20,535 | 55,443        | -0.34%   | -0.13% | -0.26% |
| 2032                         | 31,892   | 20,560 | 52,453   | 34,173   | 20,560 | 54,733  | 35,265   | 20,560 | 55,825        | 0.23%    | 0.13%  | 0.19%  |
| 2033                         | 31,534   | 20,549 | 52,083   | 33,960   | 20,549 | 54,509  | 35,161   | 20,549 | 55,710        | -1.12%   | -0.06% | -0.70% |
| 2034                         | 31,400   | 20,549 | 51,948   | 33,960   | 20,549 | 54,508  | 35,296   | 20,549 | 55,845        | -0.43%   | 0.00%  | -0.26% |
| 2035                         | 31,247   | 20,568 | 51,815   | 33,943   | 20,568 | 54,510  | 35,414   | 20,568 | 55,982        | -0.48%   | 0.09%  | -0.26% |
| 2036                         | 31,377   | 20,534 | 51,912   | 34,199   | 20,534 | 54,733  | 35,832   | 20,534 | 56,367        | 0.42%    | -0.16% | 0.19%  |
| 2037                         | 31,012   | 20,534 | 51,546   | 33,976   | 20,534 | 54,511  | 35,717   | 20,534 | 56,251        | -1.17%   | 0.00%  | -0.70% |
| 2038                         | 30,850   | 20,561 | 51,411   | 33,950   | 20,561 | 54,511  | 35,825   | 20,561 | 56,386        | -0.52%   | 0.13%  | -0.26% |
| 2039                         | 30,725   | 20,549 | 51,274   | 33,959   | 20,549 | 54,508  | 35,970   | 20,549 | 56,519        | -0.41%   | -0.06% | -0.27% |

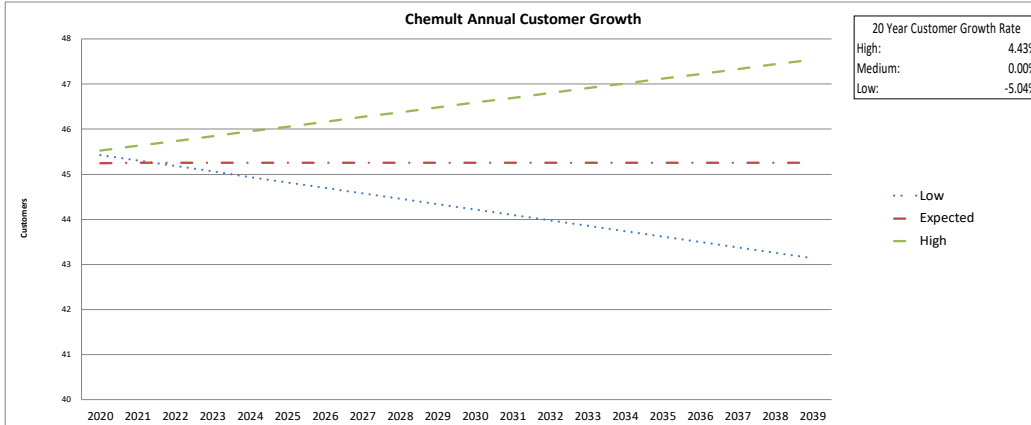
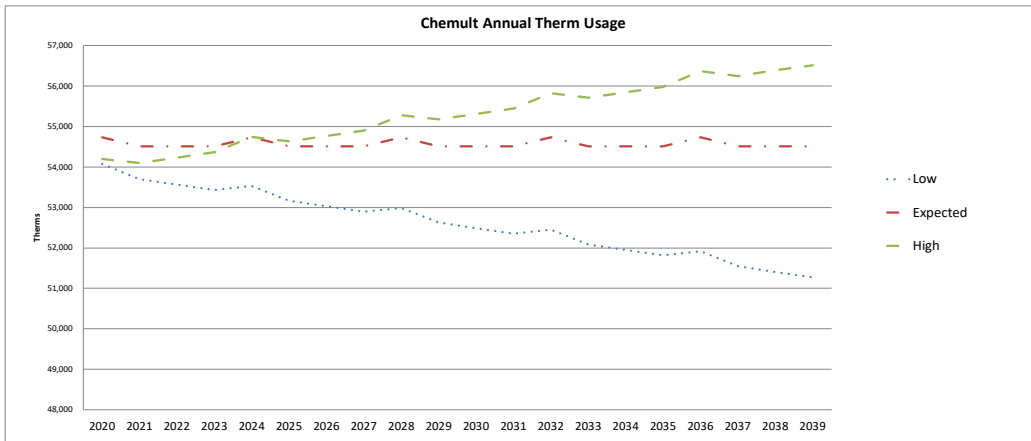
| Peak Day - BaseLoad |      |       |                |      |       |                |      |       |               |        |        |        |
|---------------------|------|-------|----------------|------|-------|----------------|------|-------|---------------|--------|--------|--------|
| Low                 |      |       | Expected       |      |       | High           |      |       | Annual Change |        |        |        |
| Daily BaseLoad      | Peak | Total | Daily BaseLoad | Peak | Total | Daily BaseLoad | Peak | Total | Base          | Peak   | Total  |        |
| 2020                | 56   | 394   | 451            | 56   | 514   | 570            | 56   | 397   | 453           | 0.00%  | 0.00%  | 0.00%  |
| 2021                | 56   | 393   | 449            | 56   | 514   | 570            | 56   | 398   | 454           | 0.13%  | -0.13% | -0.26% |
| 2022                | 56   | 392   | 448            | 56   | 514   | 570            | 56   | 399   | 455           | -0.06% | -0.27% | -0.25% |
| 2023                | 56   | 391   | 447            | 56   | 514   | 570            | 56   | 400   | 456           | 0.00%  | -0.28% | -0.25% |
| 2024                | 56   | 388   | 444            | 56   | 511   | 568            | 56   | 399   | 455           | 0.00%  | -0.87% | -0.75% |
| 2025                | 56   | 387   | 443            | 56   | 511   | 568            | 56   | 400   | 456           | -0.13% | -0.27% | -0.25% |
| 2026                | 56   | 388   | 444            | 56   | 514   | 570            | 56   | 403   | 460           | 0.00%  | 0.28%  | 0.24%  |
| 2027                | 56   | 386   | 443            | 56   | 514   | 570            | 56   | 404   | 461           | 0.13%  | -0.32% | -0.26% |
| 2028                | 56   | 385   | 442            | 56   | 514   | 570            | 56   | 406   | 462           | -0.06% | -0.28% | -0.25% |
| 2029                | 56   | 384   | 440            | 56   | 514   | 570            | 56   | 407   | 463           | 0.09%  | -0.30% | -0.25% |
| 2030                | 56   | 381   | 437            | 56   | 511   | 568            | 56   | 405   | 462           | -0.03% | -0.86% | -0.75% |
| 2031                | 56   | 380   | 436            | 56   | 511   | 568            | 56   | 407   | 463           | -0.13% | -0.27% | -0.25% |
| 2032                | 56   | 381   | 437            | 56   | 514   | 570            | 56   | 410   | 466           | 0.13%  | 0.13%  | 0.13%  |
| 2033                | 56   | 380   | 436            | 56   | 514   | 570            | 56   | 411   | 467           | -0.06% | -0.28% | -0.25% |
| 2034                | 56   | 379   | 435            | 56   | 514   | 570            | 56   | 412   | 469           | 0.00%  | -0.29% | -0.26% |
| 2035                | 56   | 377   | 434            | 56   | 514   | 570            | 56   | 413   | 470           | 0.09%  | -0.32% | -0.27% |
| 2036                | 56   | 374   | 430            | 56   | 511   | 568            | 56   | 412   | 469           | -0.16% | -0.84% | -0.75% |
| 2037                | 56   | 375   | 431            | 56   | 514   | 570            | 56   | 416   | 472           | 0.00%  | 0.27%  | 0.24%  |
| 2038                | 56   | 374   | 430            | 56   | 514   | 570            | 56   | 417   | 473           | 0.13%  | -0.33% | -0.27% |
| 2039                | 56   | 373   | 429            | 56   | 514   | 570            | 56   | 418   | 474           | -0.06% | -0.30% | -0.27% |

| Therms Usage by Class |         |        |          |         |        |        |         |        |               |         |        |        |
|-----------------------|---------|--------|----------|---------|--------|--------|---------|--------|---------------|---------|--------|--------|
| Low                   |         |        | Expected |         |        | High   |         |        | Annual Change |         |        |        |
| Res                   | Com/Ind | Total  | Res      | Com/Ind | Total  | Res    | Com/Ind | Total  | Res           | Com/Ind | Total  |        |
| 2020                  | 13,751  | 40,326 | 54,077   | 13,874  | 40,858 | 54,732 | 13,782  | 40,419 | 54,201        | 0.00%   | 0.00%  | 0.00%  |
| 2021                  | 13,655  | 40,406 | 53,702   | 13,818  | 40,693 | 54,511 | 13,755  | 40,340 | 54,095        | -0.70%  | -0.69% | -0.69% |
| 2022                  | 13,620  | 39,944 | 53,565   | 13,817  | 40,691 | 54,508 | 13,788  | 40,439 | 54,227        | -0.26%  | -0.25% | -0.25% |
| 2023                  | 13,587  | 39,824 | 53,431   | 13,817  | 40,691 | 54,508 | 13,823  | 40,540 | 54,363        | -0.25%  | -0.25% | -0.25% |
| 2024                  | 13,613  | 39,922 | 53,535   | 13,875  | 40,858 | 54,733 | 13,919  | 40,823 | 54,742        | 0.19%   | 0.20%  | 0.20%  |
| 2025                  | 13,519  | 39,644 | 53,163   | 13,818  | 40,693 | 54,511 | 13,892  | 40,742 | 54,635        | -0.69%  | -0.70% | -0.70% |
| 2026                  | 13,484  | 39,544 | 53,028   | 13,818  | 40,693 | 54,511 | 13,926  | 40,843 | 54,769        | -0.26%  | -0.25% | -0.25% |
| 2027                  | 13,449  | 39,444 | 52,893   | 13,818  | 40,693 | 54,510 | 13,961  | 40,943 | 54,904        | -0.26%  | -0.25% | -0.25% |
| 2028                  | 13,475  | 39,516 | 52,990   | 13,873  | 40,855 | 54,729 | 14,056  | 41,223 | 55,279        | 0.19%   | 0.18%  | 0.18%  |
| 2029                  | 13,382  | 39,243 | 52,624   | 13,818  | 40,693 | 54,511 | 14,030  | 41,144 | 55,174        | -0.69%  | -0.69% | -0.69% |
| 2030                  | 13,347  | 39,142 | 52,489   | 13,818  | 40,693 | 54,511 | 14,063  | 41,245 | 55,307        | -0.26%  | -0.26% | -0.26% |
| 2031                  | 13,313  | 39,042 | 52,355   | 13,818  | 40,693 | 54,510 | 14,098  | 41,345 | 55,443        | -0.25%  | -0.26% | -0.26% |
| 2032                  | 13,338  | 39,115 | 52,453   | 13,875  | 40,858 | 54,733 | 14,195  | 41,630 | 55,825        | 0.18%   | 0.19%  | 0.19%  |
| 2033                  | 13,244  | 38,839 | 52,083   | 13,817  | 40,691 | 54,509 | 14,165  | 41,544 | 55,710        | -0.70%  | -0.71% | -0.70% |
| 2034                  | 13,210  | 38,739 | 51,948   | 13,817  | 40,691 | 54,508 | 14,200  | 41,645 | 55,845        | -0.26%  | -0.26% | -0.26% |
| 2035                  | 13,176  | 38,640 | 51,815   | 13,818  | 40,693 | 54,510 | 14,235  | 41,747 | 55,982        | -0.26%  | -0.26% | -0.26% |
| 2036                  | 13,201  | 38,711 | 51,912   | 13,875  | 40,858 | 54,733 | 14,333  | 42,034 | 56,367        | 0.19%   | 0.19%  | 0.19%  |
| 2037                  | 13,107  | 38,439 | 51,546   | 13,818  | 40,693 | 54,511 | 14,303  | 41,948 | 56,251        | -0.71%  | -0.70% | -0.70% |
| 2038                  | 13,072  | 38,338 | 51,411   | 13,818  | 40,693 | 54,511 | 14,337  | 42,048 | 56,386        | -0.27%  | -0.26% | -0.26% |
| 2039                  | 13,038  | 38,236 | 51,274   | 13,817  | 40,691 | 54,508 | 14,371  | 42,147 | 56,519        | -0.27%  | -0.27% | -0.27% |

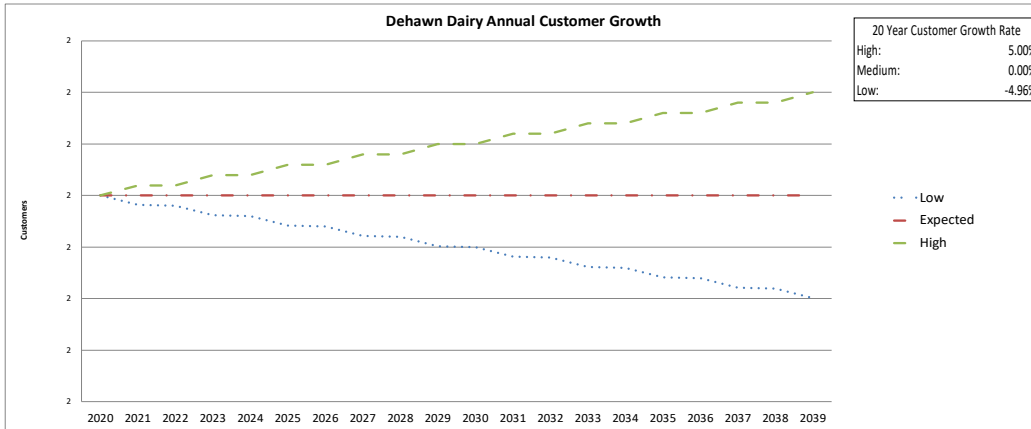
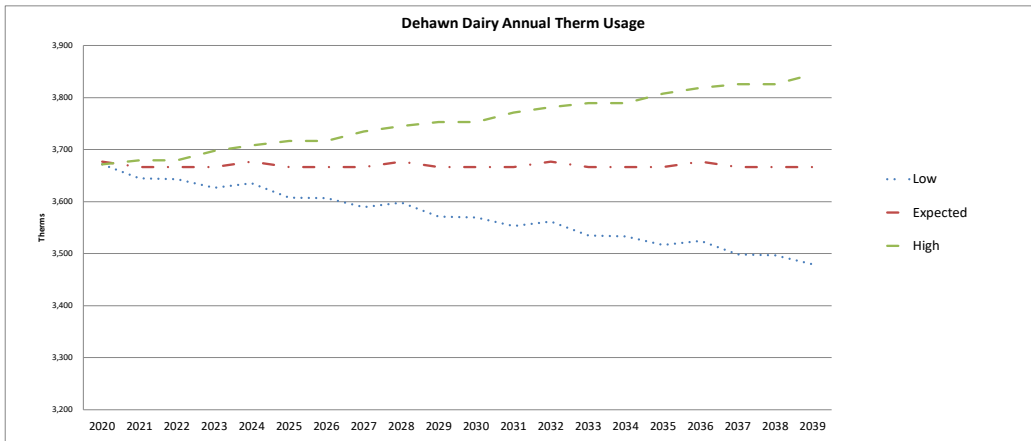
  

| Customer Count Forecast |         |       |          |         |       |      |         |       |               |         |        |        |
|-------------------------|---------|-------|----------|---------|-------|------|---------|-------|---------------|---------|--------|--------|
| Low                     |         |       | Expected |         |       | High |         |       | Annual Change |         |        |        |
| Res                     | Com/Ind | Total | Res      | Com/Ind | Total | Res  | Com/Ind | Total | Res           | Com/Ind | Total  |        |
| 2020                    | 25      | 20    | 45       | 25      | 20    | 45   | 26      | 20    | 46            | 0.00%   | 0.00%  | 0.00%  |
| 2021                    | 25      | 20    | 45       | 25      | 20    | 45   | 26      | 20    | 46            | -0.28%  | -0.25% | -0.26% |
| 2022                    | 25      | 20    | 45       | 25      | 20    | 45   | 26      | 20    | 46            | -0.28%  | -0.25% | -0.27% |
| 2023                    | 25      | 20    | 45       | 25      | 20    | 45   | 26      | 20    | 46            | -0.28%  | -0.25% | -0.27% |
| 2024                    | 25      | 20    | 45       | 25      | 20    | 45   | 26      | 20    | 46            | -0.28%  | -0.25% | -0.27% |
| 2025                    | 25      | 20    | 45       | 25      | 20    | 45   | 26      | 20    | 46            | -0.28%  | -0.25% | -0.27% |
| 2026                    | 25      | 20    | 45       | 25      | 20    | 45   | 26      | 20    | 46            | -0.28%  | -0.25% | -0.27% |
| 2027                    | 25      | 20    | 45       | 25      | 20    | 45   | 26      | 20    | 46            | -0.28%  | -0.25% | -0.27% |
| 2028                    | 25      | 20    | 44       | 25      | 20    | 45   | 26      | 20    | 46            | -0.28%  | -0.25% | -0.27% |
| 2029                    | 25      | 20    | 44       | 25      | 20    | 45   | 26      | 20    | 46            | -0.28%  | -0.26% | -0.27% |
| 2030                    | 25      | 19    | 44       | 25      | 20    | 45   | 26      | 21    | 47            | -0.29%  | -0.26% | -0.27% |
| 2031                    | 25      | 19    | 44       | 25      | 20    | 45   | 26      | 21    | 47            | -0.28%  | -0.26% | -0.27% |
| 2032                    | 25      | 19    | 44       | 25      | 20    | 45   | 26      | 21    | 47            | -0.29%  | -0.26% | -0.27% |
| 2033                    | 25      | 19    | 44       | 25      | 20    | 45   | 26      | 21    | 47            | -0.28%  | -0.26% | -0.27% |
| 2034                    | 24      | 19    | 43       | 25      | 20    | 45   | 26      | 21    | 47            | -0.29%  | -0.26% | -0.28% |
| 2035                    | 24      | 19    | 43       | 25      | 20    | 45   | 26      | 21    | 47            | -0.29%  | -0.26% | -0.27% |
| 2036                    | 24      | 19    | 43       | 25      | 20    | 45   | 26      | 21    | 47            | -0.29%  | -0.26% | -0.28% |
| 2037                    | 24      | 19    | 43       | 25      | 20    | 45   | 26      | 21    | 47            | -0.29%  | -0.26% | -0.28% |
| 2038                    | 24      | 19    | 43       | 25      | 20    | 45   | 27      | 21    | 47            | -0.29%  | -0.26% | -0.28% |
| 2039                    | 24      | 19    | 43       | 25      | 20    | 45   | 27      | 21    | 48            | -0.29%  | -0.26% | -0.28% |









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| Deming                       |          |        |          |          |        |         |          |        |               |          |         |        |
|------------------------------|----------|--------|----------|----------|--------|---------|----------|--------|---------------|----------|---------|--------|
| Annual Requirements (Therms) |          |        |          |          |        |         |          |        |               |          |         |        |
| Low                          |          |        | Expected |          |        | High    |          |        | Annual Change |          |         |        |
| Heating                      | BaseLoad | Total  | Heating  | BaseLoad | Total  | Heating | BaseLoad | Total  | Heating       | BaseLoad | Total   |        |
| 2020                         | 97,280   | 21,852 | 119,132  | 94,892   | 21,852 | 116,745 | 97,380   | 21,852 | 119,232       | 0.00%    | 0.00%   | 0.00%  |
| 2021                         | 95,439   | 22,912 | 118,350  | 93,342   | 22,912 | 116,254 | 95,776   | 22,912 | 118,688       | -1.89%   | 4.85%   | -0.56% |
| 2022                         | 95,724   | 21,858 | 117,583  | 94,305   | 21,858 | 116,163 | 97,566   | 21,858 | 119,425       | 0.30%    | -4.60%  | -0.65% |
| 2023                         | 95,458   | 21,859 | 117,317  | 94,304   | 21,859 | 116,163 | 97,689   | 21,859 | 119,548       | -0.28%   | 0.00%   | -0.23% |
| 2024                         | 95,032   | 22,912 | 117,943  | 93,832   | 22,912 | 116,744 | 97,516   | 22,912 | 120,428       | -0.45%   | 4.82%   | 0.53%  |
| 2025                         | 95,316   | 21,852 | 117,168  | 94,402   | 21,852 | 116,254 | 98,025   | 21,852 | 119,877       | 0.30%    | -4.62%  | -0.66% |
| 2026                         | 94,638   | 21,852 | 116,490  | 94,401   | 21,852 | 116,254 | 98,500   | 21,852 | 120,702       | -0.71%   | 0.00%   | -0.58% |
| 2027                         | 93,309   | 22,912 | 116,221  | 93,342   | 22,912 | 116,254 | 97,910   | 22,912 | 120,822       | -1.40%   | 4.85%   | -0.23% |
| 2028                         | 94,712   | 21,858 | 116,571  | 94,705   | 21,858 | 116,563 | 99,575   | 21,858 | 121,433       | 1.50%    | -4.60%  | 0.30%  |
| 2029                         | 93,061   | 22,918 | 115,979  | 93,336   | 22,918 | 116,254 | 98,142   | 22,918 | 121,059       | -1.74%   | 4.85%   | -0.51% |
| 2030                         | 92,391   | 22,911 | 115,302  | 93,342   | 22,911 | 116,254 | 98,973   | 22,911 | 121,885       | -0.72%   | -0.03%  | -0.58% |
| 2031                         | 93,183   | 21,852 | 115,035  | 94,401   | 21,852 | 116,253 | 100,152  | 21,852 | 122,004       | 0.86%    | -4.62%  | -0.23% |
| 2032                         | 92,647   | 22,912 | 115,558  | 93,832   | 22,912 | 116,744 | 99,897   | 22,912 | 122,808       | -0.58%   | 4.85%   | 0.46%  |
| 2033                         | 92,851   | 21,858 | 114,709  | 94,305   | 21,858 | 116,163 | 100,297  | 21,858 | 122,155       | 0.22%    | -4.60%  | -0.74% |
| 2034                         | 92,174   | 21,858 | 114,032  | 94,305   | 21,858 | 116,163 | 101,121  | 21,858 | 122,980       | -0.73%   | 0.00%   | -0.59% |
| 2035                         | 90,934   | 22,918 | 113,852  | 93,335   | 22,918 | 116,253 | 100,275  | 22,918 | 123,193       | -1.34%   | 4.85%   | -0.16% |
| 2036                         | 92,517   | 21,852 | 114,369  | 94,891   | 21,852 | 116,744 | 102,150  | 21,852 | 124,002       | 1.74%    | -4.65%  | 0.45%  |
| 2037                         | 91,761   | 21,852 | 113,613  | 94,402   | 21,852 | 116,254 | 101,579  | 21,852 | 123,431       | -0.82%   | 0.00%   | 0.66%  |
| 2038                         | 90,017   | 22,911 | 112,929  | 93,342   | 22,911 | 116,254 | 101,345  | 22,911 | 124,256       | -1.90%   | 4.85%   | -0.60% |
| 2039                         | 100,525  | 12,047 | 112,571  | 104,117  | 12,047 | 116,163 | 112,234  | 12,047 | 124,281       | 11.67%   | -47.42% | -0.32% |

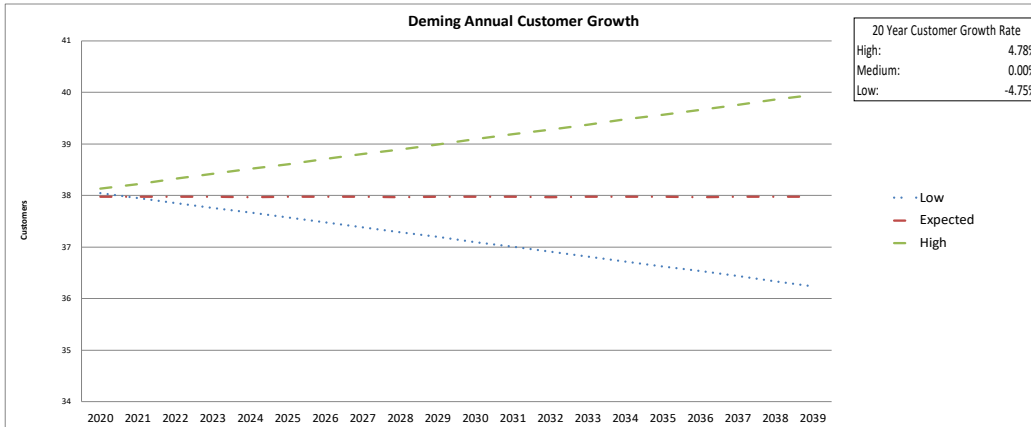
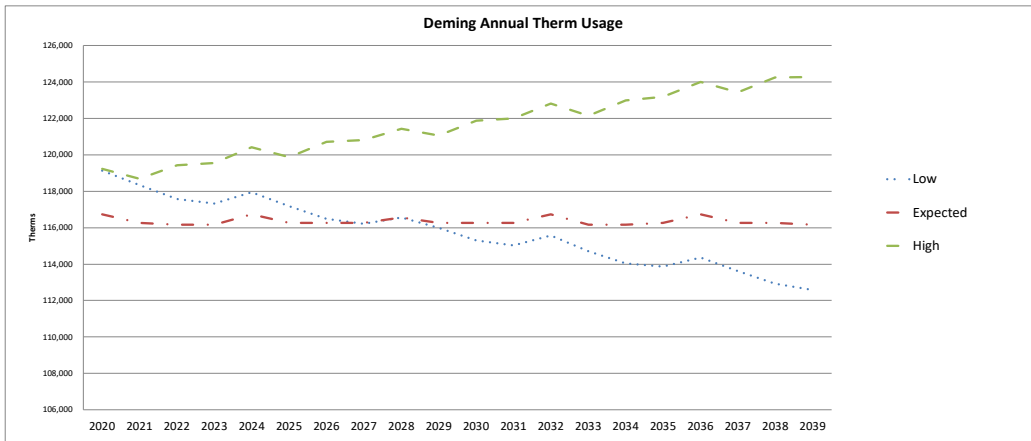
| Peak Day - BaseLoad |      |       |                |      |       |                |      |       |               |         |        |        |
|---------------------|------|-------|----------------|------|-------|----------------|------|-------|---------------|---------|--------|--------|
| Low                 |      |       | Expected       |      |       | High           |      |       | Annual Change |         |        |        |
| Daily BaseLoad      | Peak | Total | Daily BaseLoad | Peak | Total | Daily BaseLoad | Peak | Total | Base          | Peak    | Total  |        |
| 2020                | 60   | 1,013 | 1,073          | 60   | 1,209 | 1,269          | 60   | 1,015 | 1,075         | 0.00%   | 0.00%  | 0.00%  |
| 2021                | 63   | 1,009 | 1,072          | 63   | 1,206 | 1,269          | 63   | 1,013 | 1,076         | 4.85%   | -0.38% | -0.09% |
| 2022                | 60   | 1,004 | 1,064          | 60   | 1,209 | 1,269          | 60   | 1,024 | 1,084         | -4.60%  | -0.48% | -0.72% |
| 2023                | 60   | 1,003 | 1,063          | 60   | 1,209 | 1,269          | 60   | 1,025 | 1,085         | 0.00%   | -0.10% | -0.09% |
| 2024                | 63   | 910   | 973            | 63   | 1,116 | 1,179          | 63   | 932   | 994           | 4.82%   | -9.30% | -8.50% |
| 2025                | 60   | 912   | 972            | 60   | 1,119 | 1,179          | 60   | 935   | 995           | -4.62%  | 0.22%  | -0.09% |
| 2026                | 60   | 994   | 1,054          | 60   | 1,209 | 1,269          | 60   | 1,035 | 1,094         | 0.00%   | 8.94%  | 8.39%  |
| 2027                | 63   | 990   | 1,053          | 63   | 1,206 | 1,269          | 63   | 1,033 | 1,095         | 4.85%   | -0.39% | -0.09% |
| 2028                | 60   | 992   | 1,052          | 60   | 1,209 | 1,269          | 60   | 1,037 | 1,096         | -4.60%  | 0.19%  | -0.10% |
| 2029                | 63   | 988   | 1,051          | 63   | 1,206 | 1,269          | 63   | 1,035 | 1,097         | 4.85%   | -0.39% | -0.09% |
| 2030                | 63   | 892   | 955            | 63   | 1,116 | 1,179          | 63   | 949   | 1,012         | -0.03%  | -9.66% | -9.09% |
| 2031                | 63   | 894   | 954            | 60   | 1,119 | 1,179          | 60   | 953   | 1,013         | -4.62%  | 0.22%  | -0.09% |
| 2032                | 63   | 978   | 1,041          | 63   | 1,206 | 1,269          | 63   | 1,044 | 1,107         | 4.85%   | 3.36%  | 9.08%  |
| 2033                | 60   | 980   | 1,040          | 60   | 1,209 | 1,269          | 60   | 1,048 | 1,108         | -4.60%  | 0.19%  | -0.10% |
| 2034                | 60   | 972   | 1,032          | 60   | 1,209 | 1,269          | 60   | 1,056 | 1,116         | 0.00%   | -0.79% | -0.74% |
| 2035                | 63   | 968   | 1,031          | 63   | 1,206 | 1,269          | 63   | 1,054 | 1,117         | 4.85%   | -0.40% | -0.10% |
| 2036                | 60   | 884   | 944            | 60   | 1,119 | 1,179          | 60   | 964   | 1,024         | -4.65%  | -8.75% | -8.51% |
| 2037                | 60   | 969   | 1,029          | 60   | 1,209 | 1,269          | 60   | 1,059 | 1,119         | 0.00%   | 9.70%  | 9.08%  |
| 2038                | 63   | 959   | 1,021          | 63   | 1,206 | 1,269          | 63   | 1,064 | 1,127         | 4.85%   | -1.09% | -0.75% |
| 2039                | 33   | 987   | 1,020          | 33   | 1,236 | 1,269          | 33   | 1,095 | 1,128         | -47.42% | 2.97%  | -0.12% |

| Therms Usage by Class |         |         |          |         |         |         |         |         |               |         |        |        |
|-----------------------|---------|---------|----------|---------|---------|---------|---------|---------|---------------|---------|--------|--------|
| Low                   |         |         | Expected |         |         | High    |         |         | Annual Change |         |        |        |
| Res                   | Com/Ind | Total   | Res      | Com/Ind | Total   | Res     | Com/Ind | Total   | Res           | Com/Ind | Total  |        |
| 2020                  | 14,969  | 104,163 | 119,132  | 14,690  | 102,055 | 116,745 | 15,001  | 104,231 | 119,232       | 0.00%   | 0.00%  | 0.00%  |
| 2021                  | 14,852  | 103,498 | 118,350  | 14,629  | 101,625 | 116,254 | 14,958  | 103,730 | 118,688       | -0.78%  | -0.64% | -0.66% |
| 2022                  | 14,804  | 102,779 | 117,583  | 14,618  | 101,546 | 116,163 | 14,984  | 104,441 | 119,425       | -0.32%  | -0.69% | -0.65% |
| 2023                  | 14,766  | 102,551 | 117,317  | 14,618  | 101,546 | 116,163 | 15,021  | 104,527 | 119,548       | -0.26%  | -0.22% | -0.23% |
| 2024                  | 14,819  | 103,124 | 117,943  | 14,688  | 102,055 | 116,744 | 15,151  | 105,277 | 120,428       | 0.36%   | 0.56%  | 0.53%  |
| 2025                  | 14,703  | 102,465 | 117,168  | 14,629  | 101,625 | 116,254 | 15,107  | 104,770 | 119,877       | -0.79%  | -0.64% | -0.66% |
| 2026                  | 14,666  | 101,824 | 116,490  | 14,629  | 101,624 | 116,254 | 15,145  | 105,558 | 120,702       | -0.25%  | -0.63% | -0.58% |
| 2027                  | 14,638  | 101,592 | 116,221  | 14,629  | 101,624 | 116,254 | 15,182  | 105,640 | 120,822       | -0.26%  | -0.23% | -0.23% |
| 2028                  | 14,647  | 101,504 | 116,571  | 14,665  | 101,897 | 116,563 | 15,277  | 106,156 | 121,433       | 0.13%   | 0.33%  | 0.30%  |
| 2029                  | 14,554  | 101,425 | 115,979  | 14,629  | 101,625 | 116,254 | 15,256  | 105,804 | 121,059       | -0.63%  | -0.49% | -0.51% |
| 2030                  | 14,517  | 100,785 | 115,302  | 14,629  | 101,624 | 116,254 | 15,294  | 106,591 | 121,885       | -0.25%  | -0.63% | -0.58% |
| 2031                  | 14,479  | 100,556 | 115,035  | 14,629  | 101,624 | 116,253 | 15,331  | 106,673 | 122,004       | -0.62%  | -0.23% | -0.23% |
| 2032                  | 14,519  | 101,039 | 115,558  | 14,688  | 102,055 | 116,744 | 15,451  | 107,358 | 122,808       | 0.28%   | 0.48%  | 0.46%  |
| 2033                  | 14,394  | 100,315 | 114,709  | 14,618  | 101,546 | 116,163 | 15,393  | 106,762 | 122,155       | -0.87%  | -0.72% | -0.74% |
| 2034                  | 14,357  | 99,675  | 114,032  | 14,618  | 101,546 | 116,163 | 15,431  | 107,549 | 122,980       | -0.25%  | -0.64% | -0.59% |
| 2035                  | 14,330  | 99,522  | 113,852  | 14,629  | 101,624 | 116,253 | 15,480  | 107,713 | 123,193       | -0.19%  | -0.15% | -0.16% |
| 2036                  | 14,370  | 100,000 | 114,369  | 14,688  | 102,055 | 116,744 | 15,601  | 108,401 | 124,002       | 0.28%   | 0.48%  | 0.45%  |
| 2037                  | 14,256  | 99,357  | 113,613  | 14,629  | 101,625 | 116,254 | 15,554  | 107,877 | 123,431       | -0.79%  | -0.64% | -0.66% |
| 2038                  | 14,219  | 98,710  | 112,929  | 14,629  | 101,624 | 116,254 | 15,592  | 108,664 | 124,256       | -0.26%  | -0.65% | -0.60% |
| 2039                  | 14,169  | 98,402  | 112,571  | 14,618  | 101,545 | 116,163 | 15,617  | 108,664 | 124,281       | -0.35%  | -0.31% | -0.32% |

| Customer Count Forecast |         |       |          |         |       |      |         |       |               |         |        |        |
|-------------------------|---------|-------|----------|---------|-------|------|---------|-------|---------------|---------|--------|--------|
| Low                     |         |       | Expected |         |       | High |         |       | Annual Change |         |        |        |
| Res                     | Com/Ind | Total | Res      | Com/Ind | Total | Res  | Com/Ind | Total | Res           | Com/Ind | Total  |        |
| 2020                    | 25      | 13    | 38       | 25      | 13    | 38   | 25      | 13    | 38            | 0.00%   | 0.00%  | 0.00%  |
| 2021                    | 25      | 13    | 38       | 25      | 13    | 38   | 25      | 13    | 38            | -0.25%  | -0.24% | -0.25% |
| 2022                    | 25      | 13    | 38       | 25      | 13    | 38   | 25      | 13    | 38            | -0.25%  | -0.31% | -0.27% |
| 2023                    | 25      | 13    | 38       | 25      | 13    | 38   | 25      | 13    | 38            | -0.24%  | -0.25% | -0.24% |
| 2024                    | 25      | 13    | 38       | 25      | 13    | 38   | 25      | 13    | 39            | -0.24%  | -0.24% | -0.24% |
| 2025                    | 25      | 13    | 38       | 25      | 13    | 38   | 25      | 13    | 39            | -0.24%  | -0.25% | -0.25% |
| 2026                    | 25      | 13    | 37       | 25      | 13    | 38   | 25      | 13    | 39            | -0.25%  | -0.31% | -0.27% |
| 2027                    | 25      | 13    | 37       | 25      | 13    | 38   | 25      | 13    | 39            | -0.26%  | -0.25% | -0.26% |
| 2028                    | 24      | 13    | 37       | 25      | 13    | 38   | 26      | 13    | 39            | -0.24%  | -0.24% | -0.24% |
| 2029                    | 24      | 13    | 37       | 25      | 13    | 38   | 26      | 13    | 39            | -0.25%  | -0.25% | -0.25% |
| 2030                    | 24      | 13    | 37       | 25      | 13    | 38   | 26      | 13    | 39            | -0.25%  | -0.31% | -0.27% |
| 2031                    | 24      | 13    | 37       | 25      | 13    | 38   | 26      | 13    | 39            | -0.25%  | -0.26% | -0.25% |
| 2032                    | 24      | 13    | 37       | 25      | 13    | 38   | 26      | 13    | 39            | -0.26%  | -0.26% | -0.26% |
| 2033                    | 24      | 13    | 37       | 25      | 13    | 38   | 26      | 14    | 39            | -0.25%  | -0.24% | -0.25% |
| 2034                    | 24      | 13    | 37       | 25      | 13    | 38   | 26      | 14    | 39            | -0.25%  | -0.33% | -0.28% |
| 2035                    | 24      | 13    | 37       | 25      | 13    | 38   | 26      | 14    | 40            | -0.25%  | -0.24% | -0.25% |
| 2036                    | 24      | 13    | 37       | 25      | 13    | 38   | 26      | 14    | 40            | -0.25%  | -0.26% | -0.25% |
| 2037                    | 24      | 13    | 36       | 25      | 13    | 38   | 26      | 14    | 40            | -0.25%  | -0.25% | -0.25% |
| 2038                    | 24      | 12    | 36       | 25      | 13    | 38   | 26      | 14    | 40            | -0.27%  | -0.33% | -0.29% |
| 2039                    | 24      | 12    | 36       | 25      | 13    | 38   | 26      | 14    | 40            | -0.25%  | -0.26% | -0.26% |



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

East Stanwood Loop

Table with columns: Heating, Low, Total, Expected, High, Total. Rows 2020-2039. Sub-headers: Annual Requirements (Therms), Low, Expected, High.

Table with columns: Heating, Low, Total, Expected, High, Total. Rows 2020-2039. Sub-headers: Annual Change, Low, Expected, High.

Peak Day - BaseLoad

Table with columns: Daily BaseLoad, Peak, Total, Expected, High, Total. Rows 2020-2039. Sub-headers: Low, Expected, High.

Table with columns: Base, Low, Total, Expected, High, Total. Rows 2020-2039. Sub-headers: Annual Change, Low, Expected, High.

Therms Usage by Class

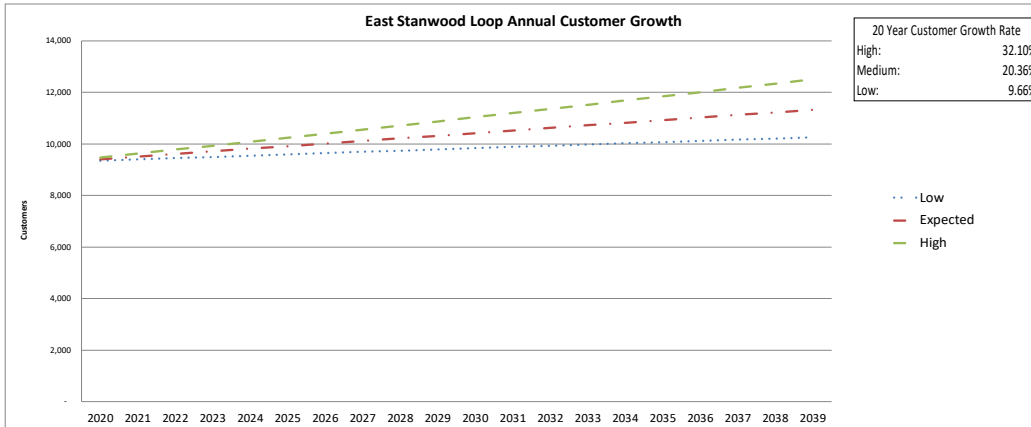
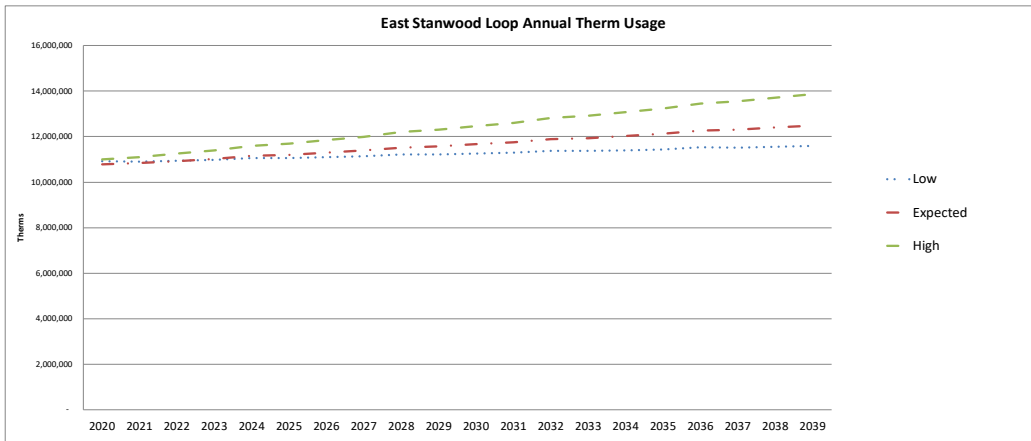
Table with columns: Res, Com/Ind, Total, Expected, High, Total. Rows 2020-2039. Sub-headers: Low, Expected, High.

Table with columns: Res, Com/Ind, Total, Expected, High, Total. Rows 2020-2039. Sub-headers: Annual Change, Low, Expected, High.

Customer Count Forecast

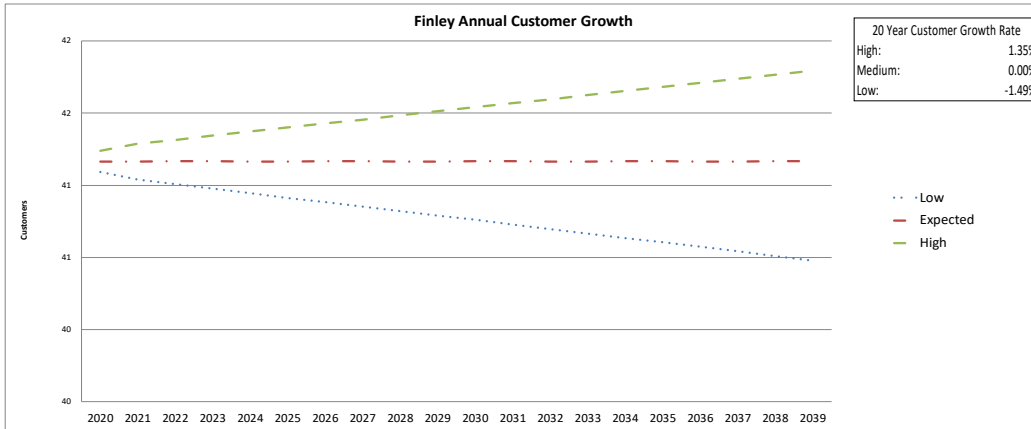
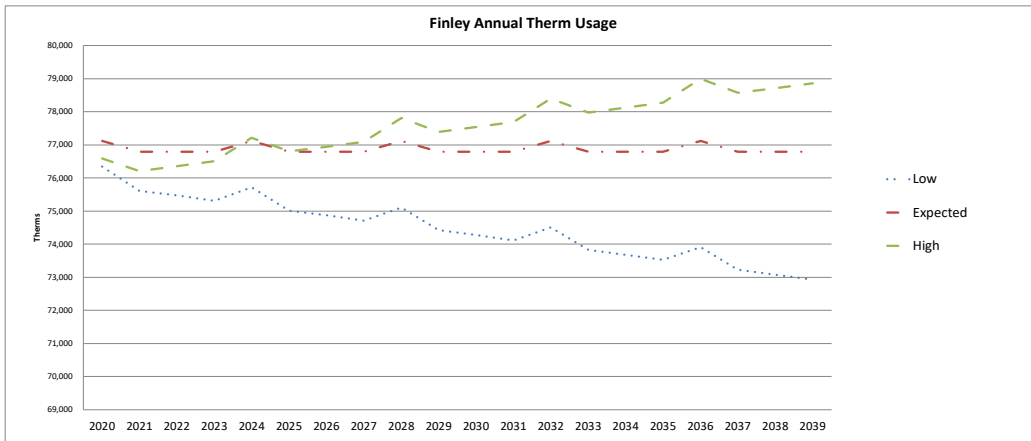
Table with columns: Res, Com/Ind, Total, Expected, High, Total. Rows 2020-2039. Sub-headers: Low, Expected, High.

Table with columns: Res, Com/Ind, Total, Expected, High, Total. Rows 2020-2039. Sub-headers: Annual Change, Low, Expected, High.



Cascade Natural Gas
2020 IRP Demand Forecast Summary Tables

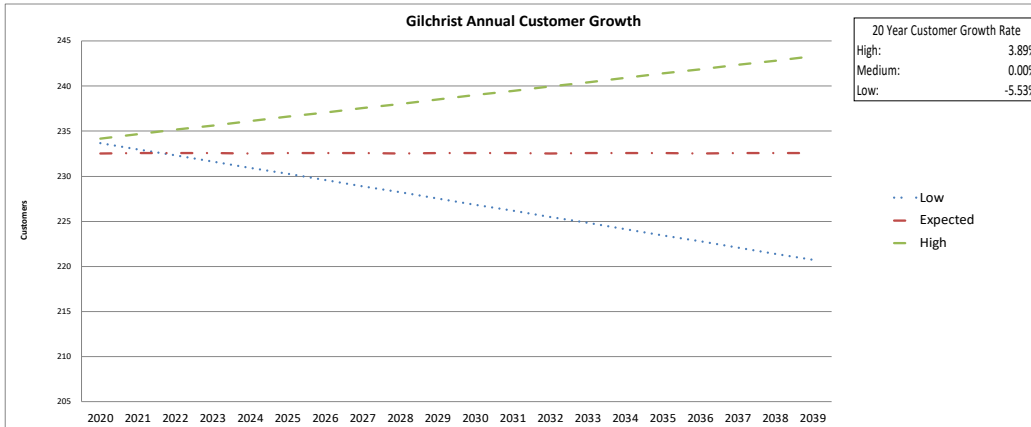
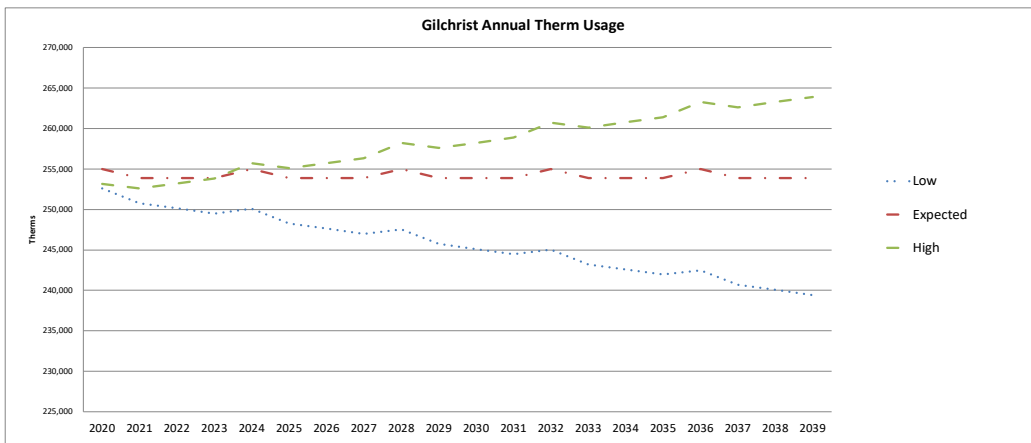
Table with multiple sections: Annual Requirements (Therms), Annual Change, Peak Day - Base Load, Thermo Usage by Class, and Customer Count Forecast. Each section contains detailed data for years 2020-2039 across various metrics like Heating, Base Load, Total, and Expected values.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Main data table for Gilchrist area, including Annual Requirements (Therms), Annual Change, Peak Day - Baseload, Therms Usage by Class, and Customer Count Forecast. The table is organized into multiple sections with columns for Heating, BaseLoad, Total, and various change percentages.





Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Grandview Annual Requirements (Therms) table with columns for Heating, BaseLoad, Total, and Expected values for Low and High categories across years 2020-2039.

Grandview Peak Day - BaseLoad table with columns for Daily BaseLoad, Peak, and Total values for Low and High categories across years 2020-2039.

Grandview Therms Usage by Class table with columns for Res, Com/Ind, Total, and Expected values for Low and High categories across years 2020-2039.

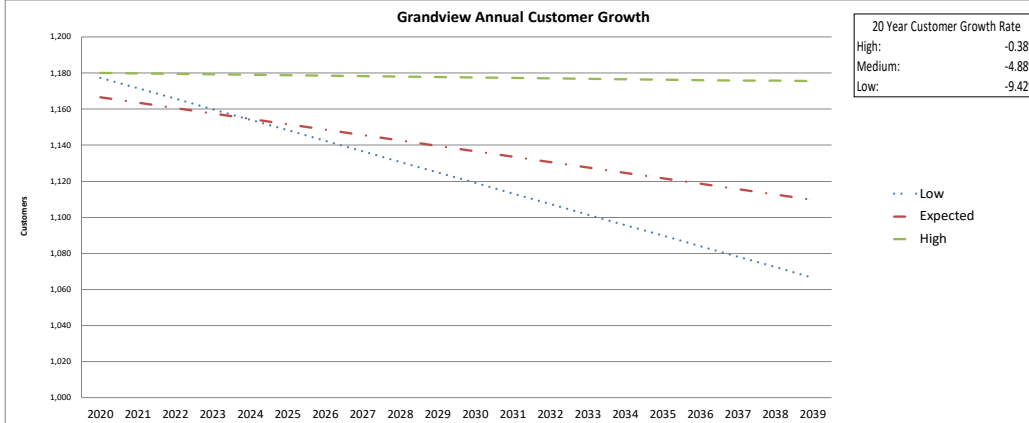
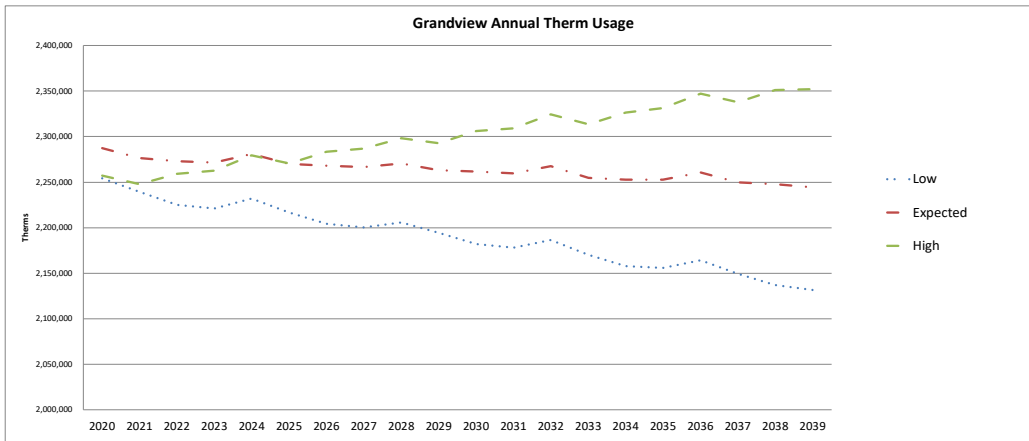
Grandview Customer Count Forecast table with columns for Res, Com/Ind, Total, and Expected values for Low and High categories across years 2020-2039.

Annual Change table for Grandview with columns for Heating, BaseLoad, Total, and Expected values for Low and High categories across years 2020-2039.

Annual Change table for Grandview with columns for Base, Peak, Total, and Expected values for Low and High categories across years 2020-2039.

Annual Change table for Grandview with columns for Res, Com/Ind, Total, and Expected values for Low and High categories across years 2020-2039.

Annual Change table for Grandview with columns for Res, Com/Ind, Total, and Expected values for Low and High categories across years 2020-2039.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Hermiston

Table with columns for Annual Requirements (Therms) and sub-columns for Low, Expected, and High heating and baseload values for years 2020-2039.

Table with columns for Annual Change and sub-columns for Low, Expected, and High heating and baseload percentage changes for years 2020-2039.

Peak Day - Baseload

Table with columns for Peak Day - Baseload and sub-columns for Low, Expected, and High daily baseload values for years 2020-2039.

Table with columns for Annual Change and sub-columns for Low, Expected, and High daily baseload percentage changes for years 2020-2039.

Therms Usage by Class

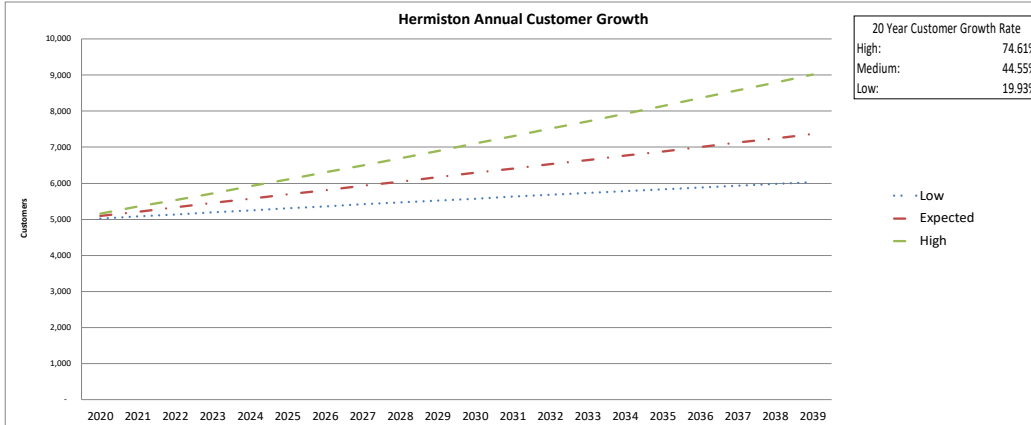
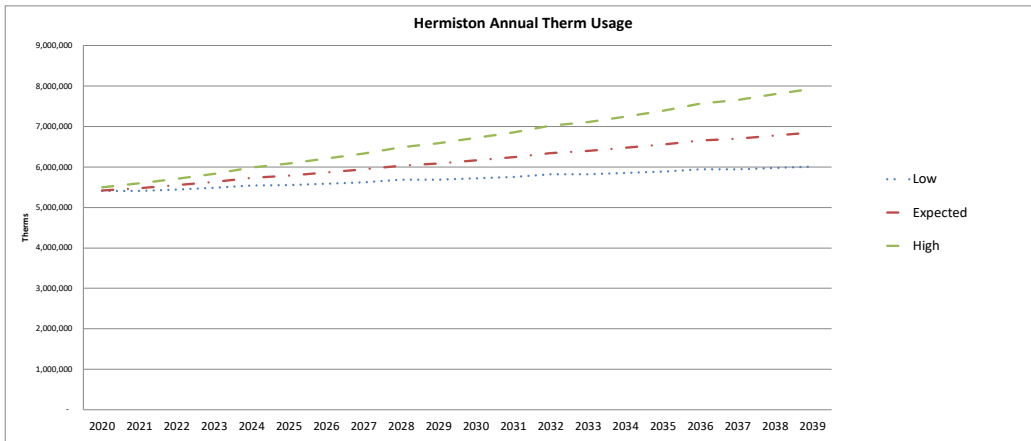
Table with columns for Therms Usage by Class and sub-columns for Low, Expected, and High usage values for years 2020-2039.

Table with columns for Annual Change and sub-columns for Low, Expected, and High usage percentage changes for years 2020-2039.

Customer Count Forecast

Table with columns for Customer Count Forecast and sub-columns for Low, Expected, and High customer count values for years 2020-2039.

Table with columns for Annual Change and sub-columns for Low, Expected, and High customer count percentage changes for years 2020-2039.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

| Huntington                   |          |       |          |          |       |         |          |       |               |          |        |        |
|------------------------------|----------|-------|----------|----------|-------|---------|----------|-------|---------------|----------|--------|--------|
| Annual Requirements (Therms) |          |       |          |          |       |         |          |       |               |          |        |        |
| Low                          |          |       | Expected |          |       | High    |          |       | Annual Change |          |        |        |
| Heating                      | BaseLoad | Total | Heating  | BaseLoad | Total | Heating | BaseLoad | Total | Heating       | BaseLoad | Total  |        |
| 2020                         | 87,489   | 5,427 | 92,916   | 88,724   | 5,427 | 94,151  | 87,962   | 5,427 | 93,389        | 0.00%    | 0.00%  | 0.00%  |
| 2021                         | 86,550   | 5,485 | 92,134   | 88,289   | 5,485 | 93,774  | 87,461   | 5,485 | 92,946        | -0.96%   | 1.06%  | -0.84% |
| 2022                         | 86,625   | 5,435 | 92,061   | 88,332   | 5,435 | 93,768  | 87,575   | 5,435 | 93,010        | -0.03%   | -0.90% | -0.08% |
| 2023                         | 86,555   | 5,435 | 91,990   | 88,331   | 5,435 | 93,767  | 87,638   | 5,435 | 93,073        | -0.08%   | 0.00%  | -0.08% |
| 2024                         | 87,039   | 5,486 | 92,526   | 88,665   | 5,486 | 94,151  | 88,277   | 5,486 | 93,763        | 0.56%    | 0.94%  | 0.58%  |
| 2025                         | 86,421   | 5,427 | 91,848   | 88,346   | 5,427 | 93,774  | 87,790   | 5,427 | 93,217        | -0.71%   | -1.08% | -0.73% |
| 2026                         | 86,352   | 5,427 | 91,779   | 88,345   | 5,427 | 93,773  | 87,857   | 5,427 | 93,284        | -0.08%   | 0.00%  | -0.08% |
| 2027                         | 86,224   | 5,485 | 91,709   | 88,287   | 5,485 | 93,772  | 87,864   | 5,485 | 93,348        | -0.15%   | 1.06%  | -0.08% |
| 2028                         | 86,792   | 5,435 | 92,227   | 88,706   | 5,435 | 94,141  | 88,592   | 5,435 | 94,027        | 0.66%    | -0.91% | 0.77%  |
| 2029                         | 86,072   | 5,494 | 91,567   | 88,279   | 5,494 | 93,774  | 87,996   | 5,494 | 93,490        | -0.83%   | 1.09%  | -0.72% |
| 2030                         | 86,006   | 5,486 | 91,493   | 88,286   | 5,486 | 93,773  | 88,071   | 5,486 | 93,557        | -0.08%   | -0.14% | -0.08% |
| 2031                         | 85,996   | 5,427 | 91,423   | 88,344   | 5,427 | 93,772  | 88,105   | 5,427 | 93,622        | -0.01%   | -1.08% | -0.08% |
| 2032                         | 86,465   | 5,485 | 91,950   | 88,666   | 5,485 | 94,151  | 88,827   | 5,485 | 94,312        | 0.55%    | 1.06%  | 0.58%  |
| 2033                         | 85,841   | 5,435 | 91,276   | 88,334   | 5,435 | 93,769  | 88,321   | 5,435 | 93,756        | -0.72%   | -0.91% | -0.73% |
| 2034                         | 85,766   | 5,435 | 91,201   | 88,332   | 5,435 | 93,768  | 88,300   | 5,435 | 93,825        | -0.09%   | 0.00%  | -0.08% |
| 2035                         | 85,642   | 5,495 | 91,136   | 88,277   | 5,495 | 93,772  | 88,397   | 5,495 | 93,892        | -0.14%   | 1.09%  | -0.07% |
| 2036                         | 86,235   | 5,427 | 91,662   | 88,724   | 5,427 | 94,151  | 89,159   | 5,427 | 94,586        | 0.69%    | -1.23% | 0.58%  |
| 2037                         | 85,567   | 5,427 | 90,994   | 88,346   | 5,427 | 93,774  | 88,604   | 5,427 | 94,031        | -0.77%   | 0.00%  | -0.73% |
| 2038                         | 85,439   | 5,485 | 90,923   | 88,288   | 5,485 | 93,773  | 88,616   | 5,485 | 94,101        | -0.15%   | 1.06%  | -0.08% |
| 2039                         | 85,406   | 5,435 | 90,841   | 88,331   | 5,435 | 93,767  | 88,723   | 5,435 | 94,158        | -0.04%   | -0.90% | -0.09% |

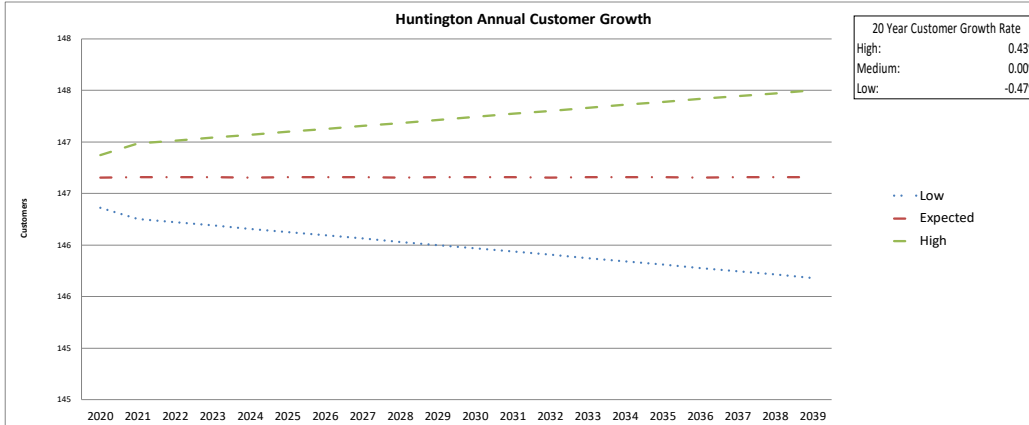
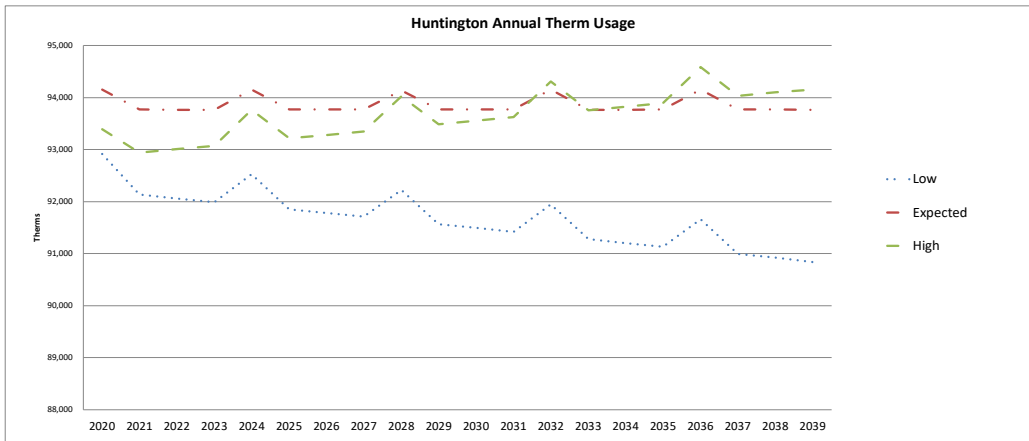
| Peak Day - BaseLoad |      |       |                |      |       |                |      |       |               |        |        |        |
|---------------------|------|-------|----------------|------|-------|----------------|------|-------|---------------|--------|--------|--------|
| Low                 |      |       | Expected       |      |       | High           |      |       | Annual Change |        |        |        |
| Daily BaseLoad      | Peak | Total | Daily BaseLoad | Peak | Total | Daily BaseLoad | Peak | Total | Base          | Peak   | Total  |        |
| 2020                | 15   | 1,285 | 1,300          | 15   | 1,311 | 1,326          | 15   | 1,296 | 1,311         | 0.00%  | 0.00%  | 0.00%  |
| 2021                | 15   | 1,284 | 1,299          | 15   | 1,311 | 1,326          | 15   | 1,297 | 1,312         | 1.06%  | -0.09% | -0.07% |
| 2022                | 15   | 1,283 | 1,298          | 15   | 1,311 | 1,326          | 15   | 1,298 | 1,313         | -0.90% | -0.07% | -0.08% |
| 2023                | 15   | 1,282 | 1,297          | 15   | 1,311 | 1,326          | 15   | 1,299 | 1,313         | 0.00%  | -0.06% | -0.06% |
| 2024                | 15   | 1,276 | 1,291          | 15   | 1,306 | 1,321          | 15   | 1,294 | 1,309         | 0.94%  | -0.48% | -0.46% |
| 2025                | 15   | 1,275 | 1,290          | 15   | 1,306 | 1,321          | 15   | 1,295 | 1,310         | -1.08% | -0.07% | -0.08% |
| 2026                | 15   | 1,279 | 1,294          | 15   | 1,311 | 1,326          | 15   | 1,301 | 1,316         | 0.00%  | 0.32%  | 0.31%  |
| 2027                | 15   | 1,279 | 1,294          | 15   | 1,311 | 1,326          | 15   | 1,302 | 1,317         | 1.06%  | -0.07% | -0.06% |
| 2028                | 15   | 1,278 | 1,293          | 15   | 1,311 | 1,326          | 15   | 1,303 | 1,318         | -0.91% | -0.06% | -0.07% |
| 2029                | 15   | 1,277 | 1,292          | 15   | 1,311 | 1,326          | 15   | 1,304 | 1,319         | 1.09%  | -0.09% | -0.08% |
| 2030                | 15   | 1,271 | 1,286          | 15   | 1,305 | 1,320          | 15   | 1,299 | 1,314         | -0.14% | -0.47% | -0.47% |
| 2031                | 15   | 1,270 | 1,285          | 15   | 1,306 | 1,321          | 15   | 1,300 | 1,315         | 1.08%  | -0.08% | -0.05% |
| 2032                | 15   | 1,274 | 1,289          | 15   | 1,311 | 1,326          | 15   | 1,307 | 1,322         | 1.06%  | 0.31%  | 0.32%  |
| 2033                | 15   | 1,273 | 1,288          | 15   | 1,311 | 1,326          | 15   | 1,307 | 1,322         | -0.91% | -0.07% | -0.08% |
| 2034                | 15   | 1,272 | 1,287          | 15   | 1,311 | 1,326          | 15   | 1,308 | 1,323         | 0.00%  | -0.08% | -0.08% |
| 2035                | 15   | 1,271 | 1,286          | 15   | 1,310 | 1,325          | 15   | 1,309 | 1,324         | 1.09%  | -0.07% | -0.06% |
| 2036                | 15   | 1,265 | 1,280          | 15   | 1,306 | 1,321          | 15   | 1,305 | 1,320         | -1.23% | -0.46% | -0.47% |
| 2037                | 15   | 1,269 | 1,284          | 15   | 1,311 | 1,326          | 15   | 1,311 | 1,326         | 0.00%  | 0.32%  | 0.31%  |
| 2038                | 15   | 1,268 | 1,283          | 15   | 1,311 | 1,326          | 15   | 1,312 | 1,327         | 1.06%  | -0.09% | -0.08% |
| 2039                | 15   | 1,267 | 1,282          | 15   | 1,311 | 1,326          | 15   | 1,313 | 1,327         | -0.90% | -0.07% | -0.08% |

| Therms Usage by Class |         |        |          |         |        |        |         |        |               |         |        |        |
|-----------------------|---------|--------|----------|---------|--------|--------|---------|--------|---------------|---------|--------|--------|
| Low                   |         |        | Expected |         |        | High   |         |        | Annual Change |         |        |        |
| Res                   | Com/Ind | Total  | Res      | Com/Ind | Total  | Res    | Com/Ind | Total  | Res           | Com/Ind | Total  |        |
| 2020                  | 63,475  | 29,441 | 92,916   | 64,435  | 29,716 | 94,151 | 63,888  | 29,502 | 93,389        | 0.00%   | 0.00%  | 0.00%  |
| 2021                  | 62,977  | 29,157 | 92,134   | 64,186  | 29,587 | 93,774 | 63,582  | 29,364 | 92,946        | -0.78%  | -0.97% | -0.84% |
| 2022                  | 62,975  | 29,085 | 92,061   | 64,181  | 29,587 | 93,768 | 63,571  | 29,439 | 93,010        | 0.00%   | -0.24% | -0.08% |
| 2023                  | 62,976  | 29,014 | 91,990   | 64,179  | 29,587 | 93,767 | 63,564  | 29,510 | 93,073        | 0.00%   | -0.24% | -0.08% |
| 2024                  | 63,380  | 29,146 | 92,526   | 64,435  | 29,716 | 94,151 | 63,969  | 29,794 | 93,763        | 0.64%   | 0.45%  | 0.58%  |
| 2025                  | 62,984  | 28,864 | 91,848   | 64,186  | 29,587 | 93,774 | 63,560  | 29,657 | 93,217        | -0.62%  | -0.97% | -0.73% |
| 2026                  | 62,985  | 28,793 | 91,779   | 64,185  | 29,588 | 93,773 | 63,553  | 29,732 | 93,284        | 0.00%   | -0.24% | -0.08% |
| 2027                  | 62,987  | 28,722 | 91,709   | 64,183  | 29,588 | 93,772 | 63,545  | 29,804 | 93,348        | 0.00%   | -0.25% | -0.08% |
| 2028                  | 63,378  | 28,849 | 92,227   | 64,427  | 29,714 | 94,141 | 63,939  | 30,088 | 94,027        | 0.62%   | 0.44%  | 0.57%  |
| 2029                  | 62,991  | 28,576 | 91,567   | 64,186  | 29,587 | 93,774 | 63,540  | 29,950 | 93,490        | -0.61%  | -0.95% | -0.72% |
| 2030                  | 62,992  | 28,500 | 91,493   | 64,185  | 29,588 | 93,773 | 63,532  | 30,025 | 93,557        | 0.00%   | -0.26% | -0.08% |
| 2031                  | 62,994  | 28,429 | 91,423   | 64,183  | 29,588 | 93,772 | 63,526  | 30,097 | 93,622        | 0.00%   | -0.25% | -0.08% |
| 2032                  | 63,394  | 28,556 | 91,950   | 64,435  | 29,716 | 94,151 | 63,927  | 30,385 | 94,312        | 0.64%   | 0.44%  | 0.58%  |
| 2033                  | 62,994  | 28,282 | 91,276   | 64,182  | 29,586 | 93,769 | 63,515  | 30,241 | 93,756        | -0.63%  | -0.96% | -0.73% |
| 2034                  | 62,995  | 28,206 | 91,201   | 64,181  | 29,587 | 93,768 | 63,508  | 30,317 | 93,825        | 0.00%   | -0.27% | -0.08% |
| 2035                  | 63,000  | 28,136 | 91,136   | 64,183  | 29,588 | 93,772 | 63,504  | 30,388 | 93,892        | 0.01%   | -0.25% | -0.07% |
| 2036                  | 63,400  | 28,262 | 91,662   | 64,435  | 29,716 | 94,151 | 63,906  | 30,680 | 94,586        | 0.63%   | 0.45%  | 0.58%  |
| 2037                  | 63,004  | 27,989 | 90,994   | 64,186  | 29,587 | 93,774 | 63,497  | 30,535 | 94,031        | -0.62%  | -0.96% | -0.73% |
| 2038                  | 63,007  | 27,917 | 90,923   | 64,185  | 29,588 | 93,773 | 63,489  | 30,611 | 94,101        | 0.00%   | -0.26% | -0.08% |
| 2039                  | 63,003  | 27,838 | 90,841   | 64,179  | 29,587 | 93,767 | 63,478  | 30,680 | 94,158        | -0.01%  | -0.28% | -0.09% |

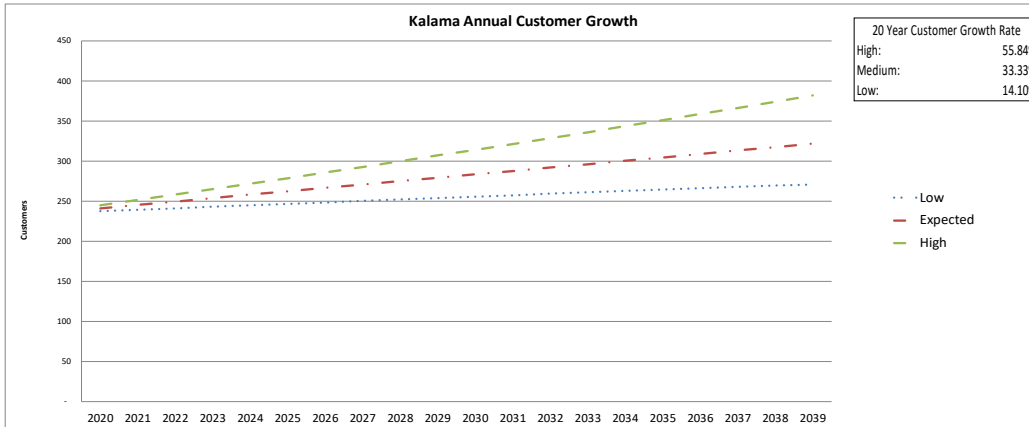
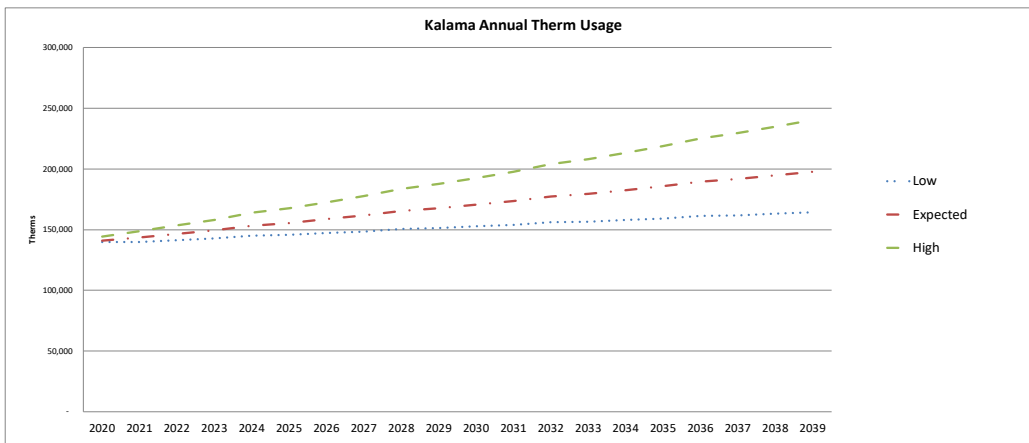
  

| Customer Count Forecast |         |       |          |         |       |      |         |       |               |         |        |        |
|-------------------------|---------|-------|----------|---------|-------|------|---------|-------|---------------|---------|--------|--------|
| Low                     |         |       | Expected |         |       | High |         |       | Annual Change |         |        |        |
| Res                     | Com/Ind | Total | Res      | Com/Ind | Total | Res  | Com/Ind | Total | Res           | Com/Ind | Total  |        |
| 2020                    | 131     | 15    | 146      | 132     | 15    | 147  | 132     | 15    | 147           | 0.00%   | 0.00%  | 0.00%  |
| 2021                    | 131     | 15    | 146      | 132     | 15    | 147  | 132     | 15    | 147           | -0.06%  | -0.23% | -0.08% |
| 2022                    | 131     | 15    | 146      | 132     | 15    | 147  | 132     | 15    | 147           | 0.00%   | -0.23% | -0.02% |
| 2023                    | 131     | 15    | 146      | 132     | 15    | 147  | 132     | 15    | 147           | 0.00%   | -0.24% | -0.02% |
| 2024                    | 131     | 15    | 146      | 132     | 15    | 147  | 132     | 15    | 147           | 0.00%   | -0.24% | -0.02% |
| 2025                    | 131     | 15    | 146      | 132     | 15    | 147  | 132     | 15    | 147           | 0.00%   | -0.24% | -0.02% |
| 2026                    | 131     | 15    | 146      | 132     | 15    | 147  | 132     | 15    | 147           | 0.00%   | -0.24% | -0.02% |
| 2027                    | 131     | 15    | 146      | 132     | 15    | 147  | 132     | 15    | 147           | 0.00%   | -0.24% | -0.02% |
| 2028                    | 131     | 15    | 146      | 132     | 15    | 147  | 132     | 15    | 147           | 0.00%   | -0.24% | -0.02% |
| 2029                    | 131     | 15    | 146      | 132     | 15    | 147  | 132     | 15    | 147           | 0.00%   | -0.24% | -0.02% |
| 2030                    | 131     | 15    | 146      | 132     | 15    | 147  | 132     | 15    | 147           | 0.00%   | -0.24% | -0.02% |
| 2031                    | 131     | 15    | 146      | 132     | 15    | 147  | 132     | 15    | 147           | 0.00%   | -0.25% | -0.02% |
| 2032                    | 131     | 15    | 146      | 132     | 15    | 147  | 132     | 15    | 147           | 0.00%   | -0.23% | -0.02% |
| 2033                    | 131     | 14    | 145      | 132     | 15    | 147  | 132     | 16    | 147           | 0.00%   | -0.25% | -0.02% |
| 2034                    | 131     | 14    | 145      | 132     | 15    | 147  | 132     | 16    | 147           | 0.00%   | -0.24% | -0.02% |
| 2035                    | 131     | 14    | 145      | 132     | 15    | 147  | 132     | 16    | 147           | 0.00%   | -0.25% | -0.02% |
| 2036                    | 131     | 14    | 145      | 132     | 15    | 147  | 132     | 16    | 147           | 0.00%   | -0.25% | -0.02% |
| 2037                    | 131     | 14    | 145      | 132     | 15    | 147  | 132     | 16    | 147           | 0.00%   | -0.24% | -0.02% |
| 2038                    | 131     | 14    | 145      | 132     | 15    | 147  | 132     | 16    | 147           | 0.00%   | -0.25% | -0.02% |
| 2039                    | 131     | 14    | 145      | 132     | 15    | 147  | 132     | 16    | 148           | 0.00%   | -0.24% | -0.02% |









Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

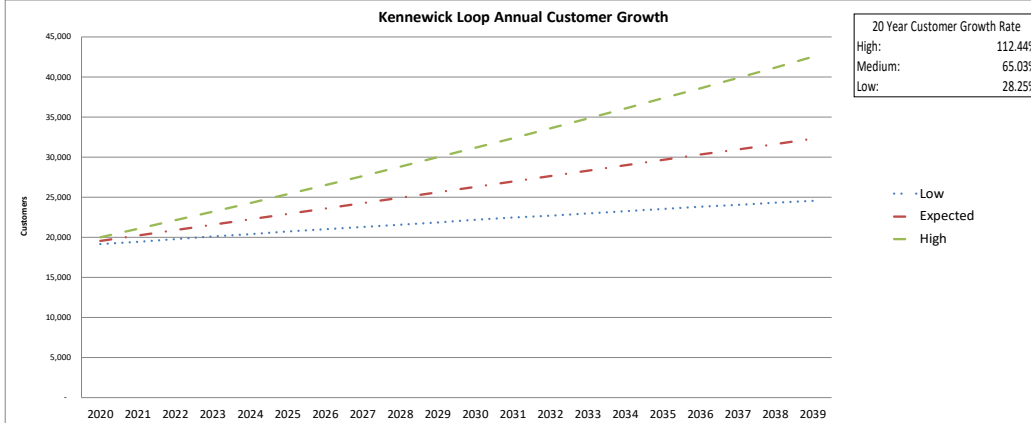
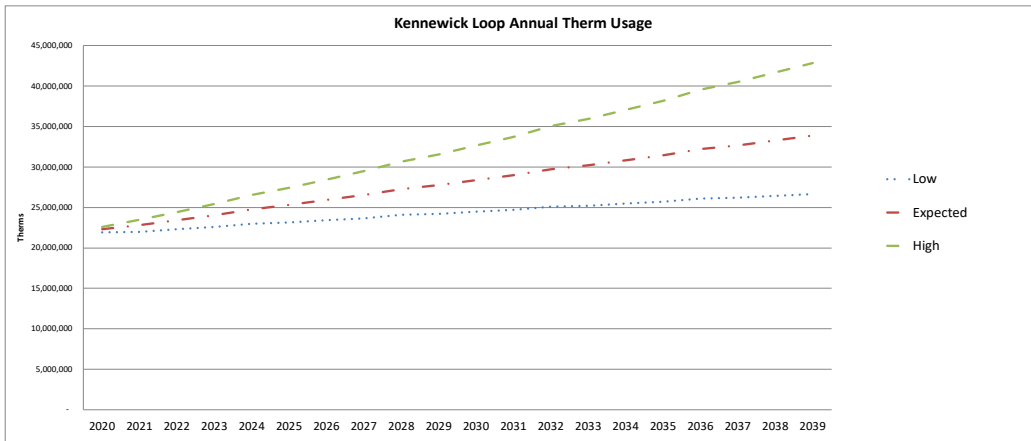
Kennecook Loop

Table with columns for Annual Requirements (Therms) and Annual Change, including sub-sections for Low, Expected, and High heating and baseload values.

Table with columns for Peak Day - Baseload and Annual Change, including sub-sections for Low, Expected, and High heating and baseload values.

Table with columns for Therms Usage by Class and Annual Change, including sub-sections for Low, Expected, and High heating and baseload values.

Table with columns for Customer Count Forecast and Annual Change, including sub-sections for Low, Expected, and High heating and baseload values.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

La Pine

Table with columns for Annual Requirements (Therms) and Annual Change. It includes sub-tables for Low, Expected, and High scenarios across Heating and BaseLoad categories for years 2020-2039.

Table with columns for Peak Day - BaseLoad. It includes sub-tables for Low, Expected, and High scenarios across Daily BaseLoad, Peak, and Total categories for years 2020-2039.

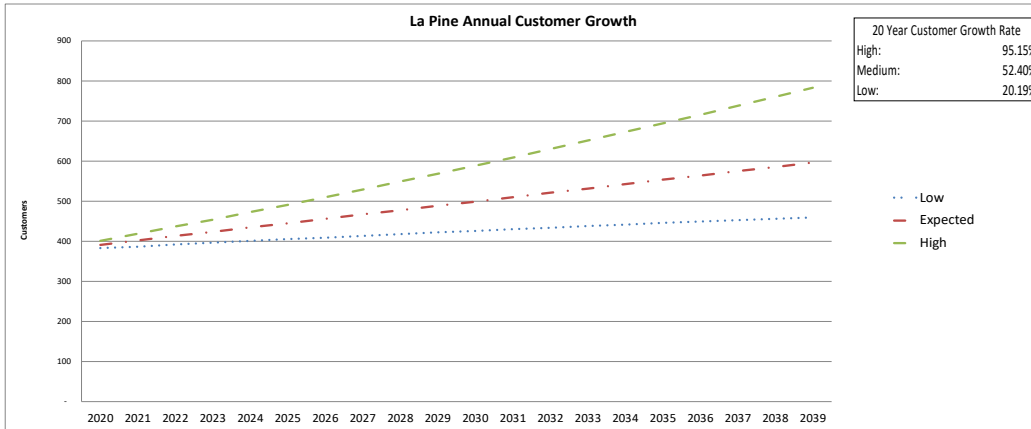
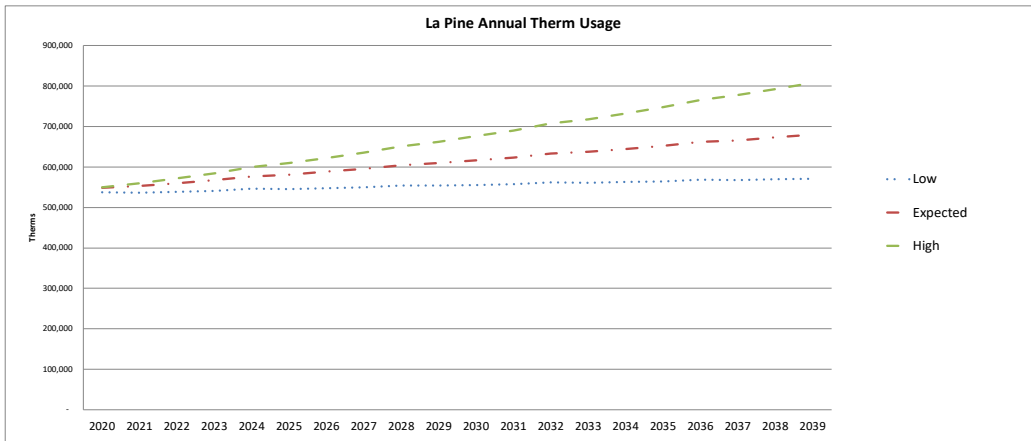
Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High scenarios across Base, Peak, and Total categories for years 2020-2039.

Table with columns for Therms Usage by Class. It includes sub-tables for Low, Expected, and High scenarios across Res, Com/Ind, and Total categories for years 2020-2039.

Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High scenarios across Res, Com/Ind, and Total categories for years 2020-2039.

Table with columns for Customer Count Forecast. It includes sub-tables for Low, Expected, and High scenarios across Res, Com/Ind, and Total categories for years 2020-2039.

Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High scenarios across Res, Com/Ind, and Total categories for years 2020-2039.



Cascade Natural Gas  
2020 IRP Demand Forecast Summary Tables

| Lawrence                     |          |        |          |          |        |         |          |        |               |          |        |        |
|------------------------------|----------|--------|----------|----------|--------|---------|----------|--------|---------------|----------|--------|--------|
| Annual Requirements (Therms) |          |        |          |          |        |         |          |        |               |          |        |        |
| Low                          |          |        | Expected |          |        | High    |          |        | Annual Change |          |        |        |
| Heating                      | Baseload | Total  | Heating  | Baseload | Total  | Heating | Baseload | Total  | Heating       | Baseload | Total  |        |
| 2020                         | 51,065   | 19,552 | 70,617   | 49,900   | 19,552 | 69,452  | 51,212   | 19,552 | 70,764        | 0.00%    | 0.00%  | 0.00%  |
| 2021                         | 50,484   | 19,606 | 70,090   | 49,585   | 19,606 | 69,190  | 50,980   | 19,606 | 70,586        | -1.14%   | 0.27%  | -0.75% |
| 2022                         | 50,376   | 19,541 | 69,918   | 49,654   | 19,541 | 69,196  | 51,231   | 19,541 | 70,773        | -0.21%   | -0.33% | -0.25% |
| 2023                         | 50,199   | 19,542 | 69,741   | 49,654   | 19,542 | 69,195  | 51,404   | 19,542 | 70,946        | -0.35%   | 0.00%  | -0.25% |
| 2024                         | 50,359   | 19,553 | 69,912   | 49,899   | 19,553 | 69,452  | 51,919   | 19,553 | 71,472        | 0.32%    | 0.06%  | 0.25%  |
| 2025                         | 49,834   | 19,553 | 69,386   | 49,638   | 19,553 | 69,190  | 51,737   | 19,553 | 71,289        | -1.04%   | 0.00%  | -0.75% |
| 2026                         | 49,656   | 19,552 | 69,209   | 49,638   | 19,552 | 69,190  | 51,919   | 19,552 | 71,471        | -0.36%   | 0.00%  | -0.26% |
| 2027                         | 49,426   | 19,606 | 69,031   | 49,584   | 19,606 | 69,190  | 52,039   | 19,606 | 71,644        | -0.48%   | 0.27%  | -0.26% |
| 2028                         | 49,674   | 19,541 | 69,215   | 49,522   | 19,541 | 69,463  | 52,647   | 19,541 | 72,188        | 0.50%    | -0.33% | 0.27%  |
| 2029                         | 49,141   | 19,542 | 68,682   | 49,649   | 19,542 | 69,190  | 52,451   | 19,542 | 71,993        | -1.07%   | 0.00%  | -0.77% |
| 2030                         | 48,952   | 19,553 | 68,505   | 49,637   | 19,553 | 69,190  | 52,620   | 19,553 | 72,173        | -0.38%   | 0.06%  | -0.26% |
| 2031                         | 48,775   | 19,553 | 68,328   | 49,637   | 19,553 | 69,190  | 52,795   | 19,553 | 72,348        | -0.36%   | 0.00%  | -0.26% |
| 2032                         | 48,892   | 19,606 | 68,497   | 49,846   | 19,606 | 69,452  | 53,279   | 19,606 | 72,884        | 0.24%    | 0.27%  | 0.25%  |
| 2033                         | 48,445   | 19,541 | 67,986   | 49,655   | 19,541 | 69,196  | 53,161   | 19,541 | 72,703        | -0.91%   | -0.33% | -0.75% |
| 2034                         | 48,265   | 19,541 | 67,806   | 49,654   | 19,541 | 69,196  | 53,341   | 19,541 | 72,882        | -0.37%   | 0.00%  | -0.26% |
| 2035                         | 48,084   | 19,542 | 67,626   | 49,648   | 19,542 | 69,190  | 53,510   | 19,542 | 73,052        | -0.37%   | 0.00%  | -0.27% |
| 2036                         | 48,237   | 19,552 | 67,790   | 49,900   | 19,552 | 69,452  | 54,039   | 19,552 | 73,592        | 0.32%    | 0.05%  | 0.24%  |
| 2037                         | 47,725   | 19,552 | 67,277   | 49,638   | 19,552 | 69,190  | 53,849   | 19,552 | 73,401        | -1.06%   | 0.00%  | -0.76% |
| 2038                         | 47,491   | 19,606 | 67,097   | 49,584   | 19,606 | 69,190  | 53,974   | 19,606 | 73,580        | -0.49%   | 0.27%  | -0.27% |
| 2039                         | 47,744   | 19,182 | 66,926   | 50,013   | 19,182 | 69,195  | 54,581   | 19,182 | 73,763        | 0.53%    | -2.16% | -0.25% |

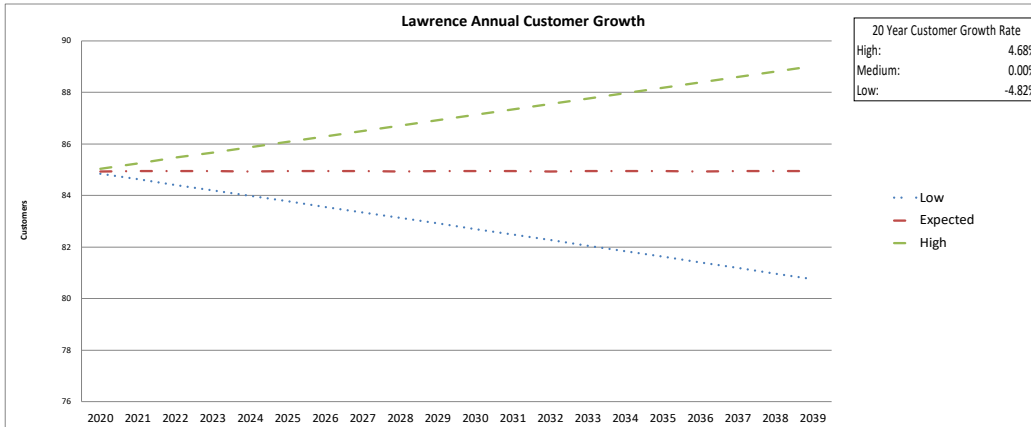
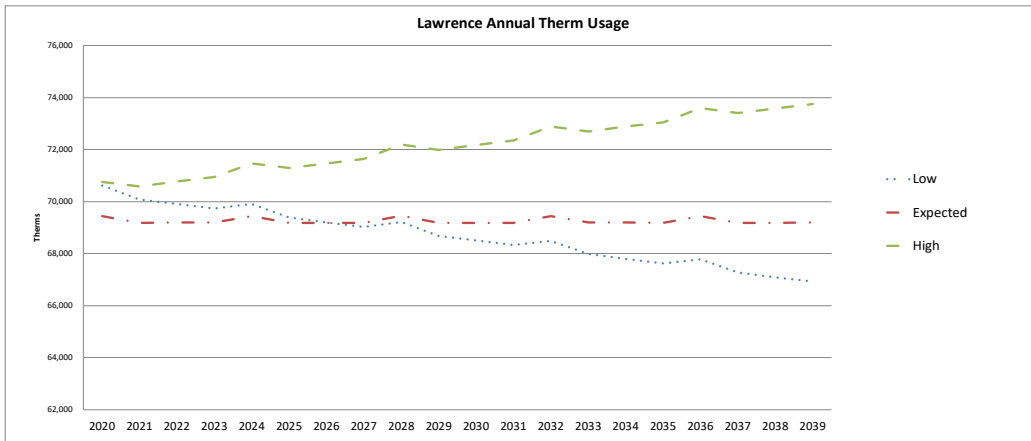
| Peak Day - Baseload |      |       |                |      |       |                |      |       |               |        |        |        |
|---------------------|------|-------|----------------|------|-------|----------------|------|-------|---------------|--------|--------|--------|
| Low                 |      |       | Expected       |      |       | High           |      |       | Annual Change |        |        |        |
| Daily Baseload      | Peak | Total | Daily Baseload | Peak | Total | Daily Baseload | Peak | Total | Base          | Peak   | Total  |        |
| 2020                | 54   | 539   | 592            | 54   | 647   | 700            | 54   | 541   | 595           | 0.00%  | 0.00%  | 0.00%  |
| 2021                | 54   | 537   | 591            | 54   | 646   | 700            | 54   | 543   | 596           | 0.27%  | -0.32% | -0.26% |
| 2022                | 54   | 536   | 589            | 54   | 647   | 700            | 54   | 544   | 598           | -0.33% | -0.23% | -0.24% |
| 2023                | 54   | 534   | 588            | 54   | 647   | 700            | 54   | 546   | 599           | 0.00%  | -0.29% | -0.27% |
| 2024                | 54   | 538   | 592            | 54   | 652   | 706            | 54   | 553   | 606           | 0.06%  | 0.75%  | 0.69%  |
| 2025                | 54   | 536   | 590            | 54   | 652   | 706            | 54   | 554   | 608           | 0.00%  | -0.29% | -0.27% |
| 2026                | 54   | 530   | 583            | 54   | 646   | 700            | 54   | 550   | 604           | 0.00%  | -1.27% | -1.16% |
| 2027                | 54   | 528   | 582            | 54   | 646   | 700            | 54   | 551   | 605           | 0.27%  | -0.32% | -0.27% |
| 2028                | 54   | 527   | 580            | 54   | 647   | 700            | 54   | 553   | 607           | -0.33% | -0.23% | -0.24% |
| 2029                | 54   | 525   | 579            | 54   | 647   | 700            | 54   | 555   | 608           | 0.00%  | -0.30% | -0.27% |
| 2030                | 54   | 529   | 583            | 54   | 652   | 706            | 54   | 562   | 615           | 0.06%  | 0.74%  | 0.68%  |
| 2031                | 54   | 527   | 581            | 54   | 652   | 706            | 54   | 563   | 617           | 0.00%  | -0.30% | -0.27% |
| 2032                | 54   | 521   | 574            | 54   | 646   | 700            | 54   | 559   | 613           | 0.27%  | -1.30% | -1.16% |
| 2033                | 54   | 519   | 573            | 54   | 647   | 700            | 54   | 561   | 614           | -0.33% | -0.27% | -0.27% |
| 2034                | 54   | 518   | 571            | 54   | 647   | 700            | 54   | 562   | 616           | 0.00%  | -0.27% | -0.25% |
| 2035                | 54   | 516   | 570            | 54   | 647   | 700            | 54   | 564   | 617           | 0.00%  | -0.30% | -0.27% |
| 2036                | 54   | 520   | 574            | 54   | 652   | 706            | 54   | 571   | 624           | 0.05%  | 0.74%  | 0.68%  |
| 2037                | 54   | 513   | 567            | 54   | 646   | 700            | 54   | 566   | 620           | 0.00%  | -1.31% | -1.19% |
| 2038                | 54   | 512   | 565            | 54   | 646   | 700            | 54   | 568   | 622           | 0.27%  | -0.30% | -0.25% |
| 2039                | 53   | 511   | 564            | 53   | 647   | 700            | 53   | 571   | 623           | -2.16% | -0.09% | -0.29% |

| Therms Usage by Class |         |        |          |         |        |        |         |        |               |         |        |        |
|-----------------------|---------|--------|----------|---------|--------|--------|---------|--------|---------------|---------|--------|--------|
| Low                   |         |        | Expected |         |        | High   |         |        | Annual Change |         |        |        |
| Res                   | Com/Ind | Total  | Res      | Com/Ind | Total  | Res    | Com/Ind | Total  | Res           | Com/Ind | Total  |        |
| 2020                  | 50,614  | 20,003 | 70,617   | 49,811  | 19,641 | 69,452 | 50,720  | 20,045 | 70,764        | 0.00%   | 0.00%  | 0.00%  |
| 2021                  | 50,244  | 19,846 | 70,090   | 49,628  | 19,562 | 69,190 | 50,603  | 19,982 | 70,585        | -0.73%  | -0.78% | -0.75% |
| 2022                  | 50,122  | 19,796 | 69,918   | 49,632  | 19,564 | 69,196 | 50,732  | 20,041 | 70,773        | -0.24%  | -0.25% | -0.25% |
| 2023                  | 49,995  | 19,745 | 69,741   | 49,632  | 19,563 | 69,195 | 50,859  | 20,087 | 70,946        | -0.25%  | -0.26% | -0.25% |
| 2024                  | 50,107  | 19,805 | 69,912   | 49,811  | 19,641 | 69,452 | 51,227  | 20,245 | 71,472        | 0.22%   | 0.30%  | 0.25%  |
| 2025                  | 49,739  | 19,647 | 69,386   | 49,628  | 19,562 | 69,190 | 51,108  | 20,182 | 71,289        | -0.73%  | -0.80% | -0.75% |
| 2026                  | 49,613  | 19,595 | 69,209   | 49,628  | 19,562 | 69,190 | 51,232  | 20,239 | 71,471        | -0.25%  | -0.26% | -0.26% |
| 2027                  | 49,487  | 19,544 | 69,031   | 49,638  | 19,562 | 69,190 | 51,360  | 20,385 | 71,644        | -0.25%  | -0.26% | -0.26% |
| 2028                  | 49,608  | 19,607 | 69,215   | 49,819  | 19,644 | 69,463 | 51,741  | 20,447 | 72,188        | 0.24%   | 0.32%  | 0.27%  |
| 2029                  | 49,235  | 19,447 | 68,682   | 49,628  | 19,562 | 69,190 | 51,612  | 20,381 | 71,993        | -0.75%  | -0.82% | -0.77% |
| 2030                  | 49,109  | 19,395 | 68,505   | 49,628  | 19,562 | 69,190 | 51,737  | 20,436 | 72,173        | -0.26%  | -0.27% | -0.26% |
| 2031                  | 48,983  | 19,345 | 68,328   | 49,628  | 19,562 | 69,190 | 51,864  | 20,484 | 72,348        | -0.26%  | -0.26% | -0.26% |
| 2032                  | 49,094  | 19,403 | 68,497   | 49,811  | 19,641 | 69,452 | 52,240  | 20,644 | 72,884        | 0.23%   | 0.30%  | 0.25%  |
| 2033                  | 48,735  | 19,252 | 67,986   | 49,632  | 19,564 | 69,196 | 52,120  | 20,583 | 72,703        | -0.73%  | -0.78% | -0.75% |
| 2034                  | 48,609  | 19,198 | 67,806   | 49,632  | 19,564 | 69,196 | 52,245  | 20,637 | 72,882        | -0.26%  | -0.28% | -0.26% |
| 2035                  | 48,479  | 19,147 | 67,626   | 49,628  | 19,562 | 69,190 | 52,368  | 20,684 | 73,052        | -0.27%  | -0.28% | -0.27% |
| 2036                  | 48,587  | 19,203 | 67,790   | 49,811  | 19,641 | 69,452 | 52,747  | 20,845 | 73,592        | 0.22%   | 0.29%  | 0.24%  |
| 2037                  | 48,227  | 19,050 | 67,277   | 49,628  | 19,562 | 69,190 | 52,620  | 20,781 | 73,401        | -0.74%  | -0.79% | -0.76% |
| 2038                  | 48,101  | 18,996 | 67,097   | 49,628  | 19,562 | 69,190 | 52,745  | 20,835 | 73,580        | -0.26%  | -0.28% | -0.27% |
| 2039                  | 47,977  | 18,849 | 66,926   | 49,632  | 19,563 | 69,195 | 52,878  | 20,885 | 73,763        | -0.26%  | -0.25% | -0.25% |

| Customer Count Forecast |         |       |          |         |       |      |         |       |               |         |        |        |
|-------------------------|---------|-------|----------|---------|-------|------|---------|-------|---------------|---------|--------|--------|
| Low                     |         |       | Expected |         |       | High |         |       | Annual Change |         |        |        |
| Res                     | Com/Ind | Total | Res      | Com/Ind | Total | Res  | Com/Ind | Total | Res           | Com/Ind | Total  |        |
| 2020                    | 66      | 19    | 85       | 66      | 19    | 85   | 66      | 19    | 85            | 0.00%   | 0.00%  | 0.00%  |
| 2021                    | 66      | 19    | 85       | 66      | 19    | 85   | 66      | 19    | 85            | 0.25%   | -0.24% | -0.25% |
| 2022                    | 66      | 19    | 84       | 66      | 19    | 85   | 66      | 19    | 85            | -0.25%  | -0.26% | -0.25% |
| 2023                    | 65      | 19    | 84       | 66      | 19    | 85   | 67      | 19    | 86            | -0.25%  | -0.26% | -0.25% |
| 2024                    | 65      | 19    | 84       | 66      | 19    | 85   | 67      | 19    | 86            | -0.25%  | -0.25% | -0.25% |
| 2025                    | 65      | 19    | 84       | 66      | 19    | 85   | 67      | 19    | 86            | -0.25%  | -0.25% | -0.25% |
| 2026                    | 65      | 19    | 84       | 66      | 19    | 85   | 67      | 19    | 86            | -0.25%  | -0.30% | -0.26% |
| 2027                    | 65      | 19    | 83       | 66      | 19    | 85   | 67      | 19    | 87            | -0.25%  | -0.26% | -0.26% |
| 2028                    | 65      | 19    | 83       | 66      | 19    | 85   | 67      | 19    | 87            | -0.25%  | -0.26% | -0.26% |
| 2029                    | 64      | 18    | 83       | 66      | 19    | 85   | 68      | 19    | 87            | -0.26%  | -0.26% | -0.26% |
| 2030                    | 64      | 18    | 83       | 66      | 19    | 85   | 68      | 19    | 87            | -0.26%  | -0.30% | -0.27% |
| 2031                    | 64      | 18    | 82       | 66      | 19    | 85   | 68      | 19    | 87            | -0.26%  | -0.26% | -0.26% |
| 2032                    | 64      | 18    | 82       | 66      | 19    | 85   | 68      | 20    | 88            | -0.26%  | -0.26% | -0.26% |
| 2033                    | 64      | 18    | 82       | 66      | 19    | 85   | 68      | 20    | 88            | -0.26%  | -0.26% | -0.26% |
| 2034                    | 64      | 18    | 82       | 66      | 19    | 85   | 68      | 20    | 88            | -0.26%  | -0.31% | -0.27% |
| 2035                    | 63      | 18    | 82       | 66      | 19    | 85   | 69      | 20    | 88            | -0.26%  | -0.26% | -0.26% |
| 2036                    | 63      | 18    | 81       | 66      | 19    | 85   | 69      | 20    | 89            | -0.26%  | -0.27% | -0.26% |
| 2037                    | 63      | 18    | 81       | 66      | 19    | 85   | 69      | 20    | 89            | -0.26%  | -0.26% | -0.26% |
| 2038                    | 63      | 18    | 81       | 66      | 19    | 85   | 69      | 20    | 89            | -0.26%  | -0.31% | -0.27% |
| 2039                    | 63      | 18    | 81       | 66      | 19    | 85   | 69      | 20    | 89            | -0.26%  | -0.26% | -0.26% |



Cascade Natural Gas  
2020 IRP Demand Forecast Summary Tables

| LDS Church                   |          |       |          |          |       |         |          |       |               |          |        |        |
|------------------------------|----------|-------|----------|----------|-------|---------|----------|-------|---------------|----------|--------|--------|
| Annual Requirements (Therms) |          |       |          |          |       |         |          |       |               |          |        |        |
| Low                          |          |       | Expected |          |       | High    |          |       | Annual Change |          |        |        |
| Heating                      | BaseLoad | Total | Heating  | BaseLoad | Total | Heating | BaseLoad | Total | Heating       | BaseLoad | Total  |        |
| 2020                         | 8,466    | 1,643 | 10,109   | 8,447    | 1,643 | 10,090  | 8,480    | 1,643 | 10,124        | 0.00%    | 0.00%  | 0.00%  |
| 2021                         | 8,365    | 1,725 | 10,091   | 8,343    | 1,725 | 10,068  | 8,403    | 1,725 | 10,129        | -1.19%   | 4.97%  | -0.19% |
| 2022                         | 8,391    | 1,642 | 10,033   | 8,426    | 1,642 | 10,068  | 8,557    | 1,642 | 10,200        | 0.30%    | -4.79% | -0.57% |
| 2023                         | 8,317    | 1,692 | 10,009   | 8,376    | 1,692 | 10,068  | 8,510    | 1,692 | 10,202        | -0.88%   | 3.01%  | -0.24% |
| 2024                         | 8,365    | 1,643 | 10,008   | 8,447    | 1,643 | 10,090  | 8,582    | 1,643 | 10,225        | 0.57%    | -2.86% | -0.01% |
| 2025                         | 8,337    | 1,643 | 9,980    | 8,425    | 1,643 | 10,068  | 8,577    | 1,643 | 10,220        | -0.33%   | 0.00%  | -0.28% |
| 2026                         | 8,274    | 1,643 | 9,918    | 8,425    | 1,643 | 10,068  | 8,643    | 1,643 | 10,286        | -0.75%   | 0.00%  | -0.63% |
| 2027                         | 8,187    | 1,725 | 9,912    | 8,343    | 1,725 | 10,068  | 8,582    | 1,725 | 10,307        | -1.06%   | 4.97%  | -0.06% |
| 2028                         | 8,220    | 1,692 | 9,912    | 8,399    | 1,692 | 10,091  | 8,640    | 1,692 | 10,332        | 0.41%    | -1.93% | 0.00%  |
| 2029                         | 8,227    | 1,652 | 9,879    | 8,416    | 1,652 | 10,068  | 8,669    | 1,652 | 10,321        | 0.08%    | -2.35% | -0.33% |
| 2030                         | 8,173    | 1,643 | 9,817    | 8,425    | 1,643 | 10,068  | 8,744    | 1,643 | 10,387        | -0.66%   | -0.52% | -0.63% |
| 2031                         | 8,158    | 1,643 | 9,802    | 8,425    | 1,643 | 10,068  | 8,755    | 1,643 | 10,399        | -0.18%   | 0.00%  | -0.15% |
| 2032                         | 8,090    | 1,725 | 9,815    | 8,365    | 1,725 | 10,090  | 8,712    | 1,725 | 10,437        | -0.84%   | 4.97%  | 0.14%  |
| 2033                         | 8,150    | 1,642 | 9,792    | 8,426    | 1,642 | 10,068  | 8,795    | 1,642 | 10,437        | 0.74%    | -4.79% | -0.23% |
| 2034                         | 8,029    | 1,692 | 9,721    | 8,376    | 1,692 | 10,068  | 8,802    | 1,692 | 10,493        | -1.49%   | 3.01%  | -0.73% |
| 2035                         | 8,048    | 1,652 | 9,701    | 8,416    | 1,652 | 10,068  | 8,848    | 1,652 | 10,500        | 0.24%    | -2.35% | -0.21% |
| 2036                         | 8,061    | 1,643 | 9,705    | 8,447    | 1,643 | 10,090  | 8,885    | 1,643 | 10,529        | 0.16%    | -0.52% | 0.04%  |
| 2037                         | 8,034    | 1,643 | 9,677    | 8,425    | 1,643 | 10,068  | 8,880    | 1,643 | 10,523        | -0.34%   | 0.00%  | -0.38% |
| 2038                         | 7,899    | 1,725 | 9,624    | 8,343    | 1,725 | 10,068  | 8,874    | 1,725 | 10,599        | -1.68%   | 4.97%  | -0.55% |
| 2039                         | 7,971    | 1,642 | 9,614    | 8,426    | 1,642 | 10,068  | 8,968    | 1,642 | 10,611        | 0.92%    | -4.79% | -0.10% |

| Peak Day - BaseLoad |      |       |                |      |       |                |      |       |               |        |        |        |
|---------------------|------|-------|----------------|------|-------|----------------|------|-------|---------------|--------|--------|--------|
| Low                 |      |       | Expected       |      |       | High           |      |       | Annual Change |        |        |        |
| Daily BaseLoad      | Peak | Total | Daily BaseLoad | Peak | Total | Daily BaseLoad | Peak | Total | Base          | Peak   | Total  |        |
| 2020                | 5    | 19    | 24             | 5    | 17    | 22             | 5    | 19    | 24            | 0.00%  | 0.00%  | 0.00%  |
| 2021                | 5    | 19    | 24             | 5    | 17    | 22             | 5    | 19    | 24            | 4.97%  | -1.28% | -0.10% |
| 2022                | 4    | 19    | 24             | 4    | 17    | 22             | 4    | 20    | 24            | -4.79% | 0.32%  | -0.69% |
| 2023                | 5    | 19    | 24             | 5    | 17    | 22             | 5    | 19    | 24            | 3.01%  | -0.83% | -0.10% |
| 2024                | 5    | 19    | 24             | 5    | 17    | 22             | 5    | 20    | 24            | -2.86% | 0.68%  | -0.02% |
| 2025                | 5    | 19    | 24             | 5    | 17    | 22             | 5    | 20    | 24            | 0.00%  | -0.13% | -0.10% |
| 2026                | 5    | 19    | 23             | 5    | 17    | 22             | 5    | 20    | 24            | 0.00%  | -0.97% | -0.79% |
| 2027                | 5    | 19    | 23             | 5    | 17    | 22             | 5    | 20    | 24            | 4.97%  | -1.31% | -0.10% |
| 2028                | 5    | 19    | 23             | 5    | 17    | 22             | 5    | 20    | 24            | -1.93% | 0.36%  | -0.10% |
| 2029                | 5    | 19    | 23             | 5    | 17    | 22             | 5    | 20    | 24            | -2.35% | 0.45%  | -0.10% |
| 2030                | 5    | 19    | 23             | 5    | 17    | 22             | 5    | 20    | 25            | -0.52% | -0.64% | -0.62% |
| 2031                | 5    | 19    | 23             | 5    | 17    | 22             | 5    | 20    | 25            | 0.00%  | -0.13% | -0.11% |
| 2032                | 5    | 18    | 23             | 5    | 17    | 22             | 5    | 20    | 25            | 4.97%  | -1.44% | -0.19% |
| 2033                | 4    | 19    | 23             | 4    | 17    | 22             | 4    | 20    | 25            | -4.79% | 1.10%  | -0.11% |
| 2034                | 5    | 18    | 23             | 5    | 17    | 22             | 5    | 20    | 25            | 3.01%  | -1.61% | -0.72% |
| 2035                | 5    | 18    | 23             | 5    | 17    | 22             | 5    | 20    | 25            | -2.35% | 0.46%  | -0.11% |
| 2036                | 5    | 18    | 23             | 5    | 17    | 22             | 5    | 20    | 25            | -0.52% | 0.10%  | -0.02% |
| 2037                | 5    | 18    | 23             | 5    | 17    | 22             | 5    | 20    | 25            | 0.00%  | -0.24% | -0.19% |
| 2038                | 5    | 18    | 23             | 5    | 17    | 22             | 5    | 20    | 25            | 4.97%  | -2.12% | -0.72% |
| 2039                | 4    | 18    | 23             | 4    | 17    | 22             | 4    | 21    | 25            | -4.79% | 1.12%  | -0.11% |

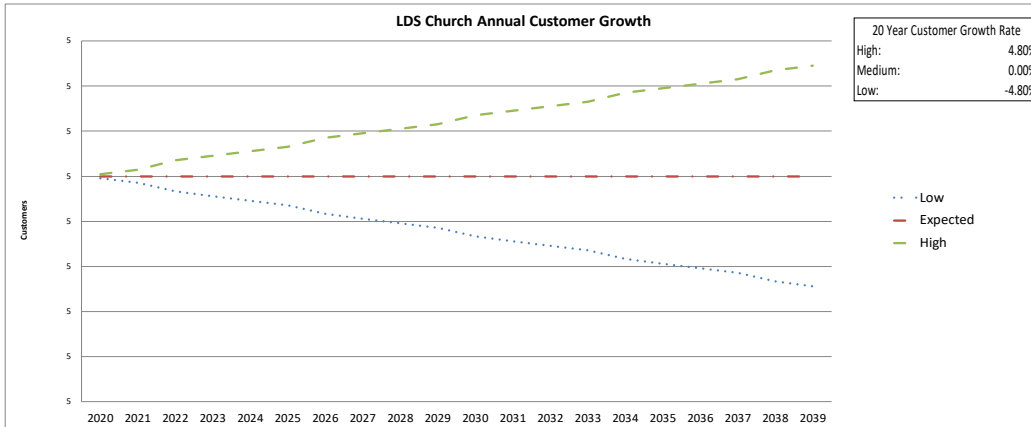
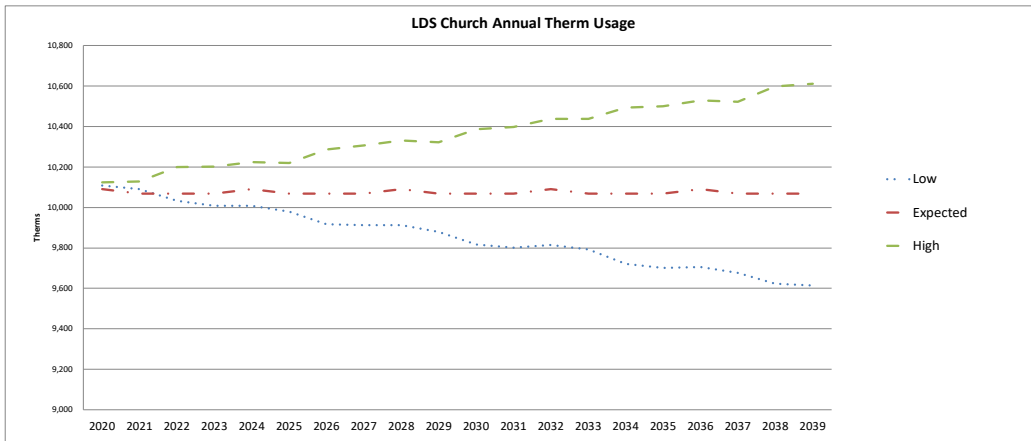
  

| Therms Usage by Class |         |       |          |         |       |        |         |       |               |         |        |        |
|-----------------------|---------|-------|----------|---------|-------|--------|---------|-------|---------------|---------|--------|--------|
| Low                   |         |       | Expected |         |       | High   |         |       | Annual Change |         |        |        |
| Res                   | Com/Ind | Total | Res      | Com/Ind | Total | Res    | Com/Ind | Total | Res           | Com/Ind | Total  |        |
| 2020                  | 4,684   | 5,425 | 10,109   | 4,706   | 5,384 | 10,090 | 4,699   | 5,425 | 10,124        | 0.00%   | 0.00%  | 0.00%  |
| 2021                  | 4,675   | 5,416 | 10,091   | 4,696   | 5,373 | 10,068 | 4,713   | 5,416 | 10,129        | -0.21%  | -0.17% | -0.19% |
| 2022                  | 4,663   | 5,370 | 10,033   | 4,696   | 5,373 | 10,068 | 4,725   | 5,475 | 10,200        | -0.25%  | -0.84% | -0.57% |
| 2023                  | 4,641   | 5,368 | 10,009   | 4,696   | 5,373 | 10,068 | 4,726   | 5,476 | 10,202        | -0.47%  | -0.05% | -0.24% |
| 2024                  | 4,637   | 5,371 | 10,008   | 4,706   | 5,384 | 10,090 | 4,746   | 5,479 | 10,225        | -0.08%  | 0.06%  | -0.01% |
| 2025                  | 4,618   | 5,362 | 9,980    | 4,696   | 5,373 | 10,068 | 4,749   | 5,471 | 10,220        | -0.43%  | -0.15% | -0.28% |
| 2026                  | 4,606   | 5,312 | 9,918    | 4,696   | 5,373 | 10,068 | 4,761   | 5,525 | 10,286        | -0.25%  | -0.95% | -0.63% |
| 2027                  | 4,604   | 5,307 | 9,912    | 4,696   | 5,373 | 10,068 | 4,763   | 5,524 | 10,307        | -0.04%  | -0.08% | -0.06% |
| 2028                  | 4,591   | 5,322 | 9,912    | 4,706   | 5,384 | 10,091 | 4,793   | 5,539 | 10,332        | -0.30%  | 0.27%  | 0.00%  |
| 2029                  | 4,571   | 5,308 | 9,879    | 4,696   | 5,373 | 10,068 | 4,796   | 5,525 | 10,321        | -0.43%  | -0.25% | -0.33% |
| 2030                  | 4,559   | 5,257 | 9,817    | 4,696   | 5,373 | 10,068 | 4,808   | 5,579 | 10,387        | -0.26%  | -0.96% | -0.63% |
| 2031                  | 4,548   | 5,254 | 9,802    | 4,696   | 5,373 | 10,068 | 4,820   | 5,579 | 10,399        | -0.62%  | -0.06% | -0.15% |
| 2032                  | 4,554   | 5,261 | 9,815    | 4,706   | 5,384 | 10,090 | 4,850   | 5,587 | 10,437        | 0.13%   | 0.14%  | 0.14%  |
| 2033                  | 4,534   | 5,258 | 9,792    | 4,696   | 5,373 | 10,068 | 4,854   | 5,584 | 10,437        | -0.43%  | -0.06% | -0.23% |
| 2034                  | 4,512   | 5,208 | 9,721    | 4,696   | 5,373 | 10,068 | 4,855   | 5,639 | 10,493        | -0.48%  | -0.95% | -0.73% |
| 2035                  | 4,501   | 5,200 | 9,701    | 4,696   | 5,373 | 10,068 | 4,866   | 5,633 | 10,500        | -0.26%  | -0.16% | -0.21% |
| 2036                  | 4,497   | 5,208 | 9,705    | 4,706   | 5,384 | 10,090 | 4,887   | 5,642 | 10,529        | -0.08%  | 0.15%  | 0.04%  |
| 2037                  | 4,477   | 5,200 | 9,677    | 4,696   | 5,373 | 10,068 | 4,890   | 5,633 | 10,523        | -0.43%  | -0.15% | -0.28% |
| 2038                  | 4,475   | 5,148 | 9,624    | 4,696   | 5,373 | 10,068 | 4,912   | 5,687 | 10,599        | -0.04%  | -0.99% | -0.55% |
| 2039                  | 4,464   | 5,150 | 9,614    | 4,696   | 5,373 | 10,068 | 4,924   | 5,687 | 10,611        | -0.26%  | 0.03%  | -0.10% |

| Customer Count Forecast |         |       |          |         |       |      |         |       |               |         |        |        |
|-------------------------|---------|-------|----------|---------|-------|------|---------|-------|---------------|---------|--------|--------|
| Low                     |         |       | Expected |         |       | High |         |       | Annual Change |         |        |        |
| Res                     | Com/Ind | Total | Res      | Com/Ind | Total | Res  | Com/Ind | Total | Res           | Com/Ind | Total  |        |
| 2020                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | 0.00%   | 0.00%  | 0.00%  |
| 2021                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.25%  | 0.00%  | -0.20% |
| 2022                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.25%  | -0.92% | -0.38% |
| 2023                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.25%  | -0.08% | -0.22% |
| 2024                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.25%  | 0.00%  | -0.20% |
| 2025                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.25%  | 0.00%  | -0.20% |
| 2026                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.25%  | -0.93% | -0.39% |
| 2027                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.25%  | -0.08% | -0.22% |
| 2028                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.25%  | 0.00%  | -0.20% |
| 2029                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.26%  | 0.00%  | -0.20% |
| 2030                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.26%  | -0.94% | -0.39% |
| 2031                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.26%  | -0.09% | -0.22% |
| 2032                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.26%  | 0.00%  | -0.21% |
| 2033                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.26%  | 0.00%  | -0.21% |
| 2034                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.26%  | -0.95% | -0.40% |
| 2035                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.26%  | -0.09% | -0.22% |
| 2036                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.26%  | 0.00%  | -0.21% |
| 2037                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.26%  | 0.00%  | -0.21% |
| 2038                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.26%  | -0.95% | -0.40% |
| 2039                    | 4       | 1     | 5        | 4       | 1     | 5    | 4       | 1     | 5             | -0.26%  | -0.09% | -0.23% |





Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Longview South Loop

Table with columns: Heating, BaseLoad, Total, Expected (Heating, BaseLoad, Total), High (Heating, BaseLoad, Total). Rows 2020-2039.

Table with columns: Heating, BaseLoad, Total, Expected (Heating, BaseLoad, Total), High (Heating, BaseLoad, Total). Rows 2020-2039.

Peak Day - BaseLoad

Table with columns: Daily BaseLoad, Peak, Total, Expected (Daily BaseLoad, Peak, Total), High (Daily BaseLoad, Peak, Total). Rows 2020-2039.

Table with columns: Base, Peak, Total, Expected (Base, Peak, Total), High (Base, Peak, Total). Rows 2020-2039.

Therms Usage by Class

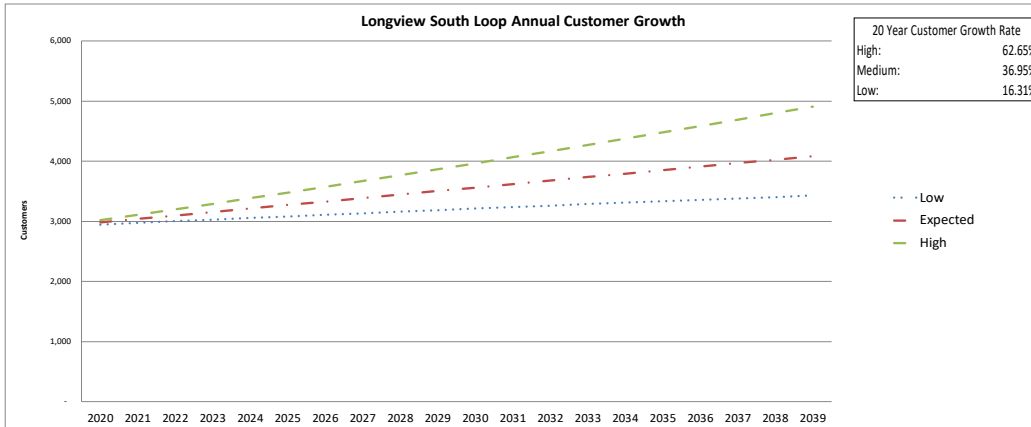
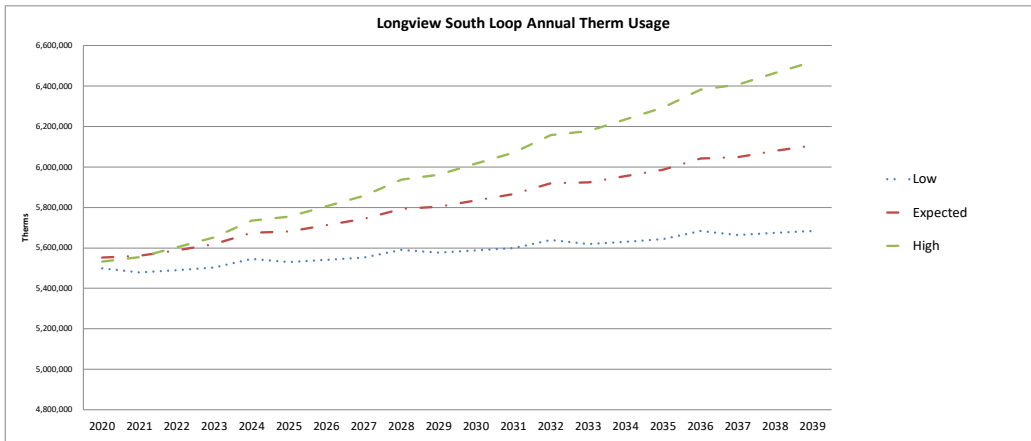
Table with columns: Com/In/d, Total, Res, Expected (Com/In/d, Total, Res), High (Com/In/d, Total, Res). Rows 2020-2039.

Table with columns: Res, Com/In/d, Total, Res, Expected (Res, Com/In/d, Total, Res), High (Res, Com/In/d, Total, Res). Rows 2020-2039.

Customer Count Forecast

Table with columns: Res, Com/In/d, Total, Res, Expected (Res, Com/In/d, Total, Res), High (Res, Com/In/d, Total, Res). Rows 2020-2039.

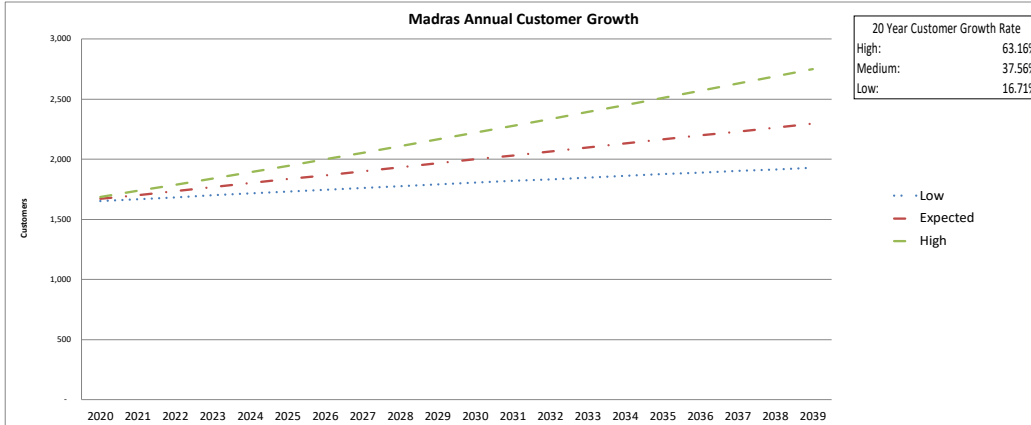
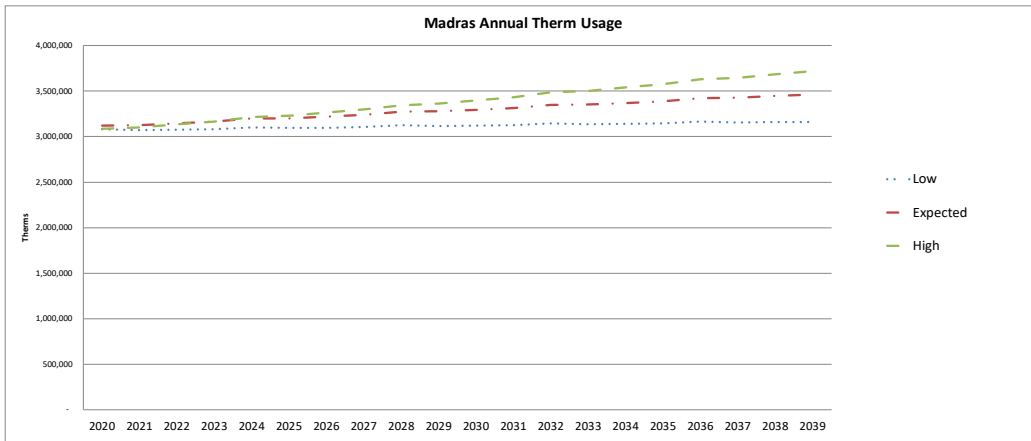
Table with columns: Res, Com/In/d, Total, Res, Expected (Res, Com/In/d, Total, Res), High (Res, Com/In/d, Total, Res). Rows 2020-2039.



Cascade Natural Gas
2020 IRP Demand Forecast Summary Tables

Madras

Main data table with multiple columns for Annual Requirements (Therms), Annual Change, Peak Day: BaseLoad, Thermo Usage by Class, and Customer Count Forecast. Includes years 2020-2039 and various sub-categories like Heating, Low, Expected, High.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

McCleary (Aberdeen/Hoquiam)

Table with columns for Annual Requirements (Therms) and Annual Change. Sub-headers include Heating, Low, Expected, and High. Rows list years from 2020 to 2039 with various demand metrics.

Table with columns for Annual Change. Sub-headers include Heating, Low, Expected, and High. Rows list years from 2020 to 2039 with percentage change metrics.

Peak Day - BaseLoad

Table with columns for Peak Day - BaseLoad. Sub-headers include Heating, Low, Expected, and High. Rows list years from 2020 to 2039 with peak demand metrics.

Table with columns for Annual Change. Sub-headers include Heating, Low, Expected, and High. Rows list years from 2020 to 2039 with percentage change metrics.

Therms Usage by Class

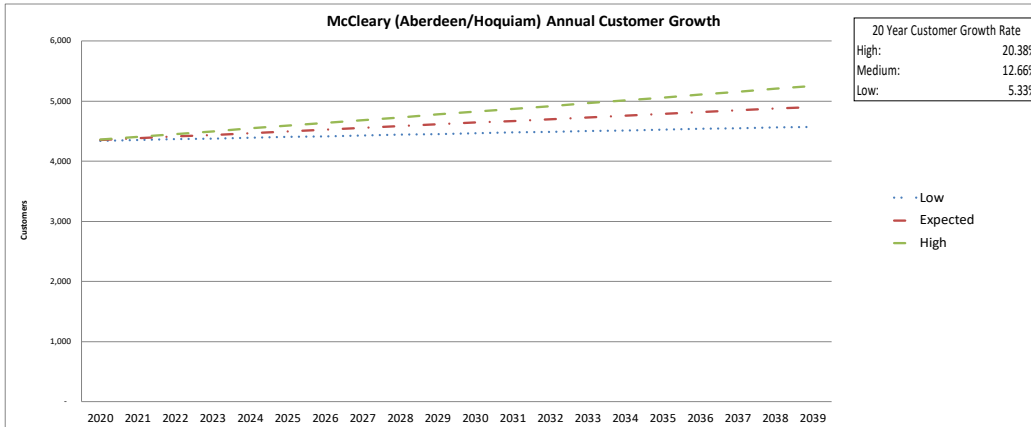
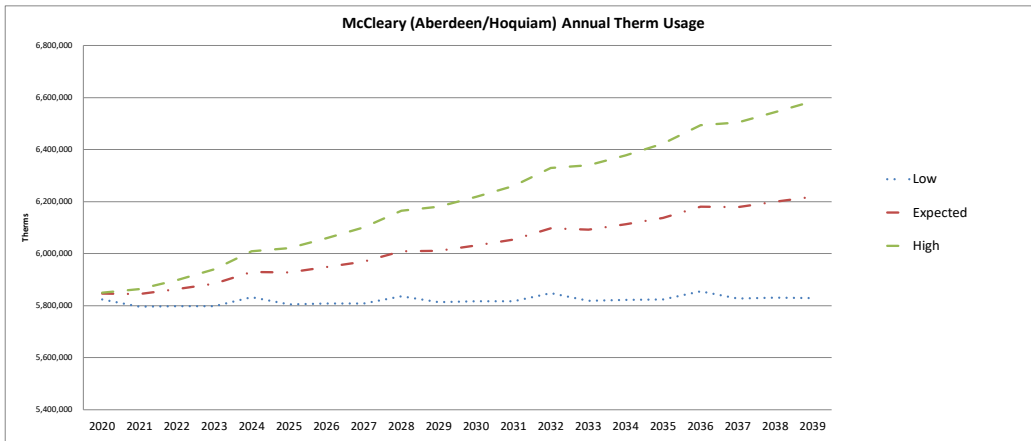
Table with columns for Therms Usage by Class. Sub-headers include Heating, Low, Expected, and High. Rows list years from 2020 to 2039 with usage metrics.

Table with columns for Annual Change. Sub-headers include Heating, Low, Expected, and High. Rows list years from 2020 to 2039 with percentage change metrics.

Customer Count Forecast

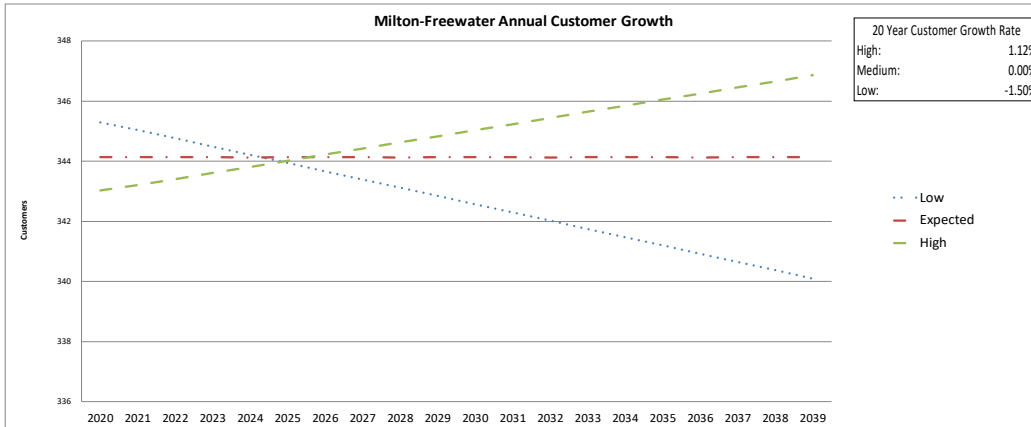
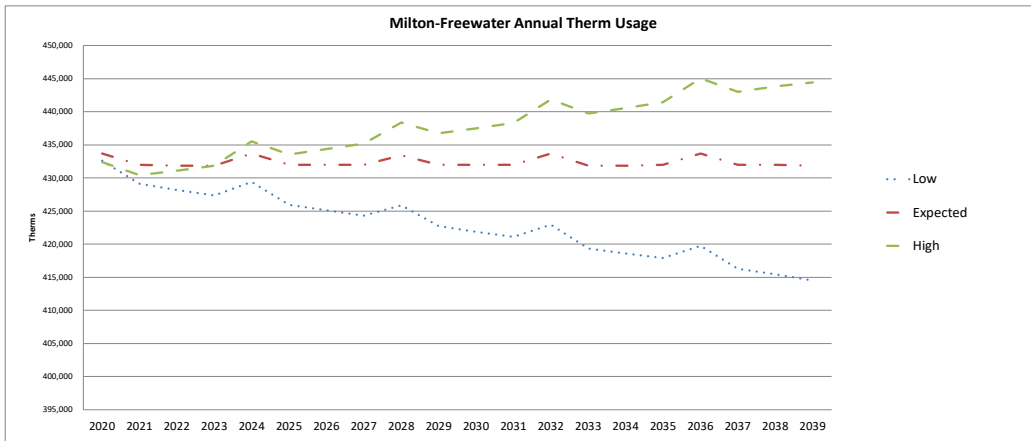
Table with columns for Customer Count Forecast. Sub-headers include Heating, Low, Expected, and High. Rows list years from 2020 to 2039 with customer count metrics.

Table with columns for Annual Change. Sub-headers include Heating, Low, Expected, and High. Rows list years from 2020 to 2039 with percentage change metrics.

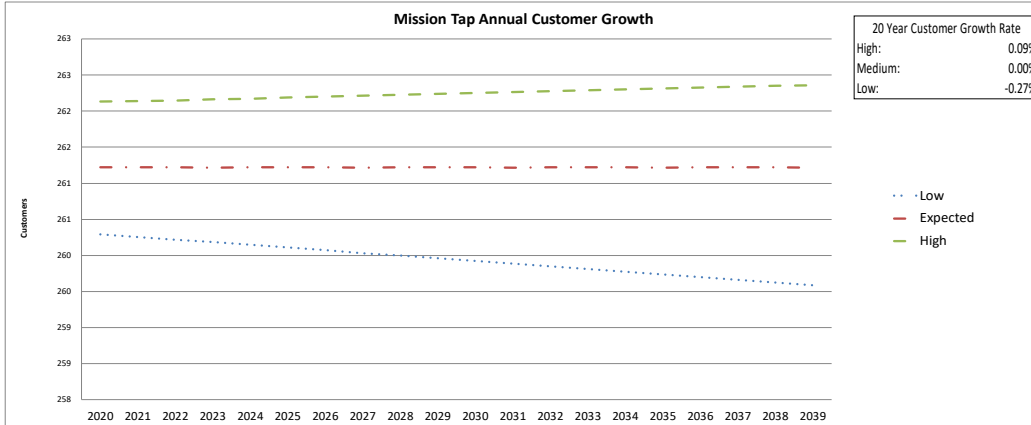
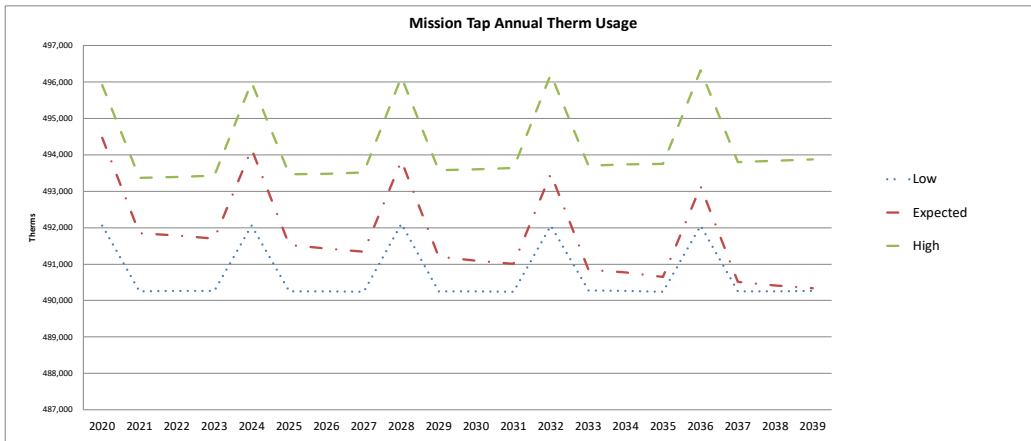






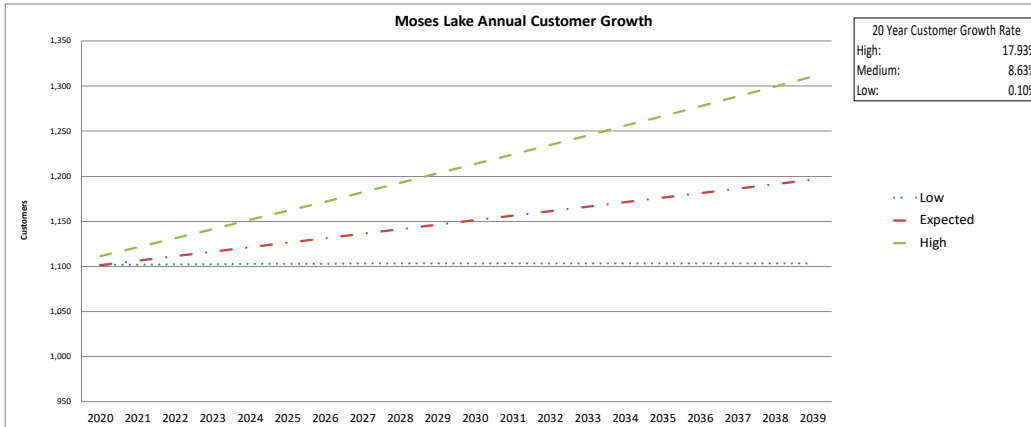
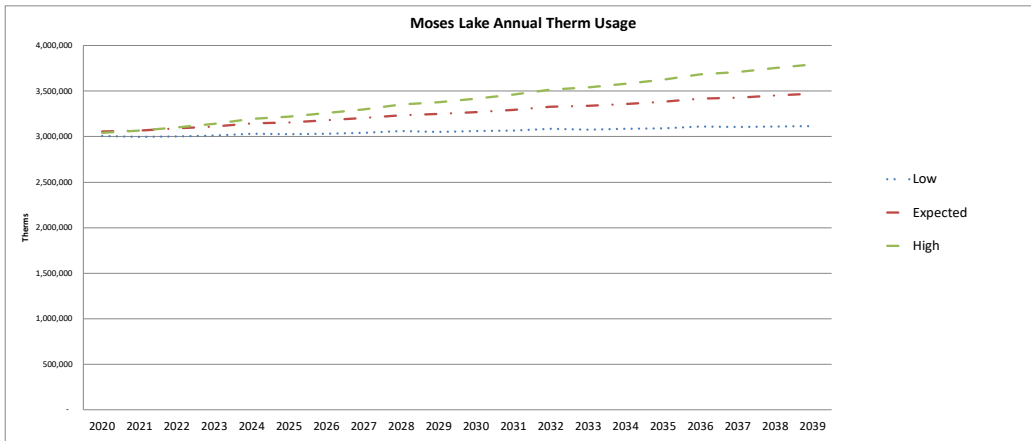






Cascade Natural Gas
2020 IRP Demand Forecast Summary Tables

Multiple data tables including: Moses Lake (Annual Requirements, Peak Day, Annual Change), Thermo Usage by Class, and Customer Count Forecast. Each table has columns for years (2020-2039) and various demand metrics, with multiple sub-columns for Low, Expected, and High scenarios.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Moxee (Beauchene)

Table with columns for Annual Requirements (Therms) and Annual Change, including sub-columns for Low, Expected, and High heating and baseload values.

Peak Day - Baseload

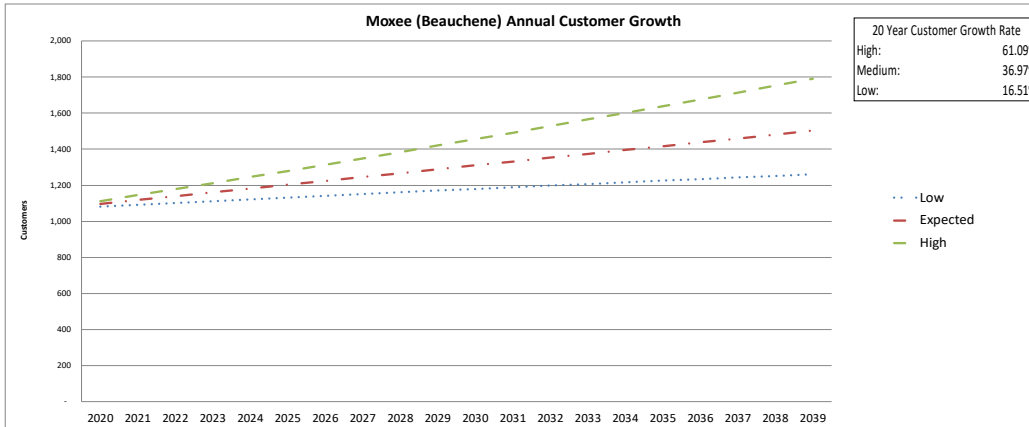
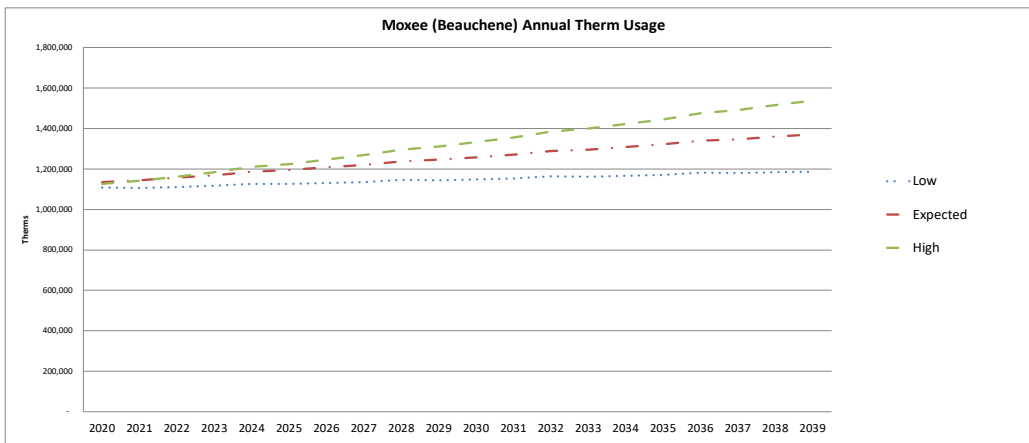
Table with columns for Peak Day - Baseload and Annual Change, including sub-columns for Low, Expected, and High baseload values.

Therms Usage by Class

Table with columns for Therms Usage by Class and Annual Change, including sub-columns for Low, Expected, and High usage values.

Customer Count Forecast

Table with columns for Customer Count Forecast and Annual Change, including sub-columns for Low, Expected, and High customer count values.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

North Bend

Table with columns for Annual Requirements (Therms) and Annual Change, including Heating, BaseLoad, and Total for Low, Expected, and High scenarios across years 2020-2039.

Peak Day - BaseLoad

Table with columns for Peak Day - BaseLoad and Annual Change, including Base, Peak, and Total for Low, Expected, and High scenarios across years 2020-2039.

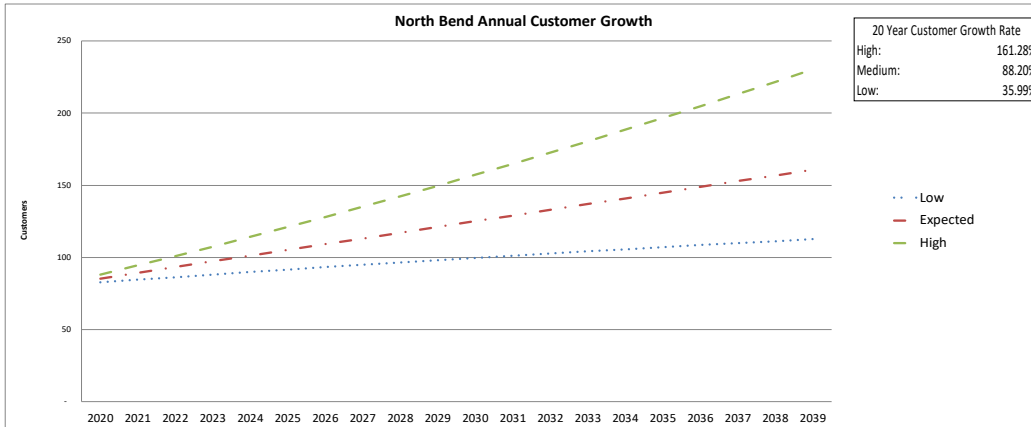
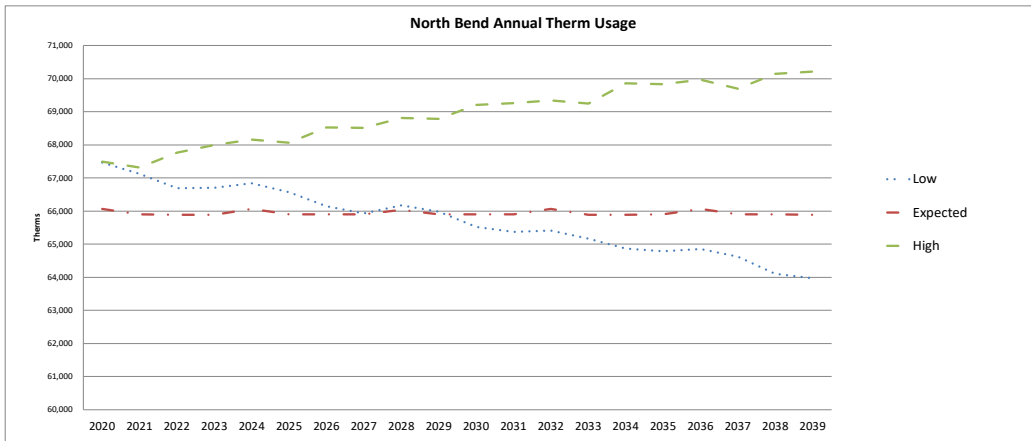
Therms Usage by Class

Table with columns for Therms Usage by Class and Annual Change, including Res, Com/Ind, and Total for Low, Expected, and High scenarios across years 2020-2039.

Customer Count Forecast

Table with columns for Customer Count Forecast and Annual Change, including Res, Com/Ind, and Total for Low, Expected, and High scenarios across years 2020-2039.





Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Nyssa-Ontario

Table with columns for Annual Requirements (Therms) and sub-columns for Low, Expected, and High heating and baseload values across years 2020-2039.

Table with columns for Annual Change and sub-columns for Low, Expected, and High heating and baseload percentage changes across years 2020-2039.

Table with columns for Peak Day - Baseload and sub-columns for Low, Expected, and High daily baseload and peak values across years 2020-2039.

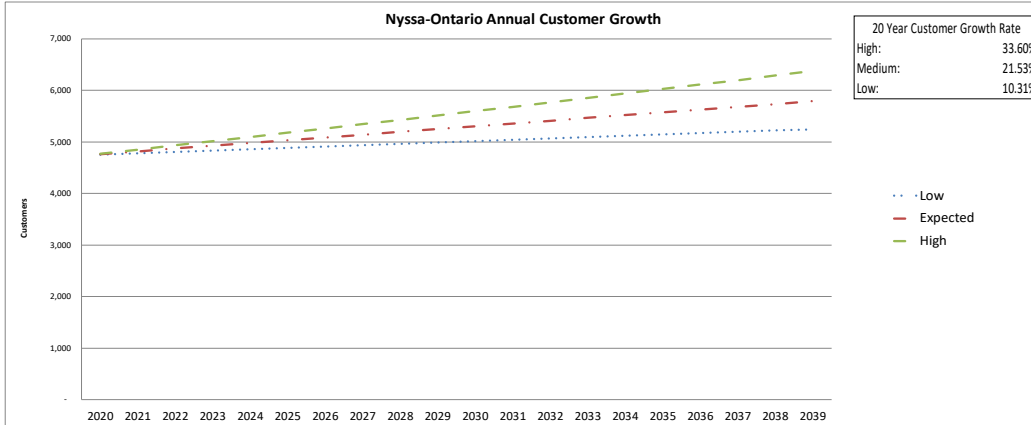
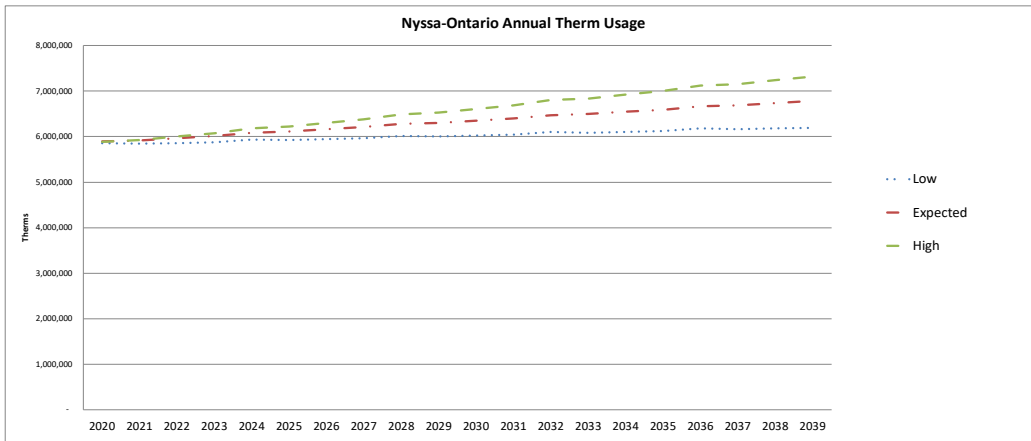
Table with columns for Annual Change and sub-columns for Low, Expected, and High daily baseload and peak percentage changes across years 2020-2039.

Table with columns for Therms Usage by Class and sub-columns for Low, Expected, and High Res, Com/Ind, and Total values across years 2020-2039.

Table with columns for Annual Change and sub-columns for Low, Expected, and High Res, Com/Ind, and Total percentage changes across years 2020-2039.

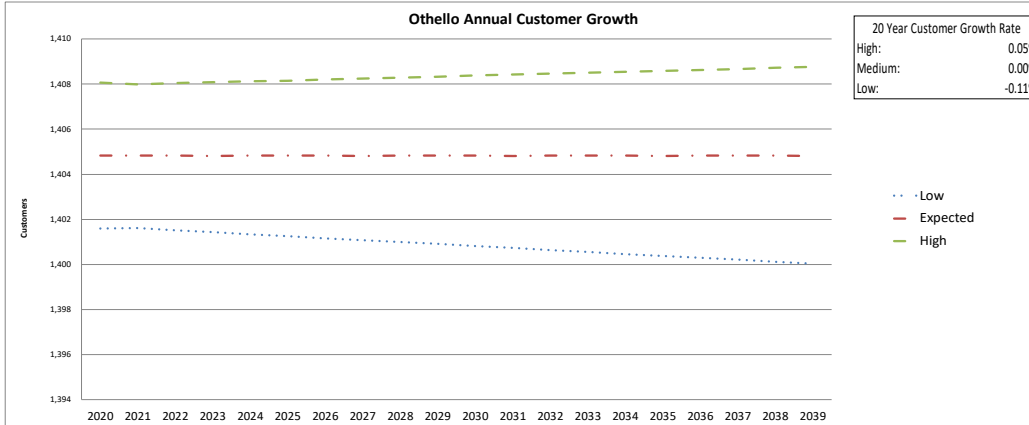
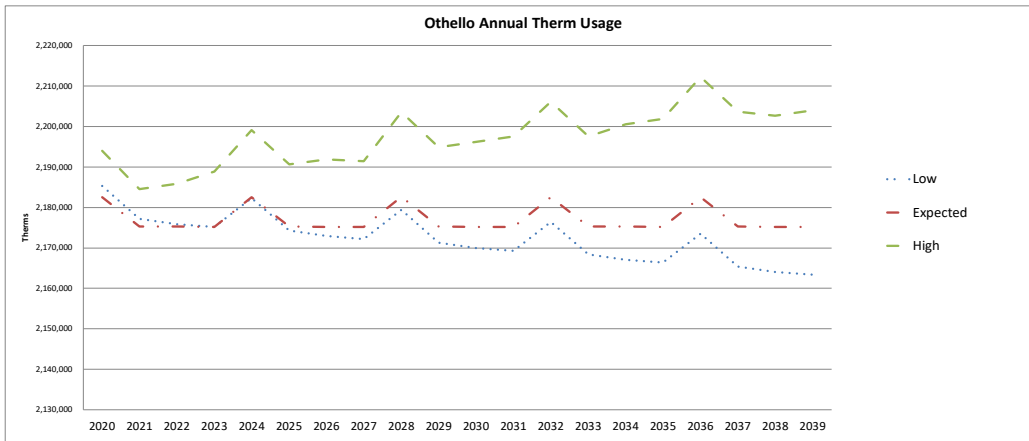
Table with columns for Customer Count Forecast and sub-columns for Low, Expected, and High Res, Com/Ind, and Total values across years 2020-2039.

Table with columns for Annual Change and sub-columns for Low, Expected, and High Res, Com/Ind, and Total percentage changes across years 2020-2039.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Table with multiple sections: Othello Annual Requirements (Therms), Annual Change, Peak Day - BaseLoad, Thermo Usage by Class, and Customer Count Forecast. Each section contains detailed data for years 2020-2039 across various metrics like Heating, BaseLoad, Total, and Com/In/d.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Patterson

Table with columns for Annual Requirements (Therms) and Annual Change, including sub-columns for Low, Expected, and High scenarios across Heating, BaseLoad, and Total categories.

Table with columns for Peak Day - BaseLoad and Thermo Usage by Class, including sub-columns for Low, Expected, and High scenarios across Daily BaseLoad, Peak, and Total categories.

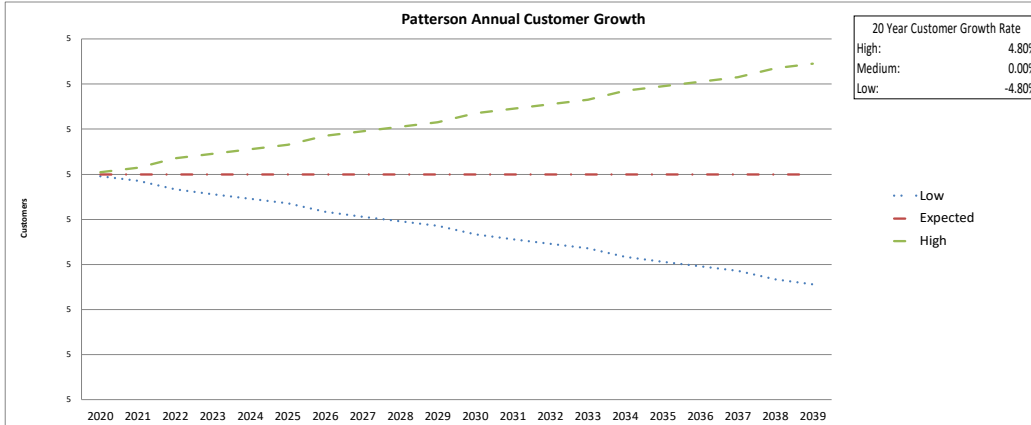
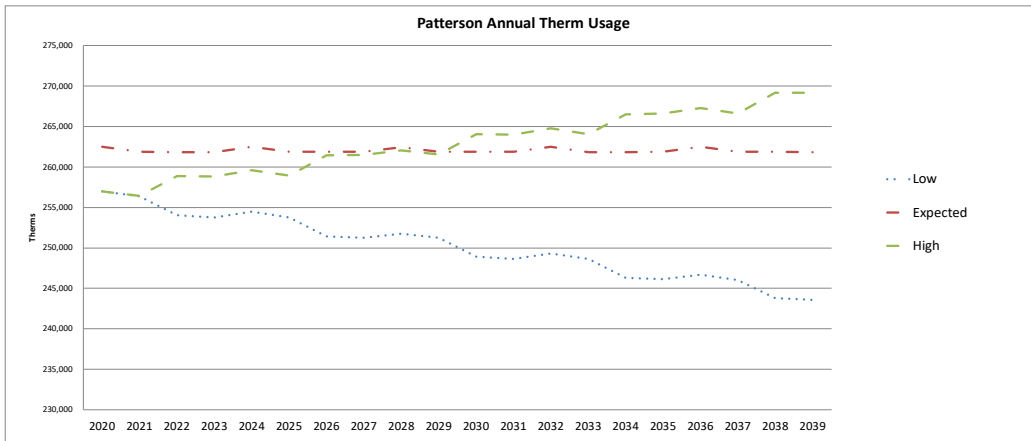
Table with columns for Annual Change, including sub-columns for Low, Expected, and High scenarios across Base, Peak, and Total categories.

Table with columns for Thermo Usage by Class, including sub-columns for Low, Expected, and High scenarios across Res, Com/Ind, and Total categories.

Table with columns for Annual Change, including sub-columns for Low, Expected, and High scenarios across Res, Com/Ind, and Total categories.

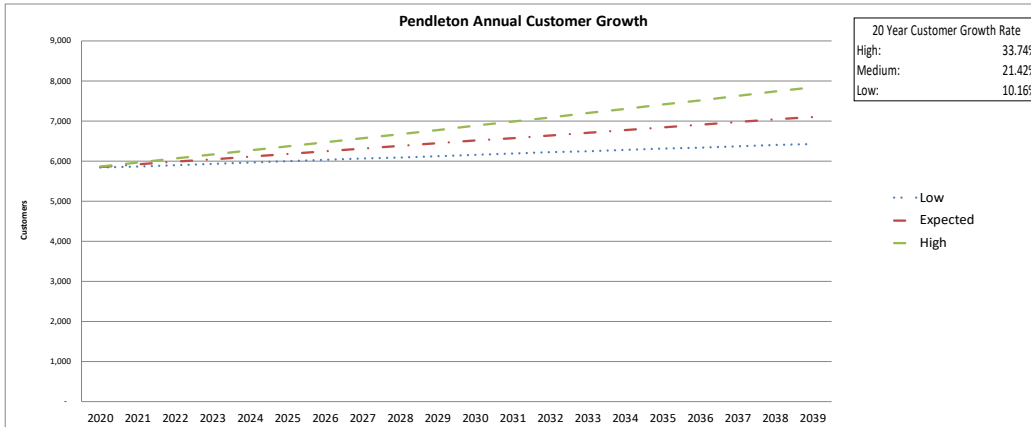
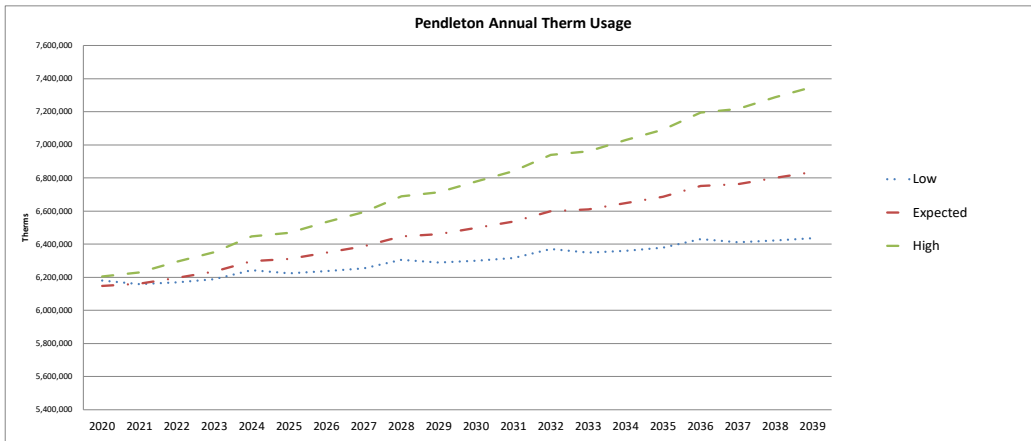
Table with columns for Customer Count Forecast, including sub-columns for Low, Expected, and High scenarios across Res, Com/Ind, and Total categories.

Table with columns for Annual Change, including sub-columns for Low, Expected, and High scenarios across Res, Com/Ind, and Total categories.

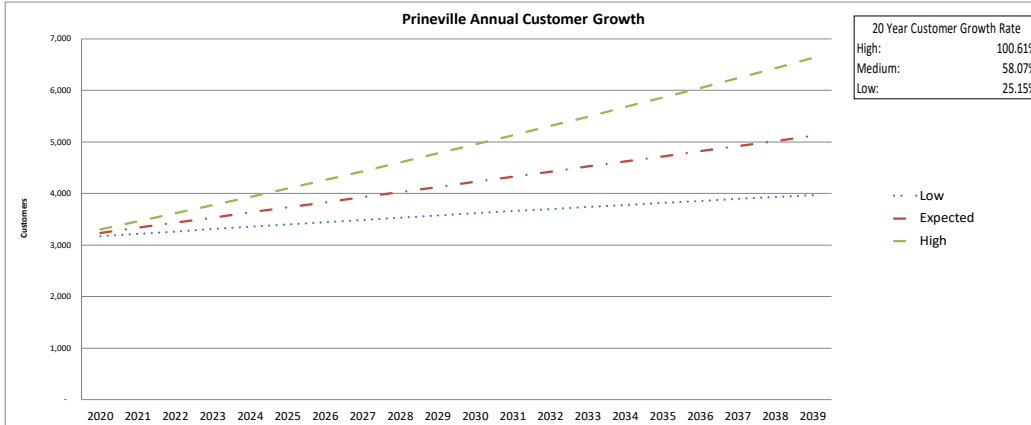
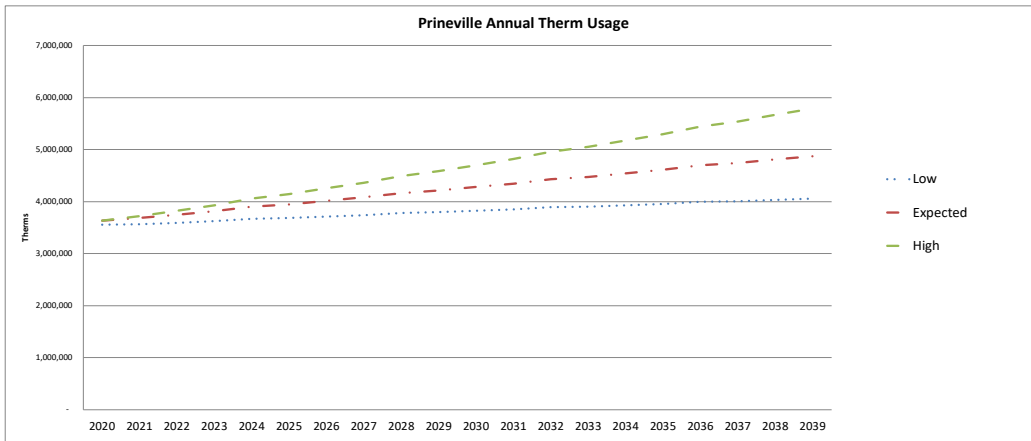












Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Pronghorn

Table with columns for Annual Requirements (Therms) and sub-columns for Low, Expected, and High heating and baseload values from 2020 to 2039.

Table with columns for Annual Change and sub-columns for Low, Expected, and High heating and baseload percentage changes from 2020 to 2039.

Peak Day - Baseload

Table with columns for Peak Day - Baseload and sub-columns for Low, Expected, and High daily baseload values from 2020 to 2039.

Table with columns for Annual Change and sub-columns for Low, Expected, and High daily baseload percentage changes from 2020 to 2039.

Therms Usage by Class

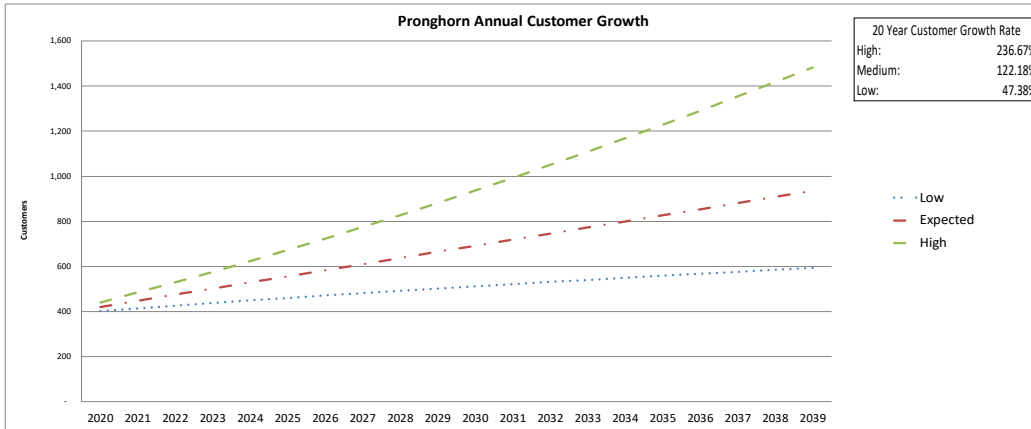
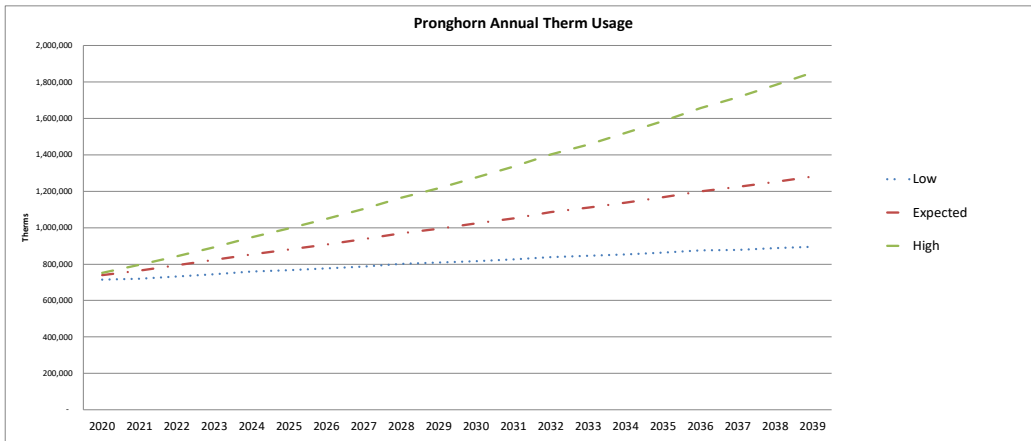
Table with columns for Therms Usage by Class and sub-columns for Low, Expected, and High usage by Res and Com/Ind from 2020 to 2039.

Table with columns for Annual Change and sub-columns for Low, Expected, and High usage by Res and Com/Ind percentage changes from 2020 to 2039.

Customer Count Forecast

Table with columns for Customer Count Forecast and sub-columns for Low, Expected, and High counts by Res and Com/Ind from 2020 to 2039.

Table with columns for Annual Change and sub-columns for Low, Expected, and High counts by Res and Com/Ind percentage changes from 2020 to 2039.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Prosser

Table with columns for Annual Requirements (Therms) and Annual Change, including sub-columns for Low, Expected, and High heating and baseload values.

Peak Day - Baseload

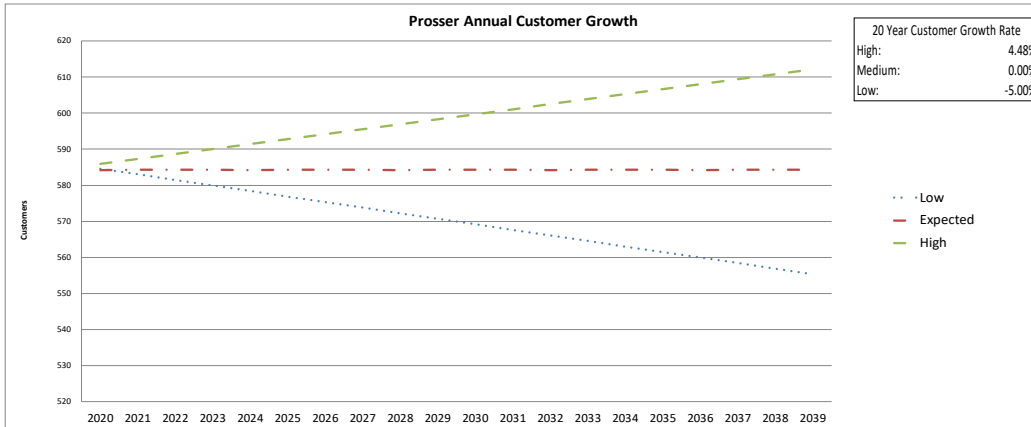
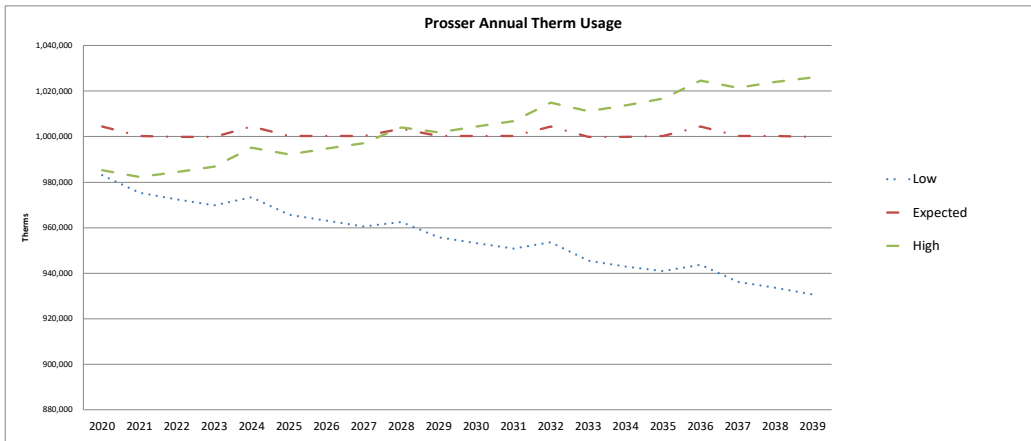
Table with columns for Peak Day - Baseload and Annual Change, including sub-columns for Low, Expected, and High values.

Therms Usage by Class

Table with columns for Therms Usage by Class and Annual Change, including sub-columns for Low, Expected, and High values.

Customer Count Forecast

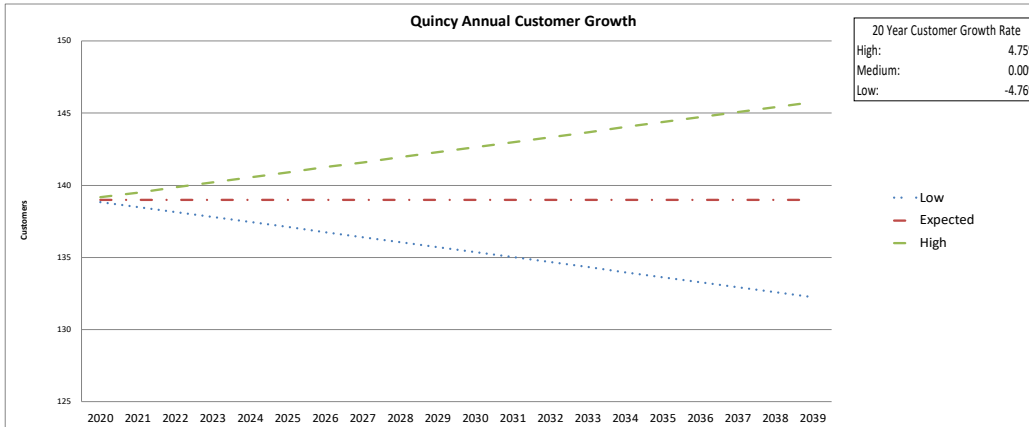
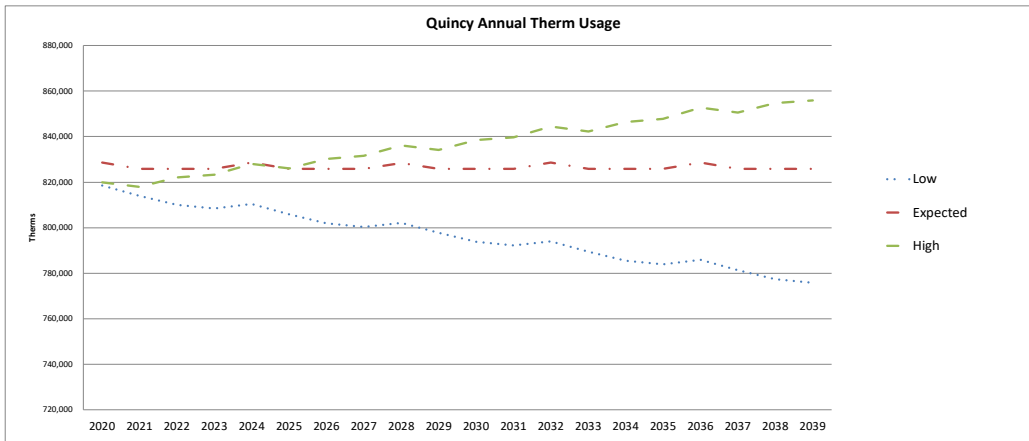
Table with columns for Customer Count Forecast and Annual Change, including sub-columns for Low, Expected, and High values.



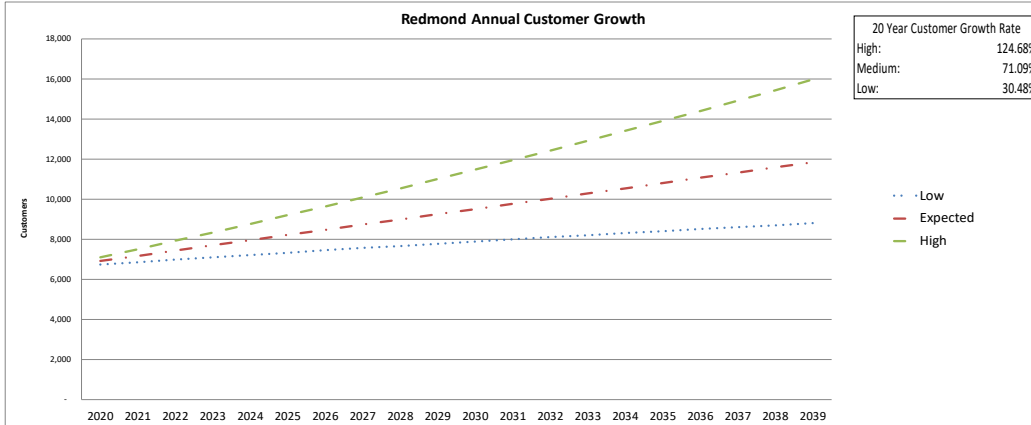
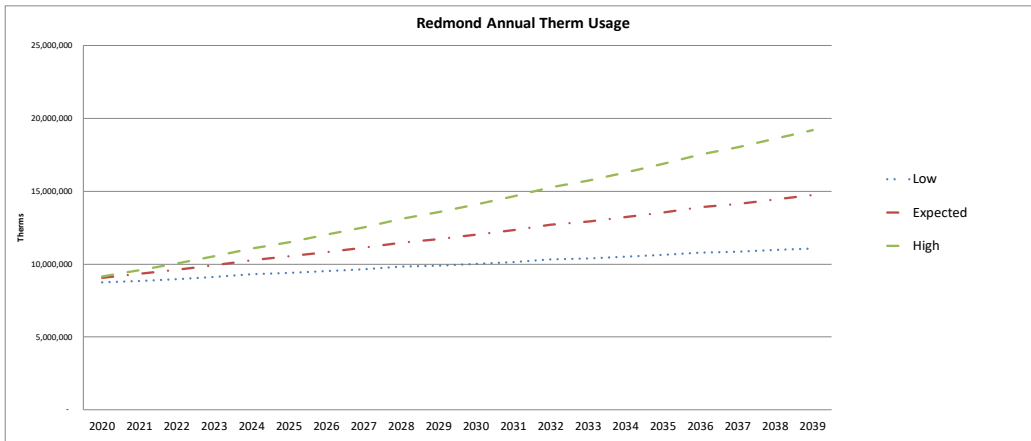
Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Table with multiple sections: Quincy Annual Requirements (Therms), Peak Day - BaseLoad, Thermo Usage by Class, and Customer Count Forecast. Each section contains columns for years (2020-2039) and various demand metrics (Low, Expected, High) with associated percentage changes.









Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

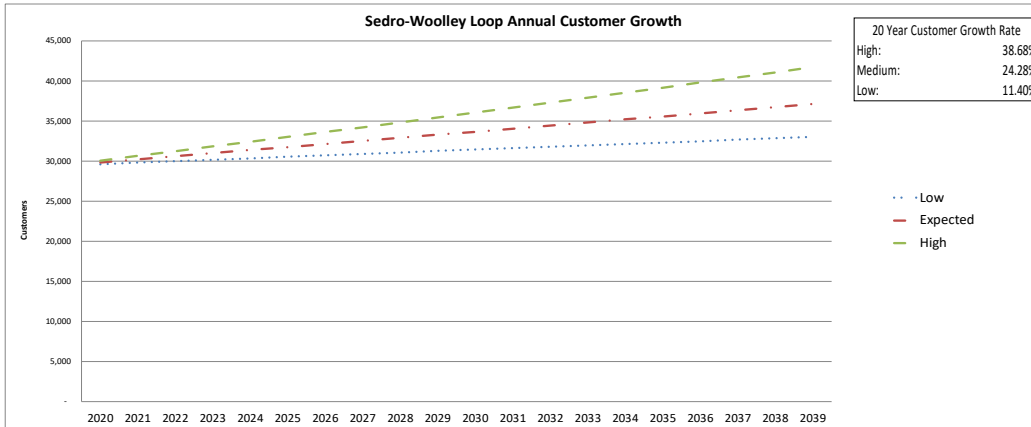
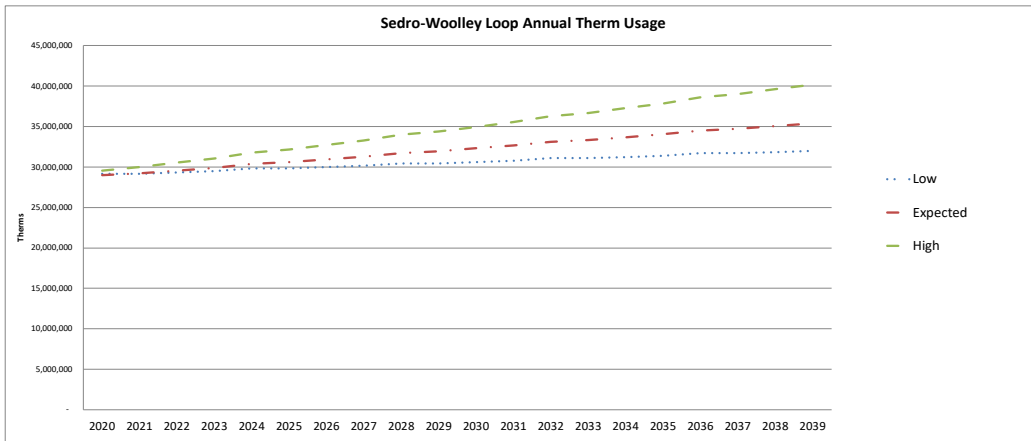
Sedro-Woolley Loop

Table with columns for Annual Requirements (Therms) and Annual Change. It includes sub-tables for Heating, Low, Expected, and High across various years from 2020 to 2039.

Table with columns for Peak Day - BaseLoad and Annual Change. It includes sub-tables for Low, Expected, and High across various years from 2020 to 2039.

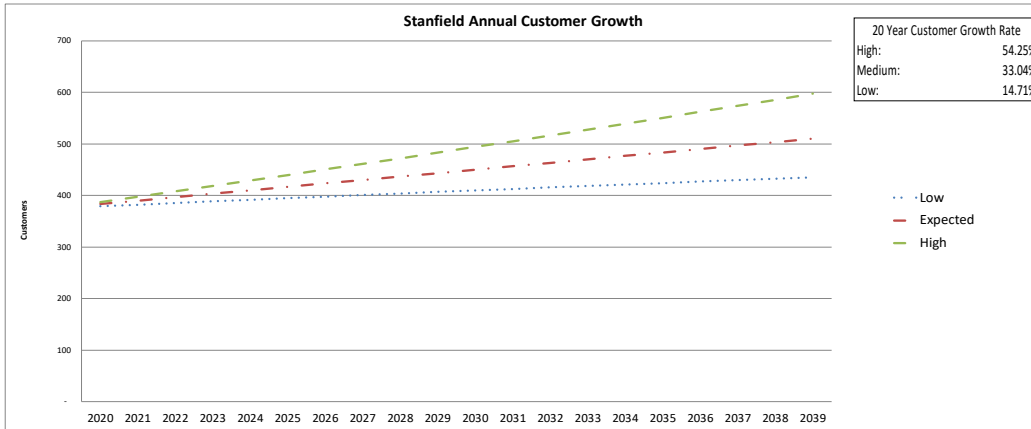
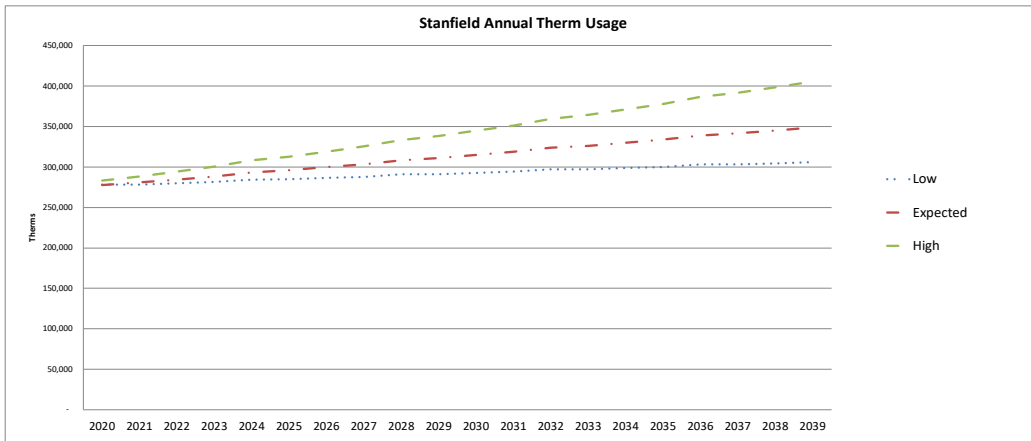
Table with columns for Therms Usage by Class and Annual Change. It includes sub-tables for Low, Expected, and High across various years from 2020 to 2039.

Table with columns for Customer Count Forecast and Annual Change. It includes sub-tables for Low, Expected, and High across various years from 2020 to 2039.



Cascade Natural Gas
2020 IRP Demand Forecast Summary Tables

Stanfield
Annual Requirements (Therms)
Annual Change
Peak Day - BaseLoad
Therms Usage by Class
Customer Count Forecast



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Stearns (Sunriver)

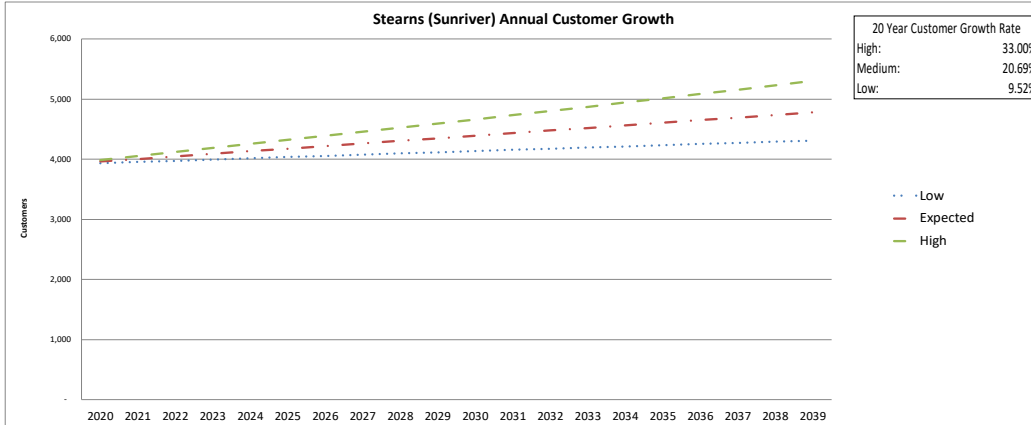
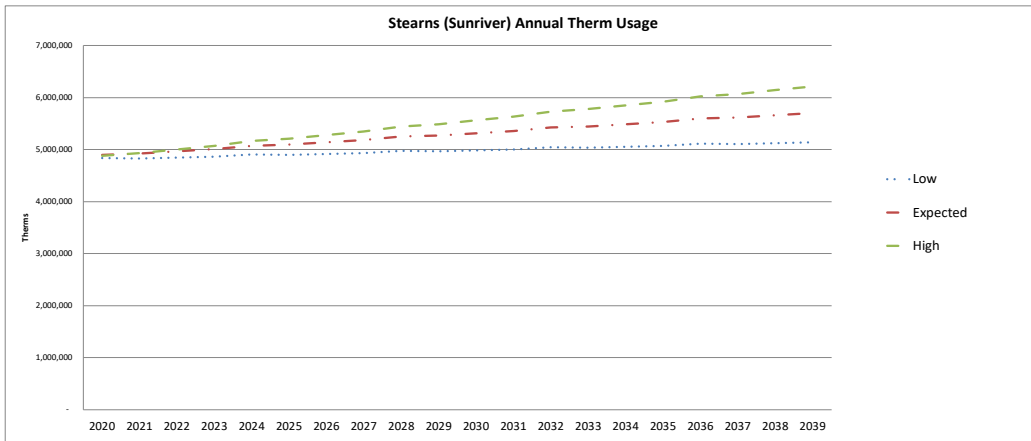
Table with columns for Annual Requirements (Therms) and Annual Change. Rows include Heating, BaseLoad, Total, and Expected values for years 2020-2039.

Table with columns for Peak Day - BaseLoad and Annual Change. Rows include Base, Peak, Total, and Expected values for years 2020-2039.

Table with columns for Therms Usage by Class and Annual Change. Rows include Res, Com/Ind, Total, and Expected values for years 2020-2039.

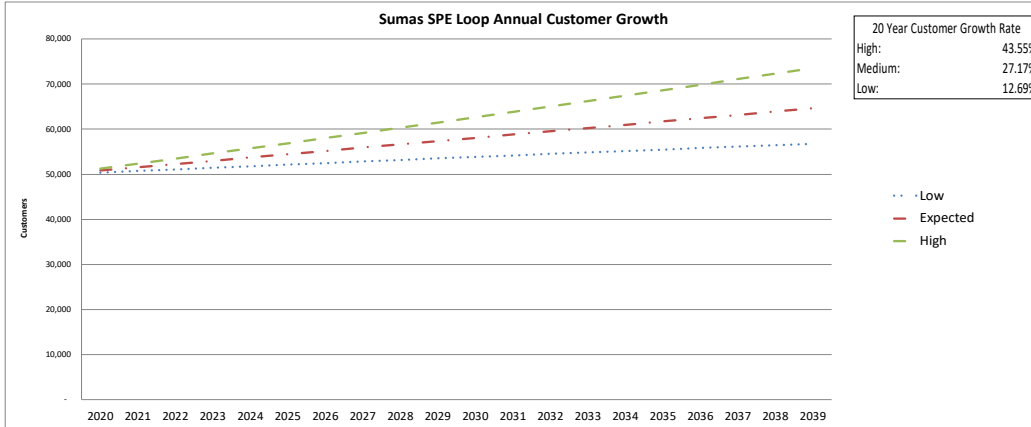
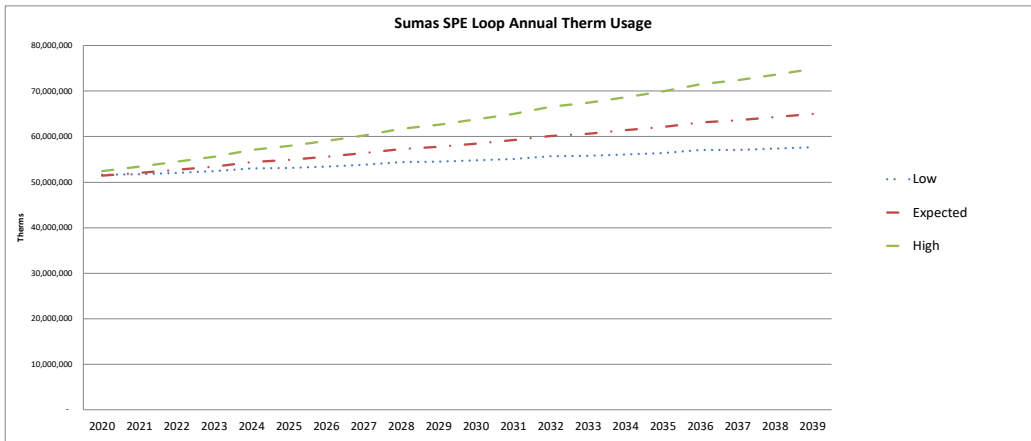
Table with columns for Customer Count Forecast and Annual Change. Rows include Res, Com/Ind, Total, and Expected values for years 2020-2039.





Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Sumas SPE Loop. Annual Requirements (Therms), Annual Change, Peak Day - Base Load, Thermo Usage by Class, Customer Count Forecast.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Sunnyside

Table with columns for Annual Requirements (Therms) and Annual Change, including sub-sections for Low, Expected, and High heating and baseload values.

Peak Day - Baseload

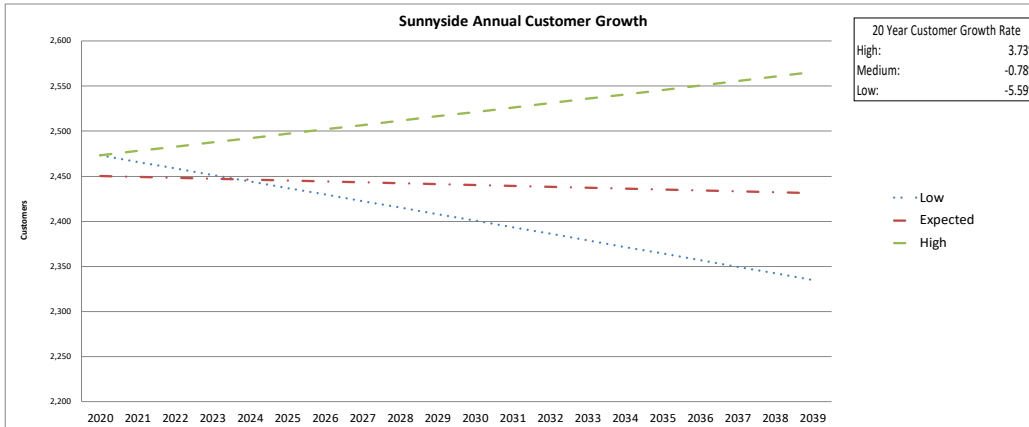
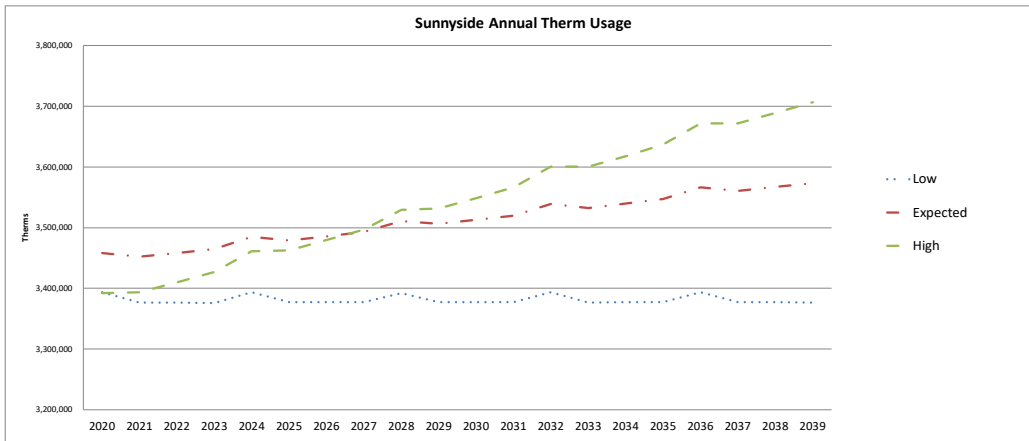
Table with columns for Low, Expected, and High baseload values, including sub-sections for Daily Baseload, Peak, and Total.

Therms Usage by Class

Table with columns for Low, Expected, and High therm usage, including sub-sections for Res, Com/Ind, and Total.

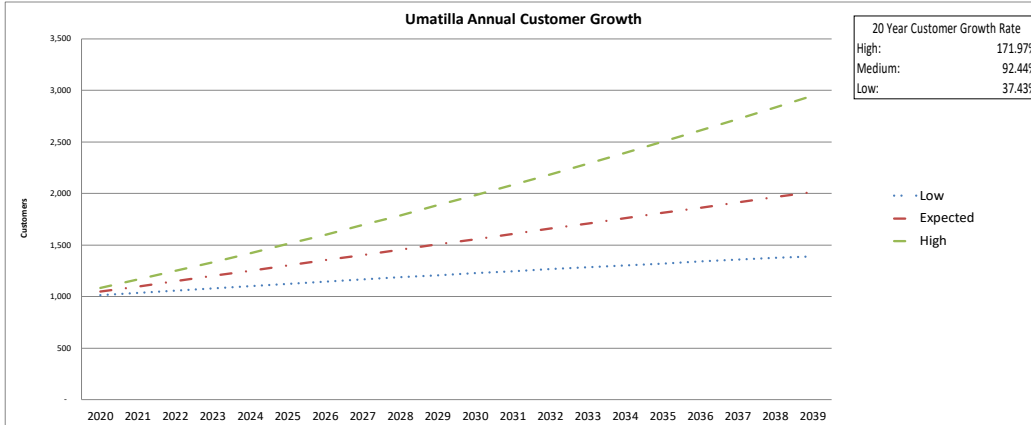
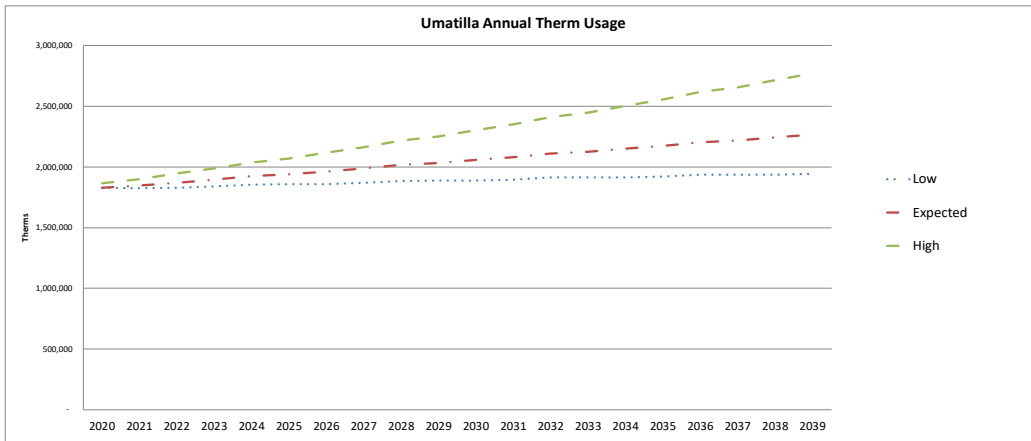
Customer Count Forecast

Table with columns for Low, Expected, and High customer counts, including sub-sections for Res, Com/Ind, and Total.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Umatilla Annual Requirements (Therms) and Annual Change tables. Includes columns for Heating, BaseLoad, Total, and Expected/High values across years 2020-2039. Also includes Peak Day: BaseLoad and Thermo Usage by Class tables.



Cascade Natural Gas
2020 IRP Demand Forecast Summary Tables

Walla Walla

Annual Requirements (Therms) table with columns for Low, Expected, and High scenarios across Heating and Baseload categories for years 2020-2039.

Peak Day - Baseload table with columns for Low, Expected, and High scenarios across Daily Baseload, Peak, and Total categories for years 2020-2039.

Therms Usage by Class table with columns for Low, Expected, and High scenarios across Com/In/d, Total, Res, and Com/In/d categories for years 2020-2039.

Customer Count Forecast table with columns for Low, Expected, and High scenarios across Res, Com/In/d, and Total categories for years 2020-2039.

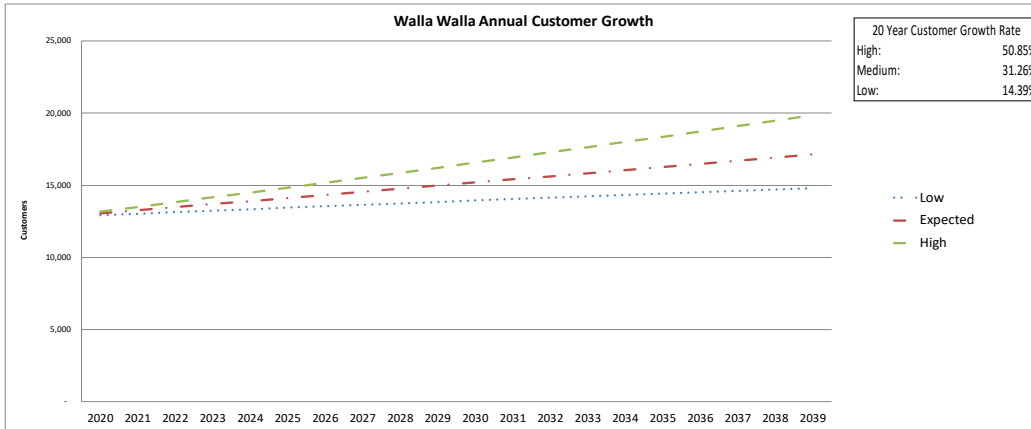
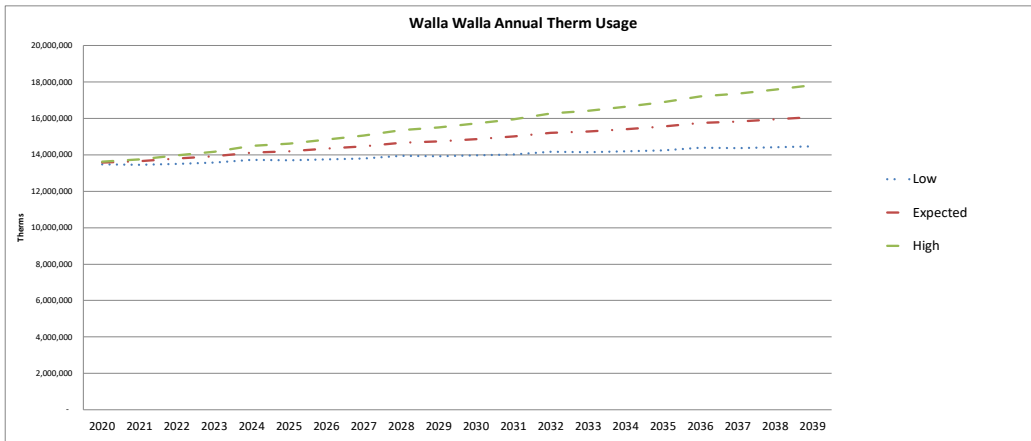
Annual Change table with columns for Low, Expected, and High scenarios across Heating and Baseload categories for years 2020-2039.

Annual Change table with columns for Low, Expected, and High scenarios across Base, Peak, and Total categories for years 2020-2039.

Annual Change table with columns for Low, Expected, and High scenarios across Res, Com/In/d, and Total categories for years 2020-2039.

Annual Change table with columns for Low, Expected, and High scenarios across Res, Com/In/d, and Total categories for years 2020-2039.





Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

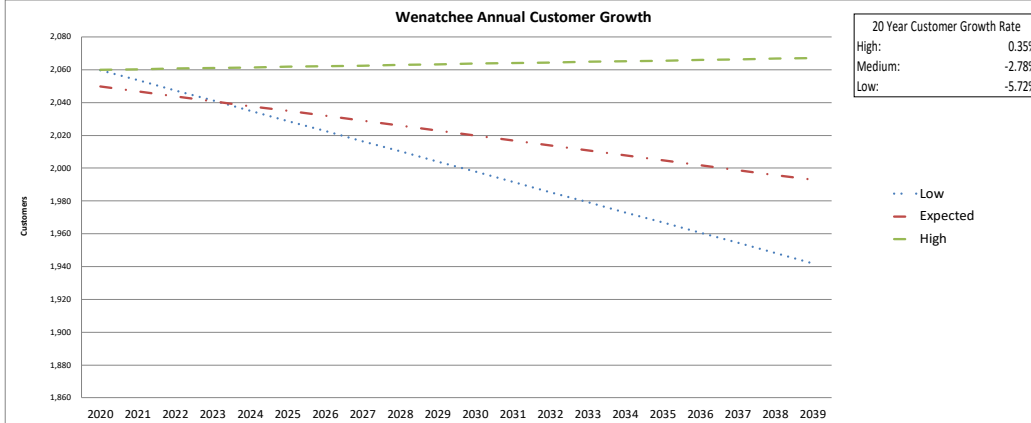
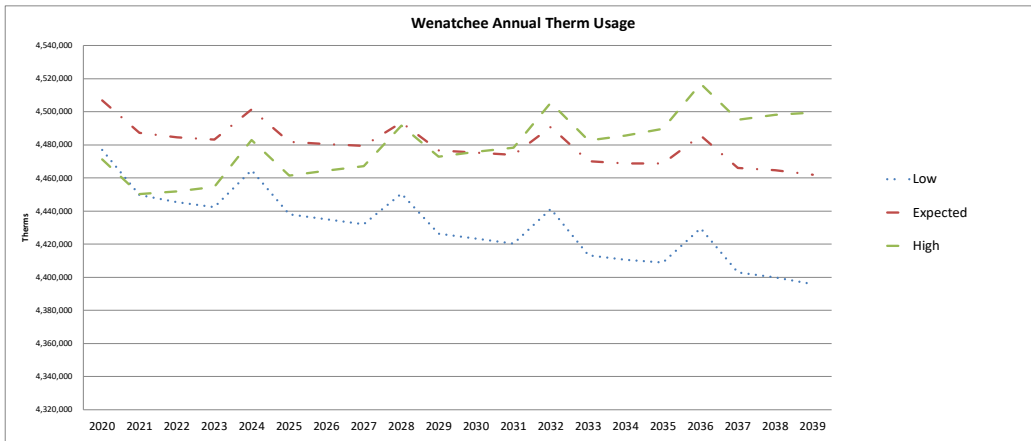
Wenatchee

Annual Requirements (Therms) table with columns for Heating, BaseLoad, Total, Expected, and High across years 2020-2039.

Peak Day - BaseLoad table with columns for Daily BaseLoad, Peak, Total, Expected, and High across years 2020-2039.

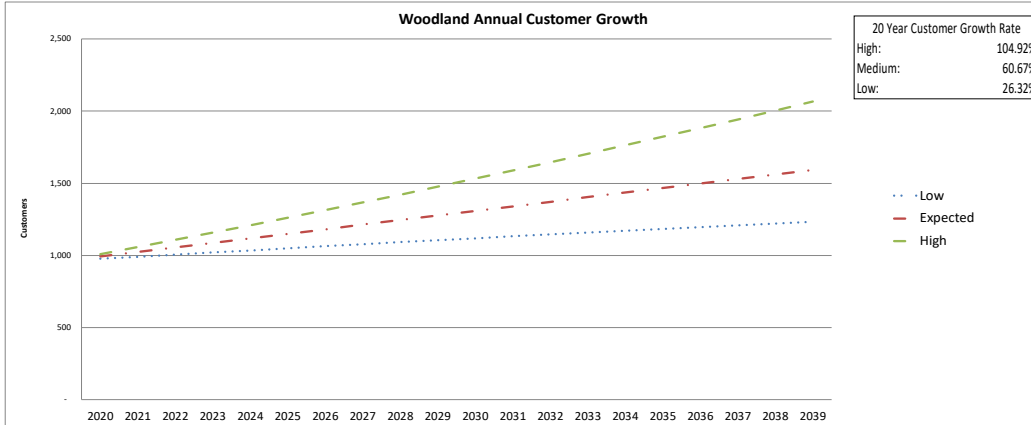
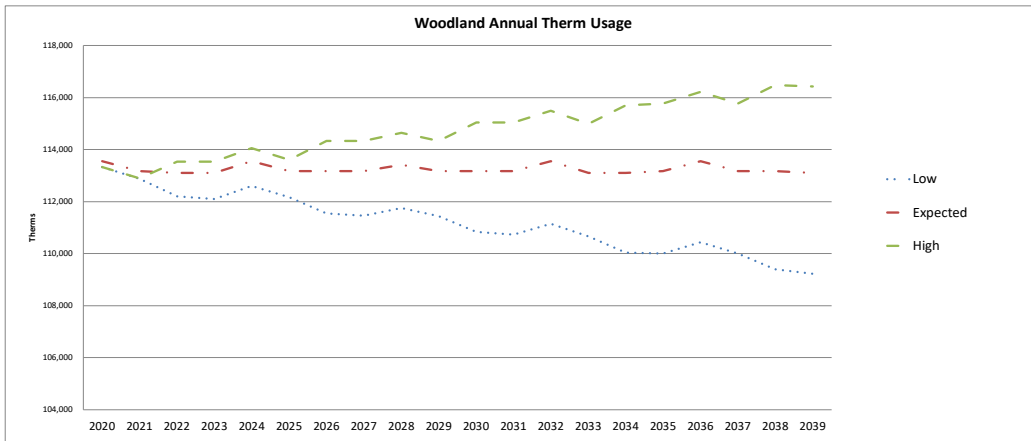
Therms Usage by Class table with columns for Res, Com/Ind, Total, Expected, and High across years 2020-2039.

Customer Count Forecast table with columns for Res, Com/Ind, Total, Expected, and High across years 2020-2039.



Cascade Natural Gas  
2020 IRP Demand Forecast Summary Tables

Woodland
Annual Requirements (Therms)
Annual Change
Peak Day - BaseLoad
Therms Usage by Class
Customer Count Forecast



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Yakima Chief Ranch

Table with columns for Annual Requirements (Therms) and Annual Change. Rows include years 2020-2039 and categories Low, Expected, High.

Table with columns for Peak Day - BaseLoad and Thermo Usage by Class. Rows include years 2020-2039 and categories Low, Expected, High.

Table with columns for Annual Change. Rows include years 2020-2039 and categories Low, Expected, High.

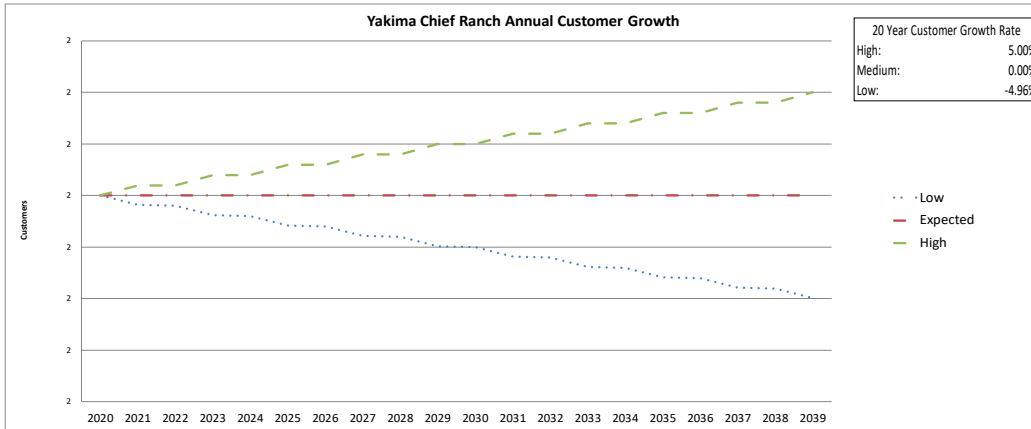
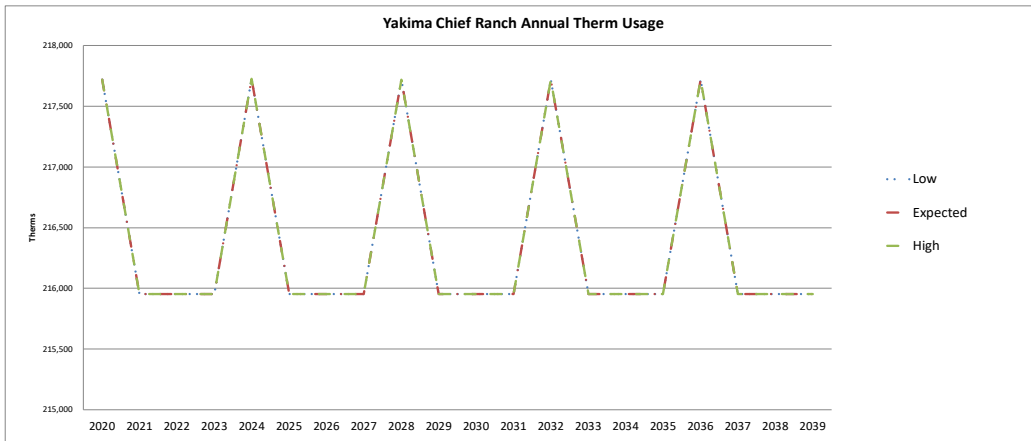
Table with columns for Annual Change. Rows include years 2020-2039 and categories Low, Expected, High.

Table with columns for Thermo Usage by Class. Rows include years 2020-2039 and categories Low, Expected, High.

Table with columns for Annual Change. Rows include years 2020-2039 and categories Low, Expected, High.

Table with columns for Customer Count Forecast. Rows include years 2020-2039 and categories Low, Expected, High.

Table with columns for Annual Change. Rows include years 2020-2039 and categories Low, Expected, High.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Yakima Loop

Table with columns: Heating, BaseLoad, Total, Expected (Heating, BaseLoad, Total), High (Heating, BaseLoad, Total). Rows 2020-2039.

Table with columns: Heating, BaseLoad, Total, Expected (Heating, BaseLoad, Total), High (Heating, BaseLoad, Total), Annual Change (Heating, BaseLoad, Total). Rows 2020-2039.

Table with columns: Daily BaseLoad, Peak, Total, Expected (Daily BaseLoad, Peak, Total), High (Daily BaseLoad, Peak, Total). Rows 2020-2039.

Table with columns: Base, Peak, Total, Expected (Base, Peak, Total), High (Base, Peak, Total), Annual Change (Base, Peak, Total). Rows 2020-2039.

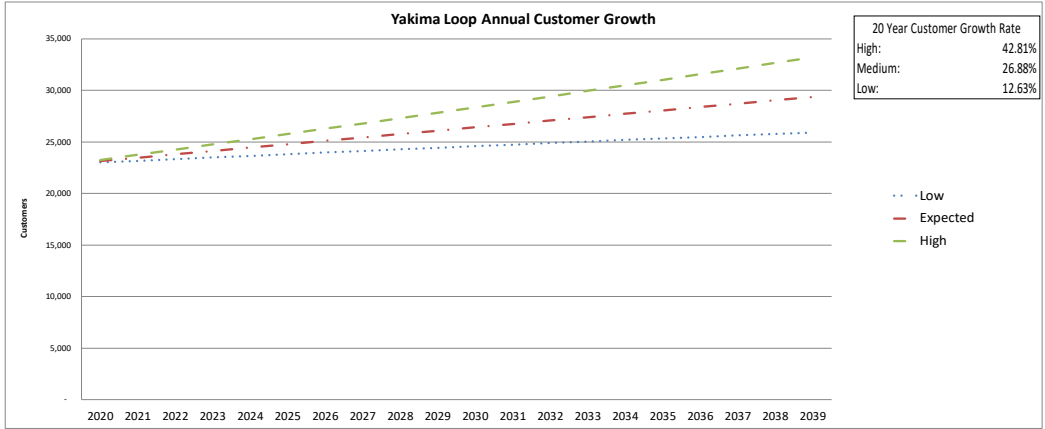
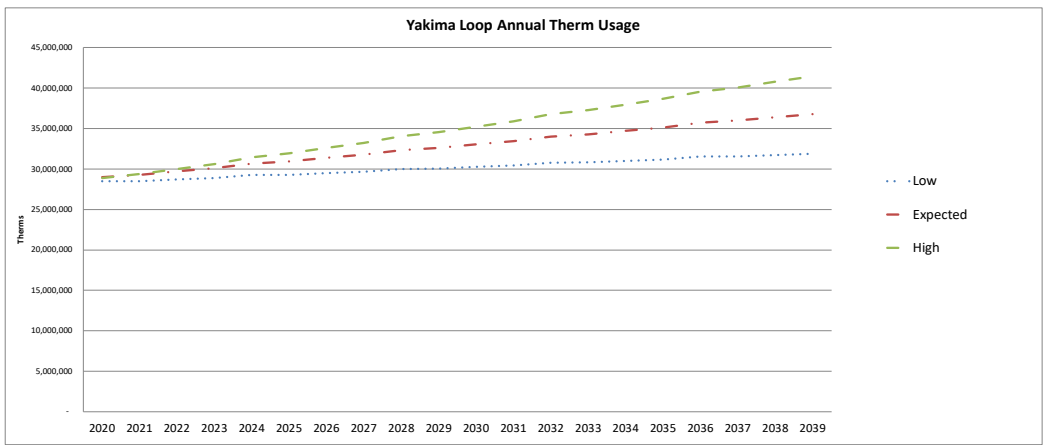
Table with columns: Res, Com/In/d, Total, Expected (Res, Com/In/d, Total), High (Res, Com/In/d, Total). Rows 2020-2039.

Table with columns: Res, Com/In/d, Total, Expected (Res, Com/In/d, Total), High (Res, Com/In/d, Total), Annual Change (Res, Com/In/d, Total). Rows 2020-2039.

Table with columns: Res, Com/In/d, Total, Expected (Res, Com/In/d, Total), High (Res, Com/In/d, Total). Rows 2020-2039.

Table with columns: Res, Com/In/d, Total, Expected (Res, Com/In/d, Total), High (Res, Com/In/d, Total), Annual Change (Res, Com/In/d, Total). Rows 2020-2039.





Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Yakima Training Center

Table with columns: Heating, Baseload, Total, Expected (Heating, Baseload, Total), High (Heating, Baseload, Total). Rows 2020-2039.

Table with columns: Heating, Baseload, Total, Expected (Heating, Baseload, Total), High (Heating, Baseload, Total). Rows 2020-2039.

Table with columns: Daily Baseload, Peak, Total, Expected (Daily Baseload, Peak, Total), High (Daily Baseload, Peak, Total). Rows 2020-2039.

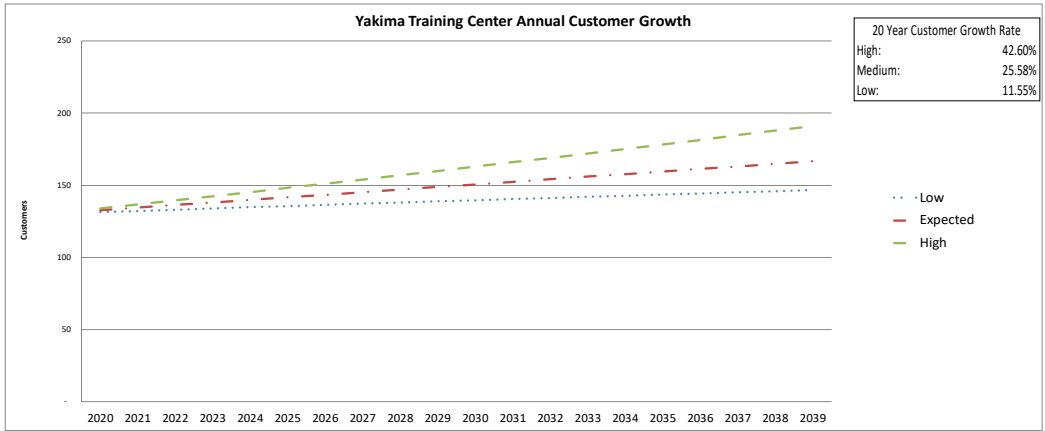
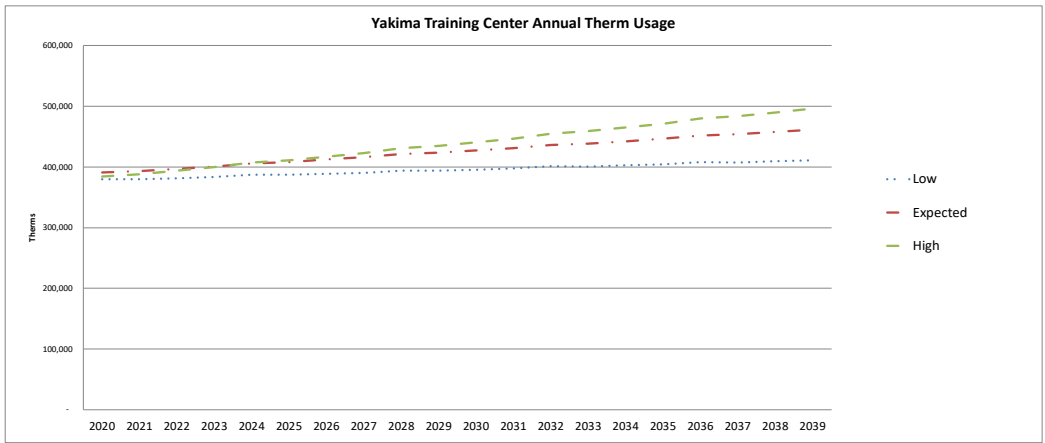
Table with columns: Base, Peak, Total, Expected (Base, Peak, Total), High (Base, Peak, Total). Rows 2020-2039.

Table with columns: Res, Com/Ind, Total, Expected (Res, Com/Ind, Total), High (Res, Com/Ind, Total). Rows 2020-2039.

Table with columns: Res, Com/Ind, Total, Expected (Res, Com/Ind, Total), High (Res, Com/Ind, Total). Rows 2020-2039.

Table with columns: Res, Com/Ind, Total, Expected (Res, Com/Ind, Total), High (Res, Com/Ind, Total). Rows 2020-2039.

Table with columns: Res, Com/Ind, Total, Expected (Res, Com/Ind, Total), High (Res, Com/Ind, Total). Rows 2020-2039.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Zillah (Toppenish)

Annual Requirements (Therms) table with columns for Low, Expected, and High heating and baseload values for years 2020-2039.

Annual Change table with columns for Low, Expected, and High heating and baseload percentage changes for years 2020-2039.

Peak Day - Baseload table with columns for Low, Expected, and High daily baseload values for years 2020-2039.

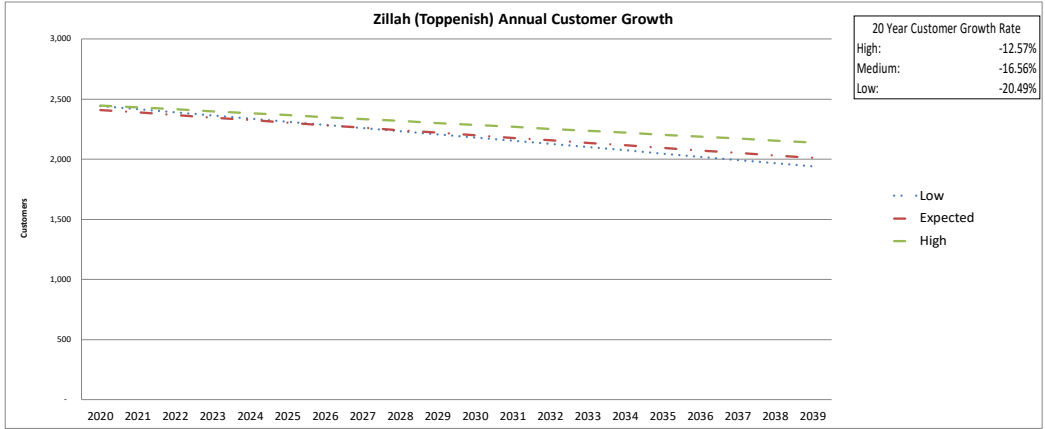
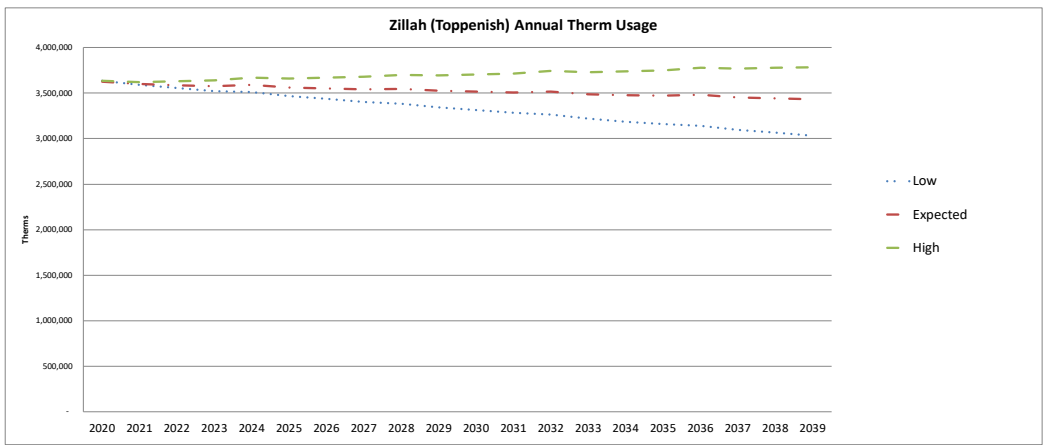
Annual Change table with columns for Low, Expected, and High base, peak, and total percentage changes for years 2020-2039.

Therms Usage by Class table with columns for Low, Expected, and High usage values for years 2020-2039.

Annual Change table with columns for Low, Expected, and High usage percentage changes for years 2020-2039.

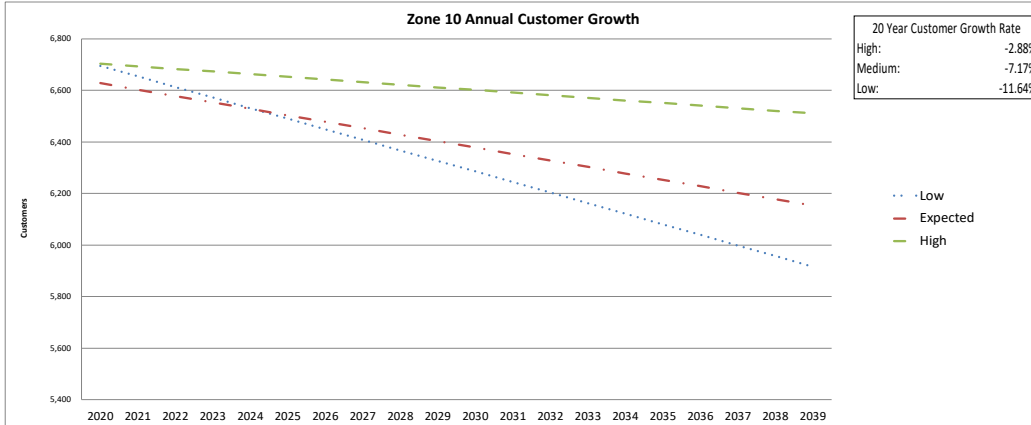
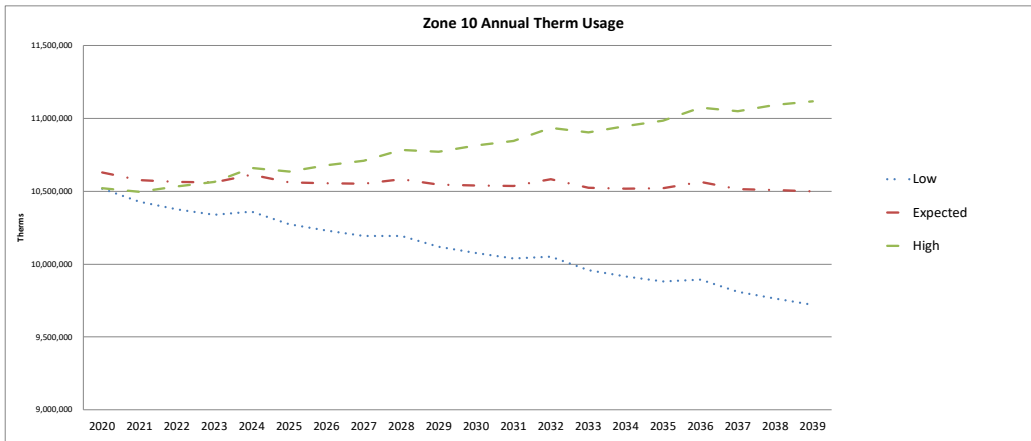
Customer Count Forecast table with columns for Low, Expected, and High customer counts for years 2020-2039.

Annual Change table with columns for Low, Expected, and High customer count percentage changes for years 2020-2039.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Table with multiple sections: Zone 10 Annual Requirements (Therms), Peak Day - BaseLoad, Thermo Usage by Class, and Customer Count Forecast. Each section contains columns for Low, Expected, and High scenarios across various metrics like Heating, BaseLoad, and Total.



Cascade Natural Gas  
2020 IRP Demand Forecast Summary Tables

Zone 11

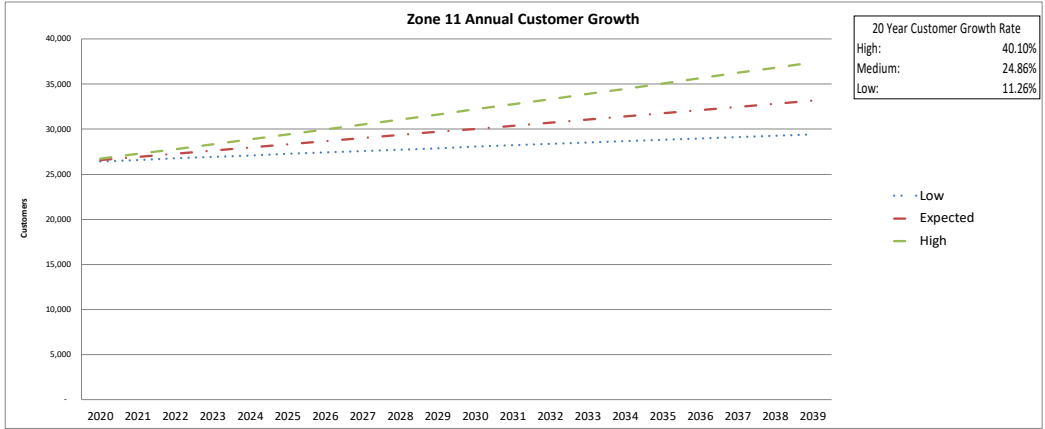
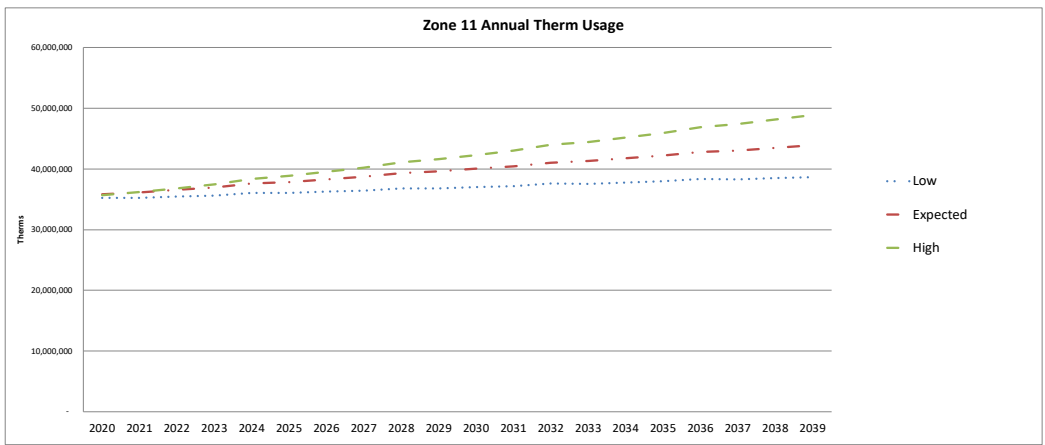
Table with columns for Annual Requirements (Therms) and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years (2020-2039).

Table with columns for Peak Day - BaseLoad and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years (2020-2039).

Table with columns for Therms Usage by Class and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years (2020-2039).

Table with columns for Customer Count Forecast and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years (2020-2039).





Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Zone 20

Table with columns for Annual Requirements (Therms) and Annual Change. It includes sub-tables for Low, Expected, and High heating and baseload requirements across various years from 2020 to 2039.

Table with columns for Peak Day - Baseload and Annual Change. It includes sub-tables for Low, Expected, and High baseload requirements across various years from 2020 to 2039.

Table with columns for Therms Usage by Class and Annual Change. It includes sub-tables for Low, Expected, and High usage across various years from 2020 to 2039.

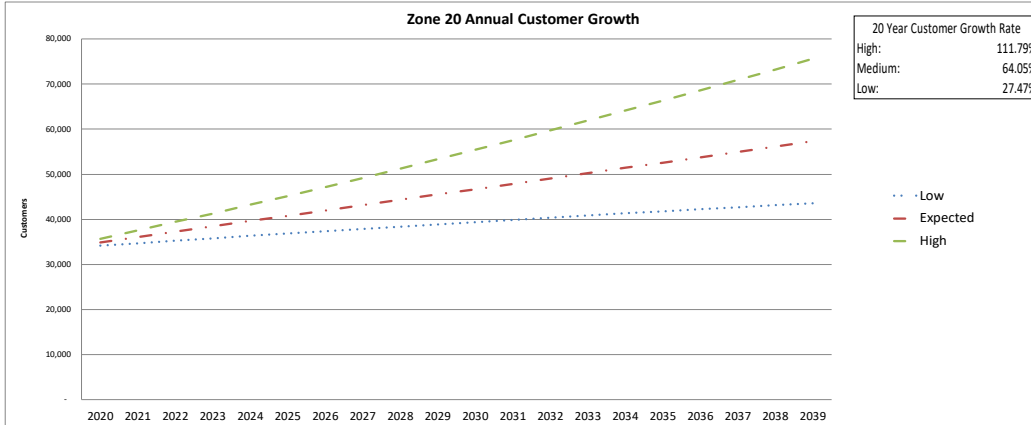
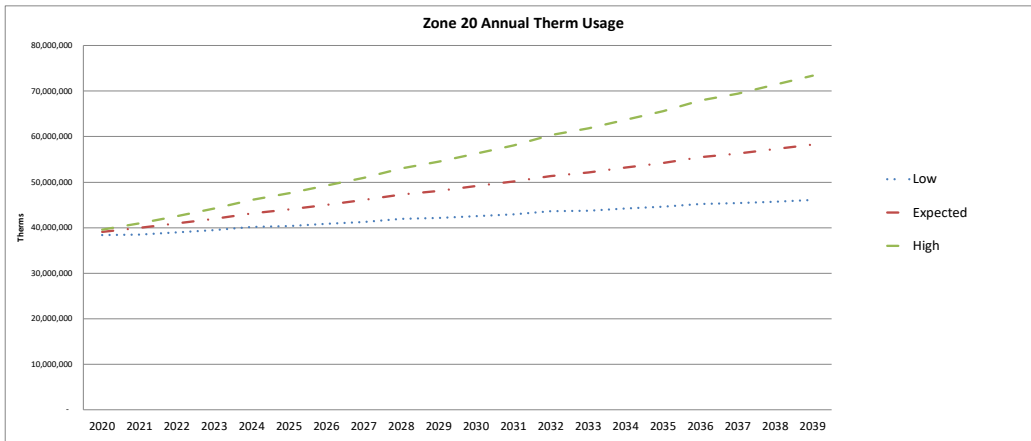
Table with columns for Customer Count Forecast and Annual Change. It includes sub-tables for Low, Expected, and High customer counts across various years from 2020 to 2039.

Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High heating and baseload requirements across various years from 2020 to 2039.

Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High baseload requirements across various years from 2020 to 2039.

Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High usage across various years from 2020 to 2039.

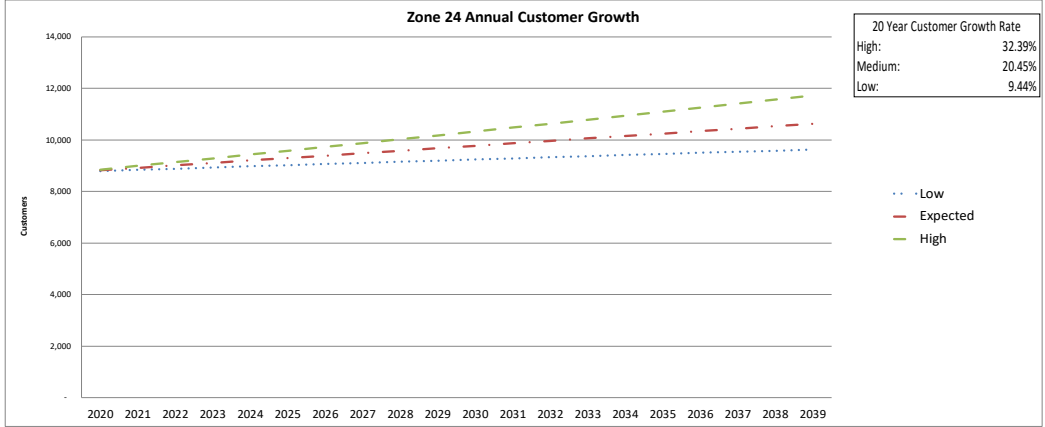
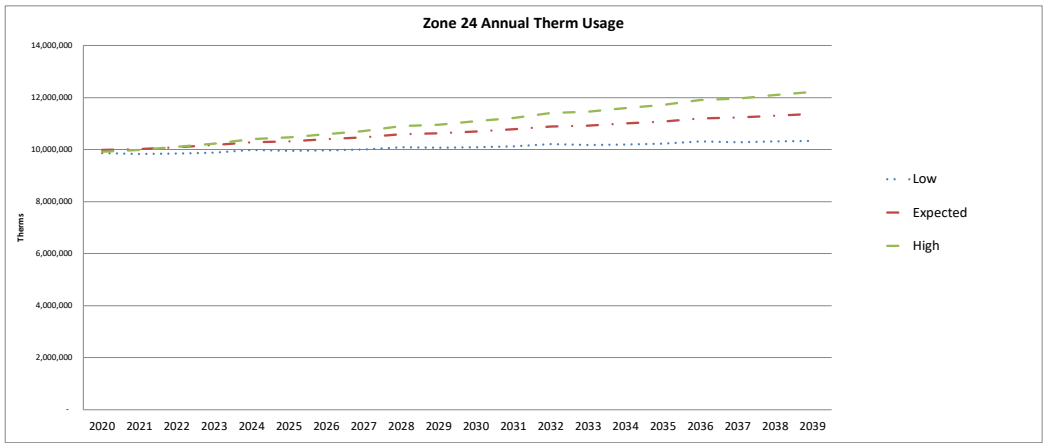
Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High customer counts across various years from 2020 to 2039.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Zone 24

Table with multiple sections: Annual Requirements (Therms), Annual Change, Peak Day - BaseLoad, Thermo Usage by Class, and Customer Count Forecast. Each section contains columns for Low, Expected, and High categories, with sub-columns for Heating, BaseLoad, and Total. Rows represent years from 2020 to 2039.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Zone 26

Table with columns: Heating, BaseLoad, Total, Expected (Heating, BaseLoad, Total), High (Heating, BaseLoad, Total). Rows 2020-2039.

Table with columns: Heating, BaseLoad, Total, Expected (Heating, BaseLoad, Total), High (Heating, BaseLoad, Total). Rows 2020-2039.

Table with columns: Daily BaseLoad, Peak, Total, Expected (Daily BaseLoad, Peak, Total), High (Daily BaseLoad, Peak, Total). Rows 2020-2039.

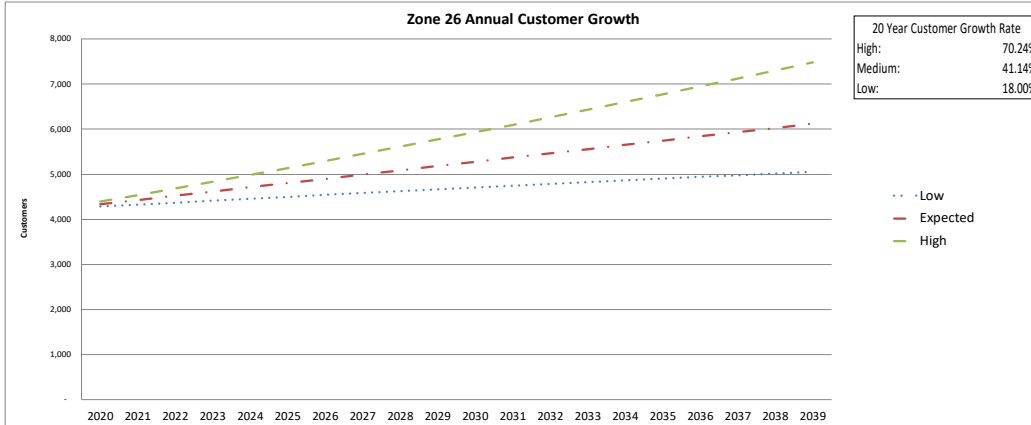
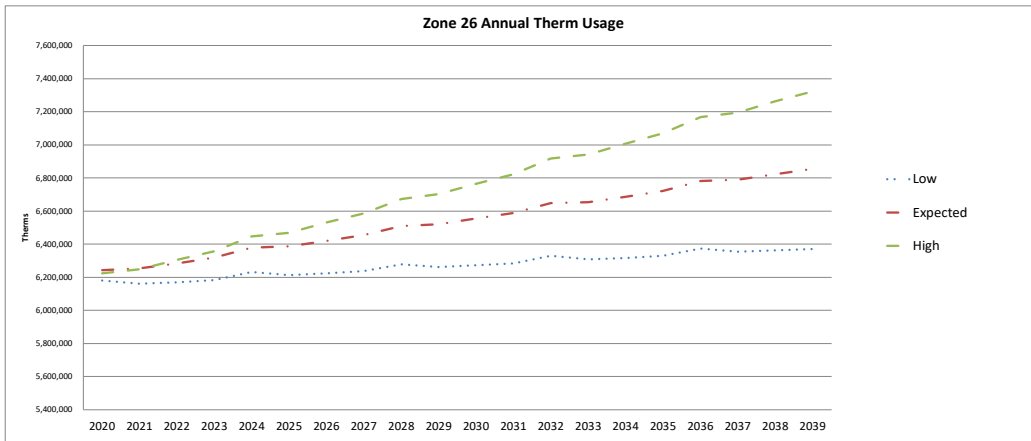
Table with columns: Base, Peak, Total, Expected (Base, Peak, Total), High (Base, Peak, Total). Rows 2020-2039.

Table with columns: Res, Com/Ind, Total, Expected (Res, Com/Ind, Total), High (Res, Com/Ind, Total). Rows 2020-2039.

Table with columns: Res, Com/Ind, Total, Expected (Res, Com/Ind, Total), High (Res, Com/Ind, Total). Rows 2020-2039.

Table with columns: Res, Com/Ind, Total, Expected (Res, Com/Ind, Total), High (Res, Com/Ind, Total). Rows 2020-2039.

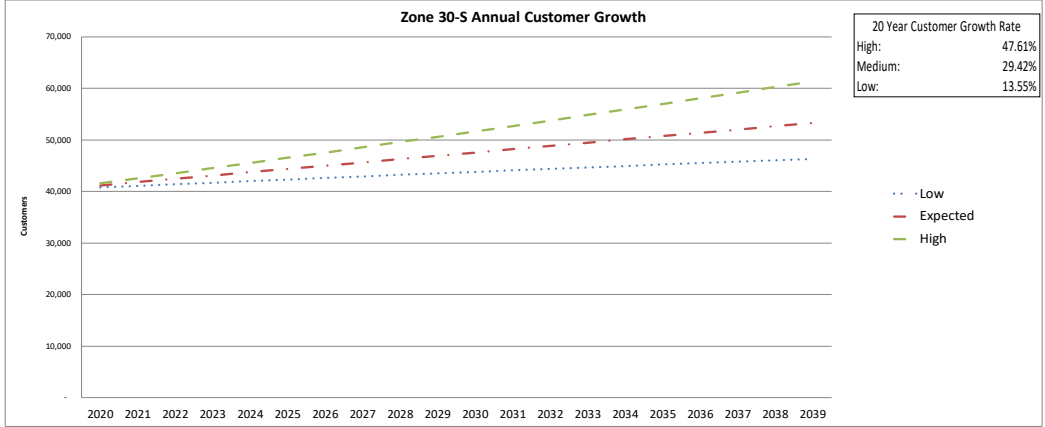
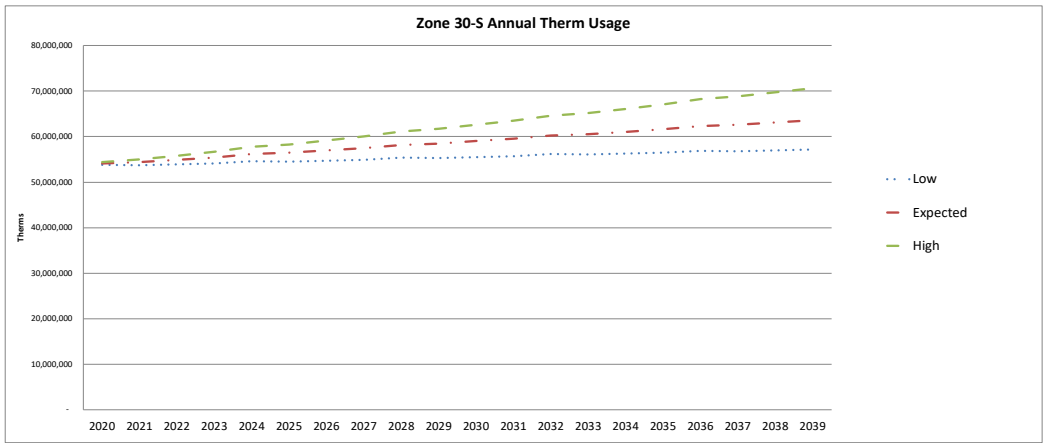
Table with columns: Res, Com/Ind, Total, Expected (Res, Com/Ind, Total), High (Res, Com/Ind, Total). Rows 2020-2039.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Zone 30-S Annual Requirements (Therms) and Annual Change tables. Includes sub-sections for Peak Day - BaseLoad, Thermo Usage by Class, and Customer Count Forecast. Each section contains multiple columns for Heating, BaseLoad, Total, and various percentage change metrics.





Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Zone 30-W

Table with columns: Heating, BaseLoad, Total, Expected (Heating, BaseLoad, Total), High (Heating, BaseLoad, Total). Rows 2020-2039.

Table with columns: Heating, BaseLoad, Total, Expected (Heating, BaseLoad, Total), High (Heating, BaseLoad, Total). Rows 2020-2039.

Table with columns: Daily BaseLoad, Peak, Total, Expected (Daily BaseLoad, Peak, Total), High (Daily BaseLoad, Peak, Total). Rows 2020-2039.

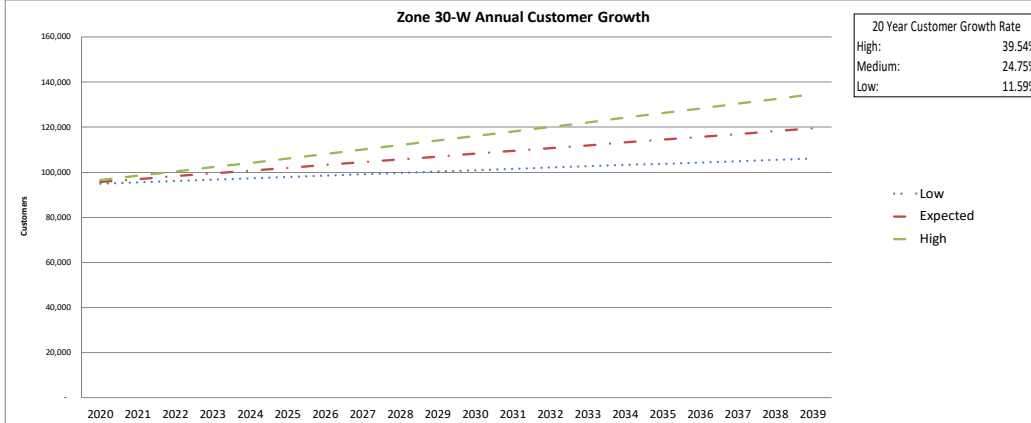
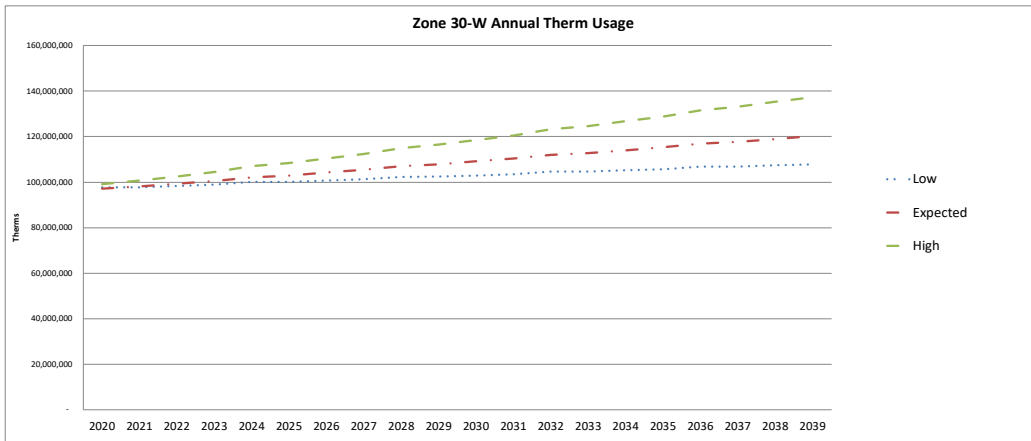
Table with columns: Base, Peak, Total, Expected (Base, Peak, Total), High (Base, Peak, Total). Rows 2020-2039.

Table with columns: Res, Com/In/d, Total, Expected (Res, Com/In/d, Total), High (Res, Com/In/d, Total). Rows 2020-2039.

Table with columns: Res, Com/In/d, Total, Expected (Res, Com/In/d, Total), High (Res, Com/In/d, Total). Rows 2020-2039.

Table with columns: Res, Com/In/d, Total, Expected (Res, Com/In/d, Total), High (Res, Com/In/d, Total). Rows 2020-2039.

Table with columns: Res, Com/In/d, Total, Expected (Res, Com/In/d, Total), High (Res, Com/In/d, Total). Rows 2020-2039.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

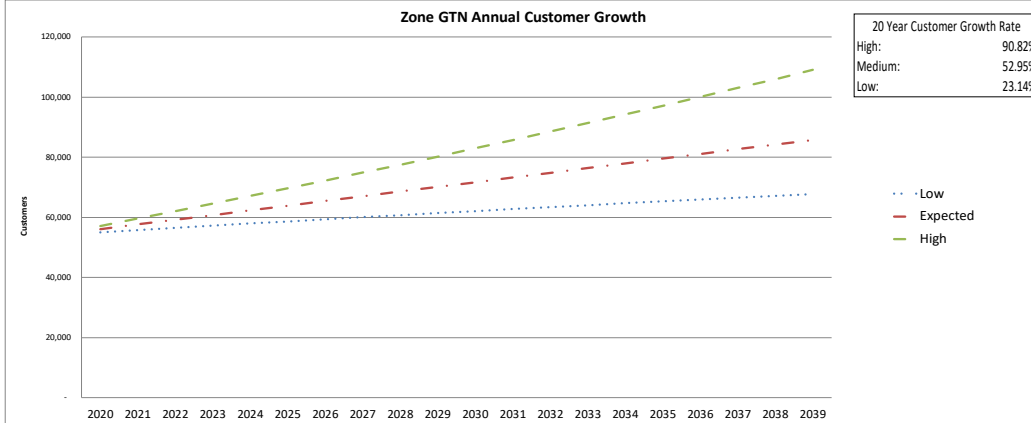
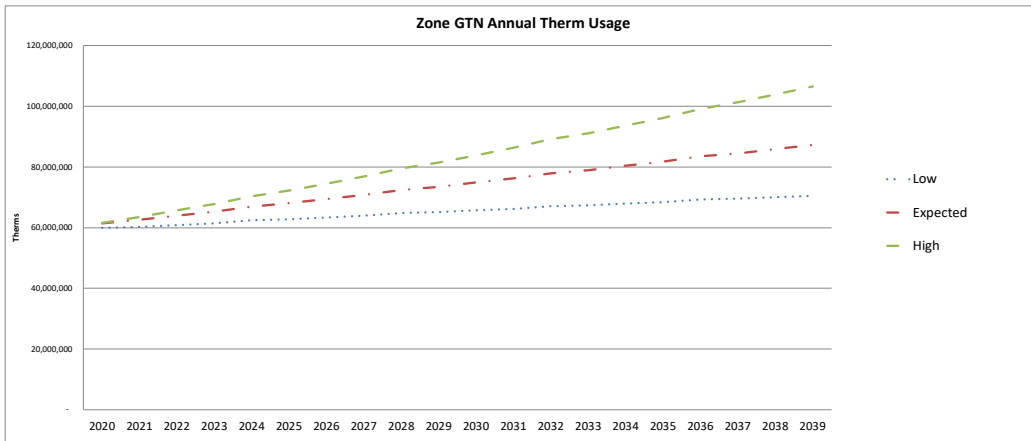
Zone GTN

Table with columns for Annual Requirements (Therms) and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years (2020-2039).

Table with columns for Peak Day - BaseLoad and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years (2020-2039).

Table with columns for Therms Usage by Class and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years (2020-2039).

Table with columns for Customer Count Forecast and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years (2020-2039).



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Zone ME-OR

Table with columns for Annual Requirements (Therms) and Annual Change. It includes sub-tables for Low, Expected, and High heating and base load requirements across years 2020-2039.

Table with columns for Peak Day - Base Load. It includes sub-tables for Low, Expected, and High base load requirements across years 2020-2039.

Table with columns for Therms Usage by Class. It includes sub-tables for Low, Expected, and High usage across years 2020-2039.

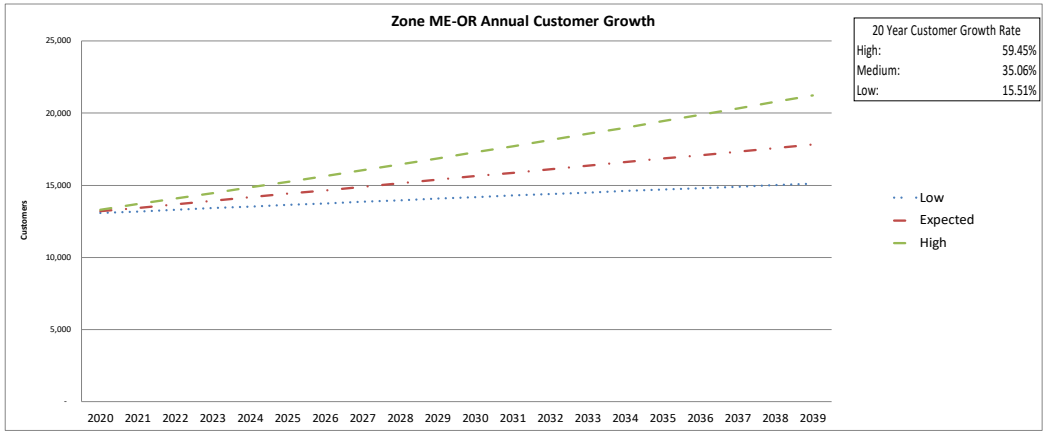
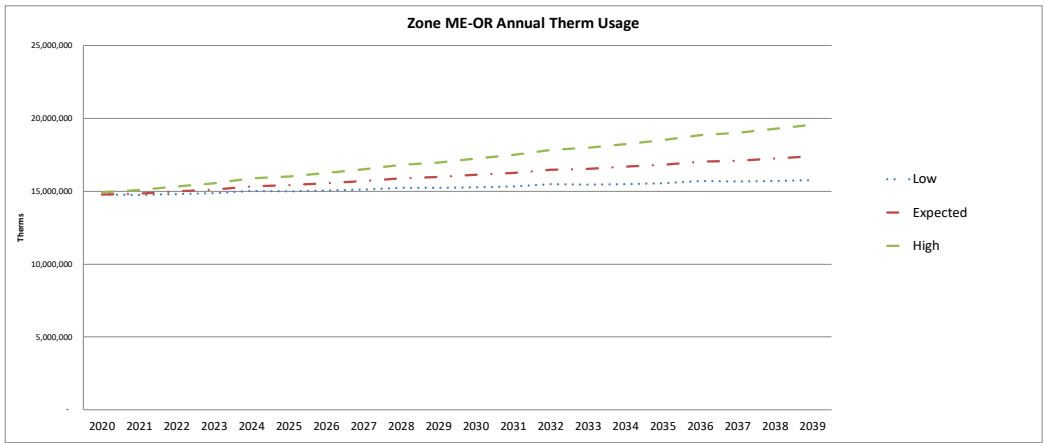
Table with columns for Customer Count Forecast. It includes sub-tables for Low, Expected, and High customer counts across years 2020-2039.

Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High heating and base load changes across years 2020-2039.

Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High base load changes across years 2020-2039.

Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High usage changes across years 2020-2039.

Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High customer count changes across years 2020-2039.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Zone ME-WA

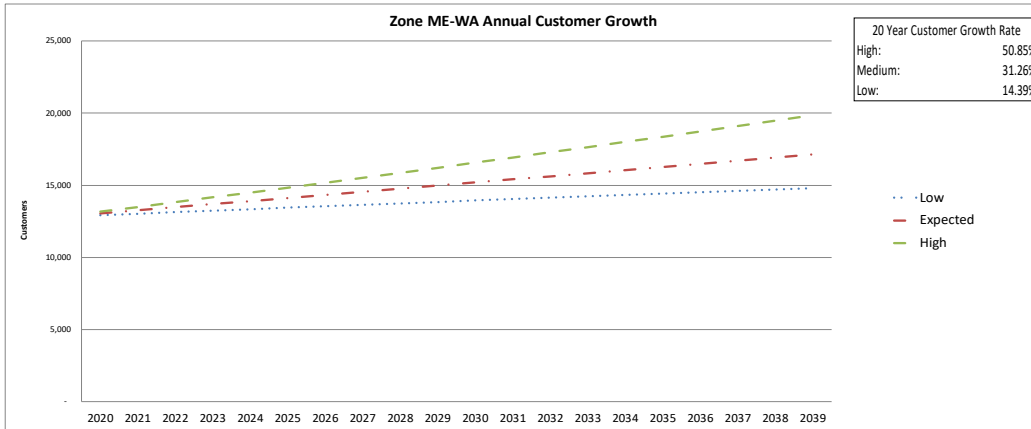
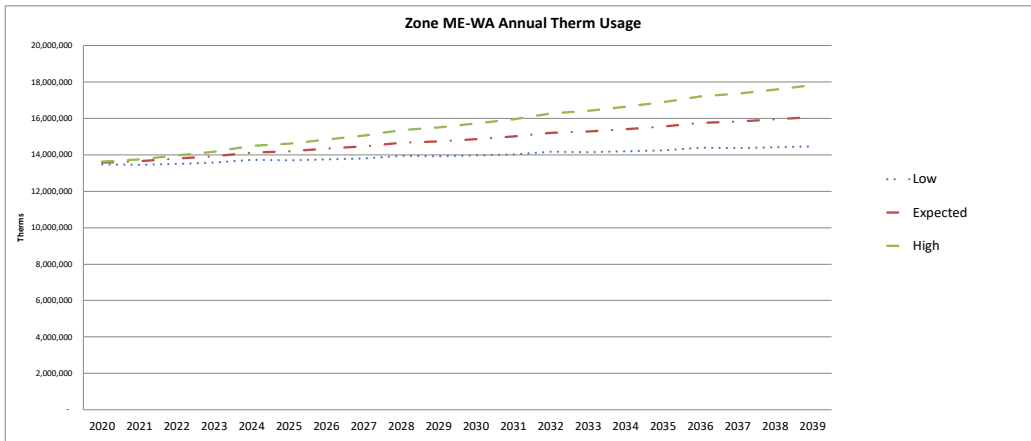
Table with columns for Annual Requirements (Therms) and Annual Change. It includes sub-tables for Low, Expected, and High heating requirements and changes for years 2020-2039.

Table with columns for Peak Day - BaseLoad and Annual Change. It includes sub-tables for Low, Expected, and High peak day base loads and changes for years 2020-2039.

Table with columns for Therms Usage by Class and Annual Change. It includes sub-tables for Low, Expected, and High therms usage by class and changes for years 2020-2039.

Table with columns for Customer Count Forecast and Annual Change. It includes sub-tables for Low, Expected, and High customer count forecasts and changes for years 2020-2039.





Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

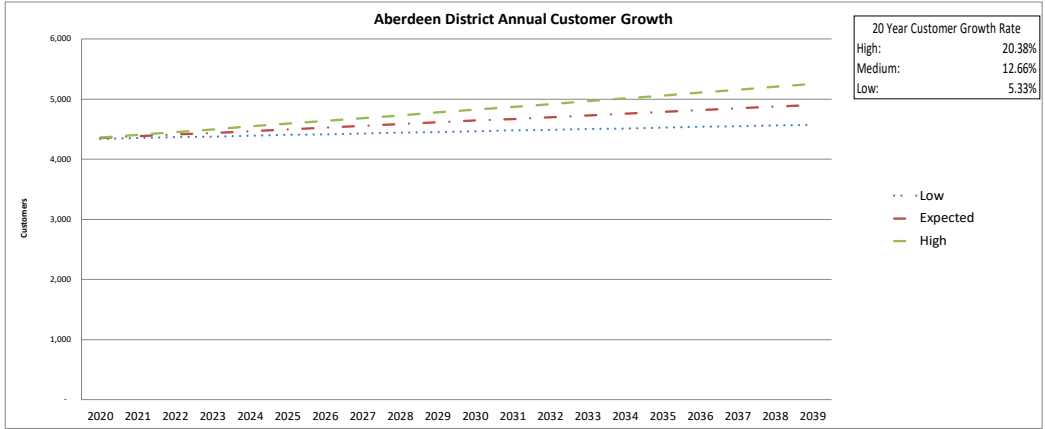
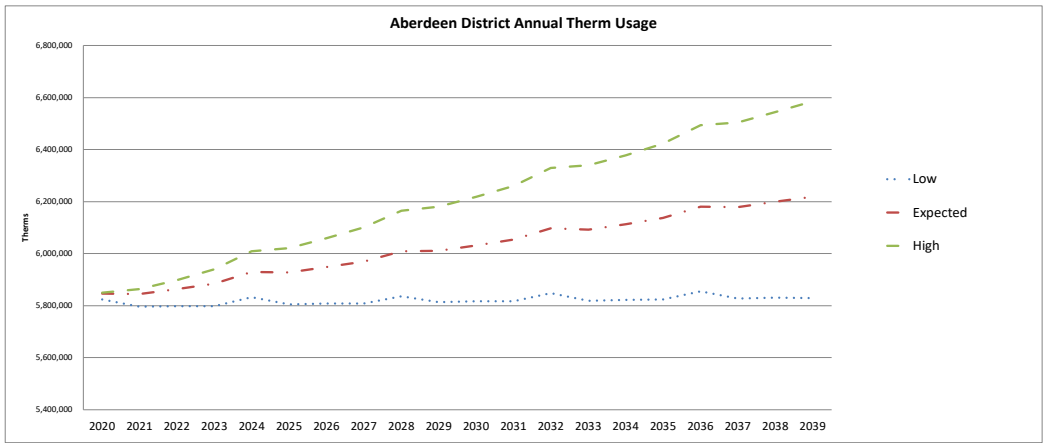
Aberdeen District

Table with columns for Annual Requirements (Therms) and Annual Change, including sub-sections for Heating, Low, Expected, and High.

Table with columns for Peak Day - BaseLoad and Annual Change, including sub-sections for Base, Low, Expected, and High.

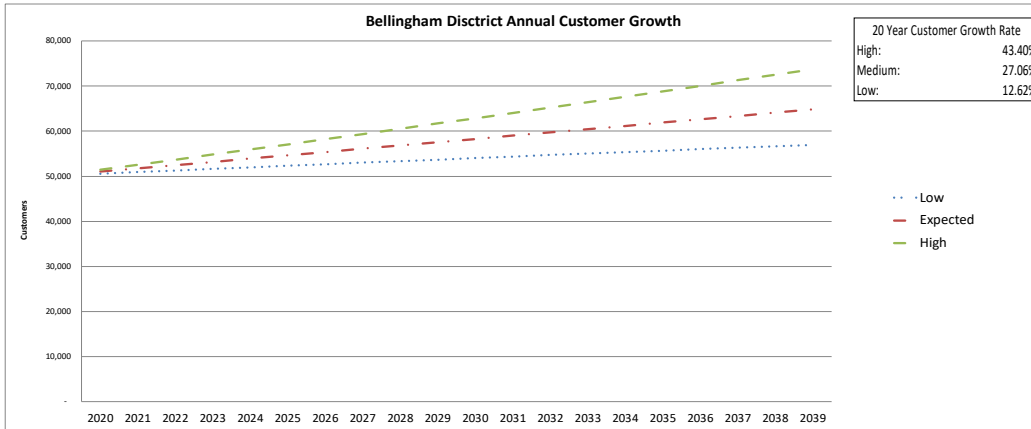
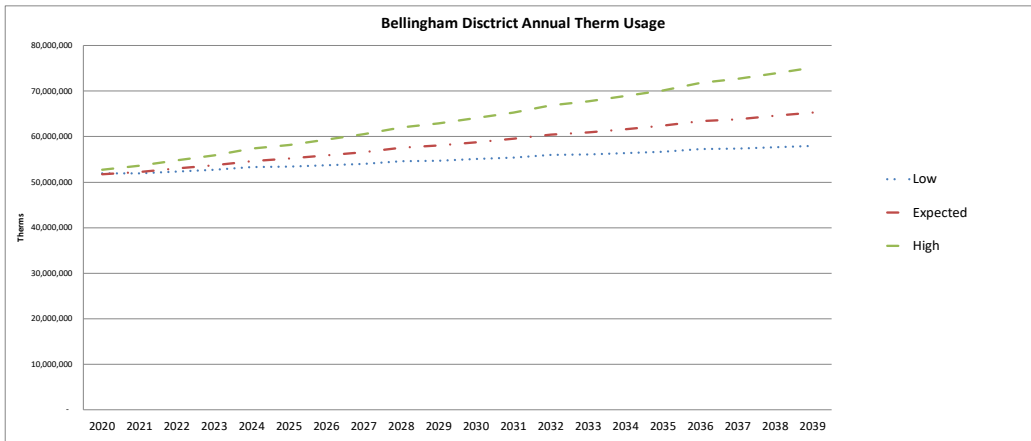
Table with columns for Therms Usage by Class and Annual Change, including sub-sections for Res, Low, Expected, and High.

Table with columns for Customer Count Forecast and Annual Change, including sub-sections for Res, Low, Expected, and High.



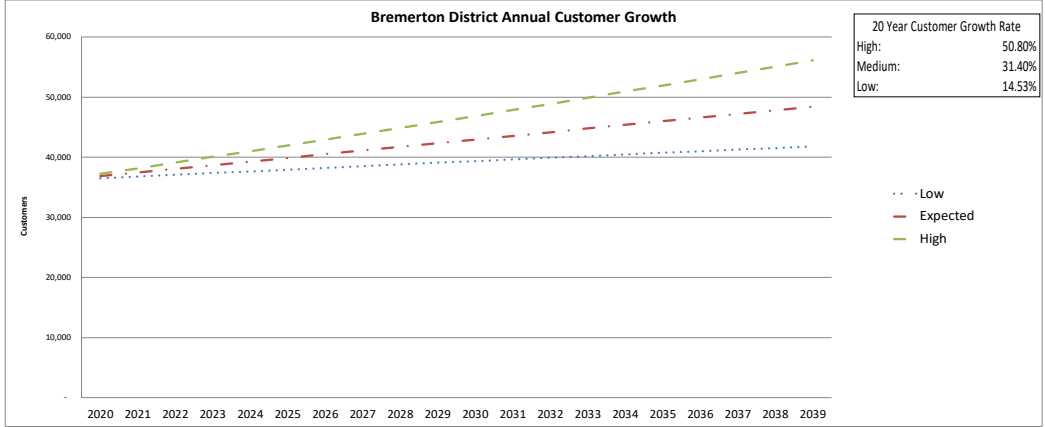
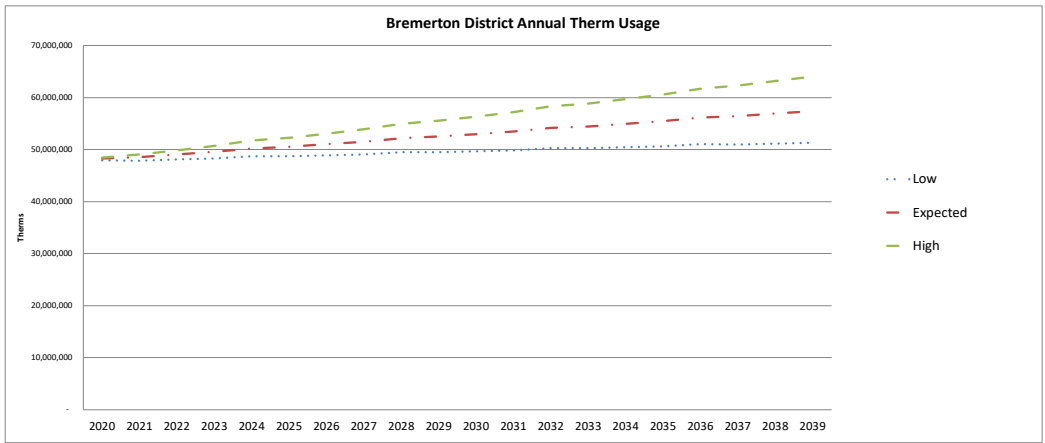
Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Table with multiple sections: Bellingham District, Annual Requirements (Therms), Annual Change, Peak Day - BaseLoad, Thermo Usage by Class, and Customer Count Forecast. Each section contains detailed data for years 2020-2039 across various metrics like Heating, BaseLoad, Total, and Annual Change.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Table with multiple sections: Bremernton District, Annual Requirements (Therms), Annual Change, Peak Day - BaseLoad, Thermo Usage by Class, and Customer Count Forecast. Each section contains detailed data for years 2020-2039 across various categories like Heating, BaseLoad, Total, and Com/In/d.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Central Oregon (Bend) District

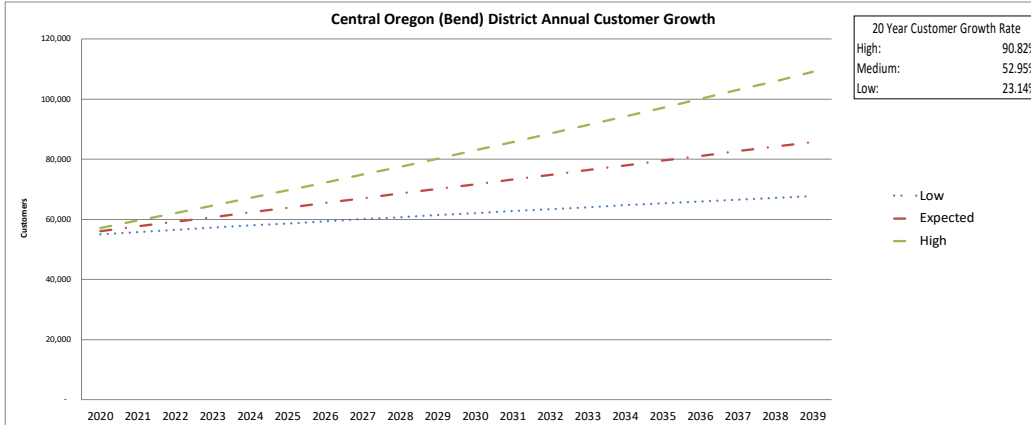
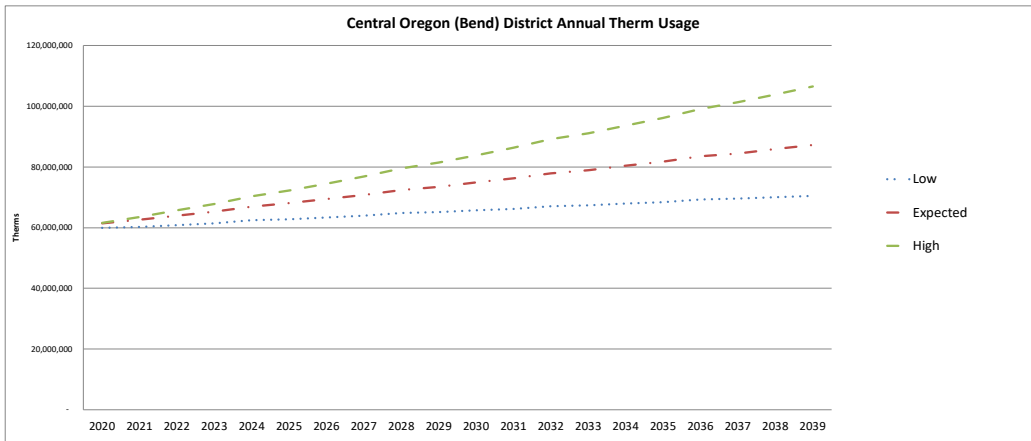
Table with columns for Annual Requirements (Therms) and Annual Change, including sub-headers for Low, Expected, and High categories across Heating, BaseLoad, and Total metrics.

Table with columns for Peak Day - BaseLoad and Annual Change, including sub-headers for Low, Expected, and High categories across Base, Peak, and Total metrics.

Table with columns for Therms Usage by Class and Annual Change, including sub-headers for Low, Expected, and High categories across Res, Com/Ind, and Total metrics.

Table with columns for Customer Count Forecast and Annual Change, including sub-headers for Low, Expected, and High categories across Res, Com/Ind, and Total metrics.





Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

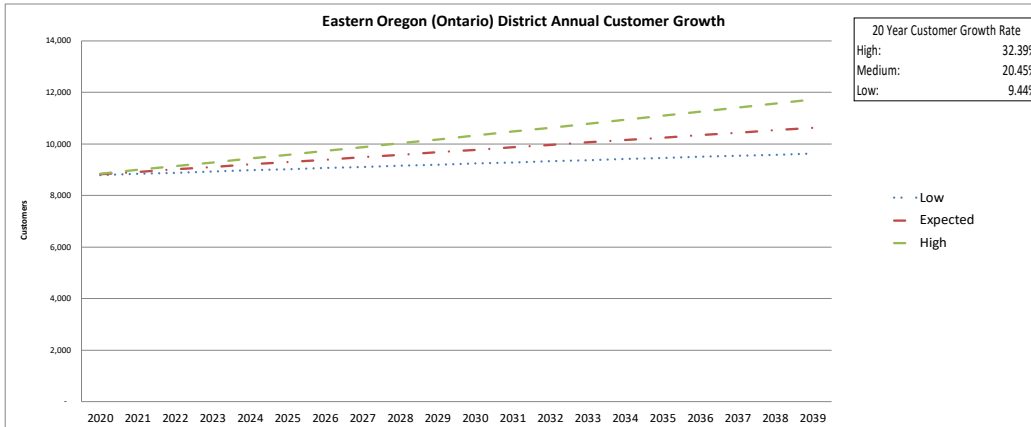
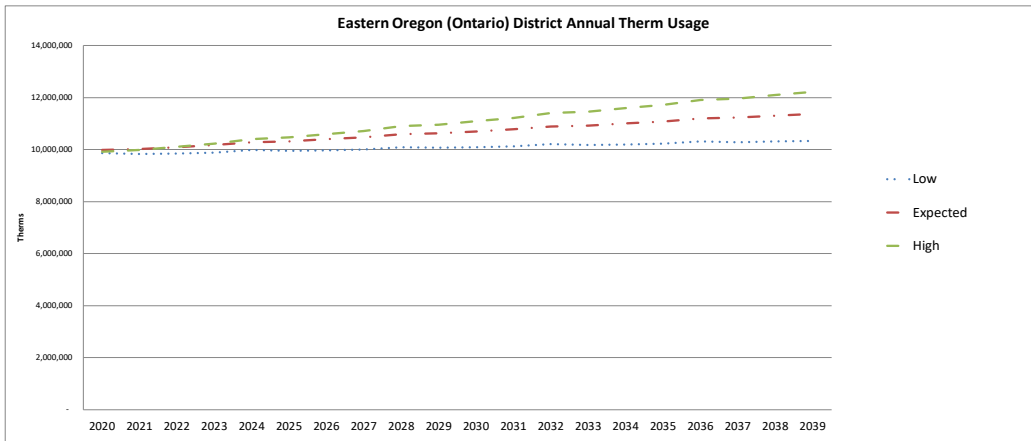
Eastern Oregon (Ontario) District

Table with columns for Annual Requirements (Therms) and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years from 2020 to 2039.

Table with columns for Peak Day - BaseLoad and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years from 2020 to 2039.

Table with columns for Therms Usage by Class and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years from 2020 to 2039.

Table with columns for Customer Count Forecast and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years from 2020 to 2039.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Kennewick District

Table with columns: Heating, Low, Expected, High, Total. Rows 2020-2039. Sub-headers: Annual Requirements (Therms).

Table with columns: Heating, Low, Expected, High, Total. Rows 2020-2039. Sub-headers: Annual Change.

Table with columns: Heating, Low, Expected, High, Total. Rows 2020-2039. Sub-headers: Peak Day - BaseLoad.

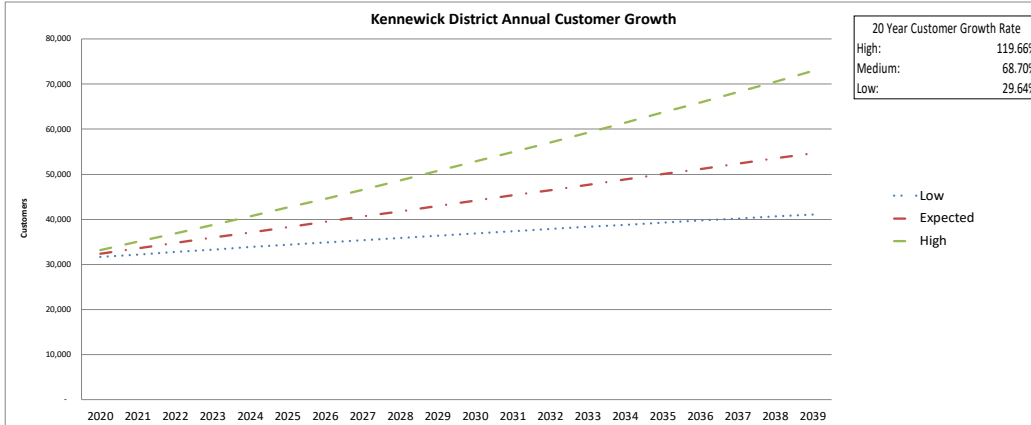
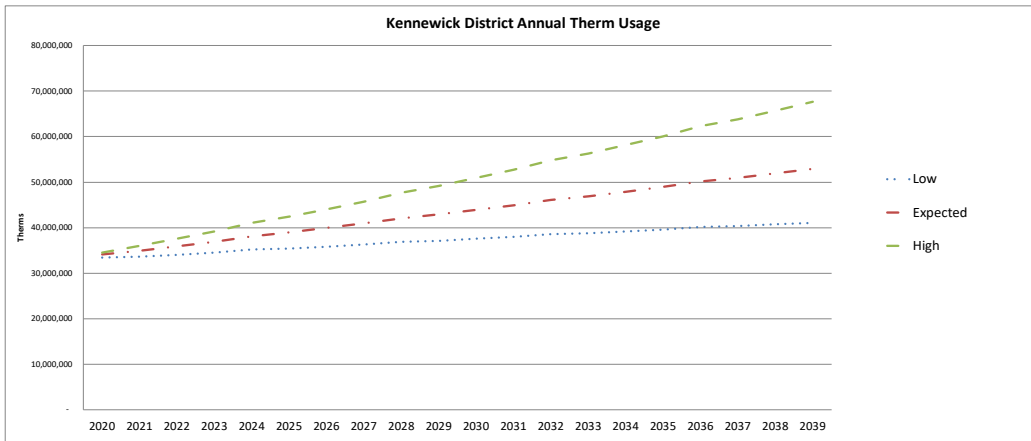
Table with columns: Heating, Low, Expected, High, Total. Rows 2020-2039. Sub-headers: Annual Change.

Table with columns: Heating, Low, Expected, High, Total. Rows 2020-2039. Sub-headers: Therms Usage by Class.

Table with columns: Heating, Low, Expected, High, Total. Rows 2020-2039. Sub-headers: Annual Change.

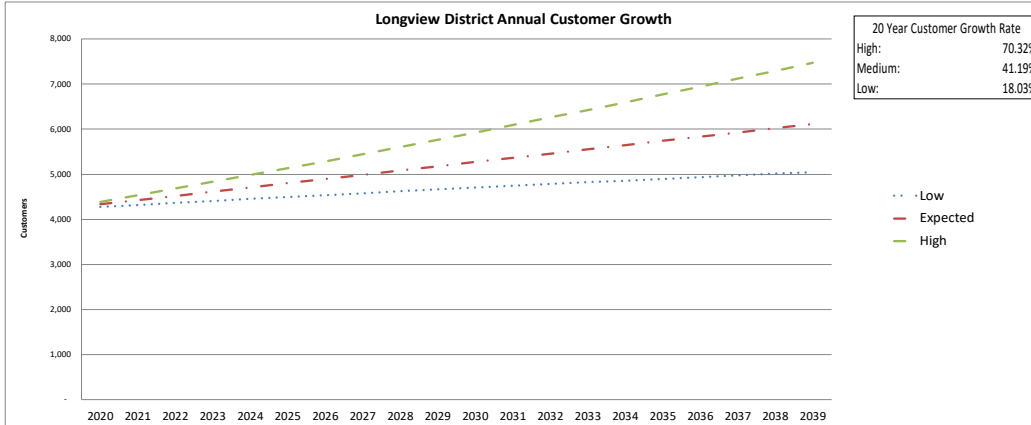
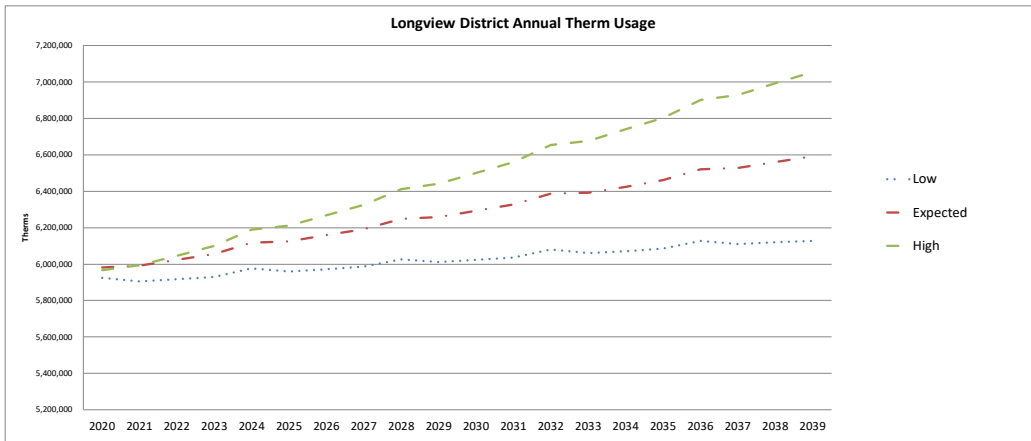
Table with columns: Heating, Low, Expected, High, Total. Rows 2020-2039. Sub-headers: Customer Count Forecast.

Table with columns: Heating, Low, Expected, High, Total. Rows 2020-2039. Sub-headers: Annual Change.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Longview District Annual Requirements (Therms) and Annual Change tables. Includes sub-tables for Low, Expected, and High heating and baseload requirements, and corresponding annual change percentages.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Mount Vernon District

Table with columns for Heating, BaseLoad, Total, Expected, and High. It contains demand forecast data for various years from 2020 to 2039, including annual requirements and annual change percentages.

Peak Day - BaseLoad

Table with columns for Daily BaseLoad, Peak, Total, Expected, and High. It shows peak day base load data for years 2020-2039, including base, peak, and total values and annual change percentages.

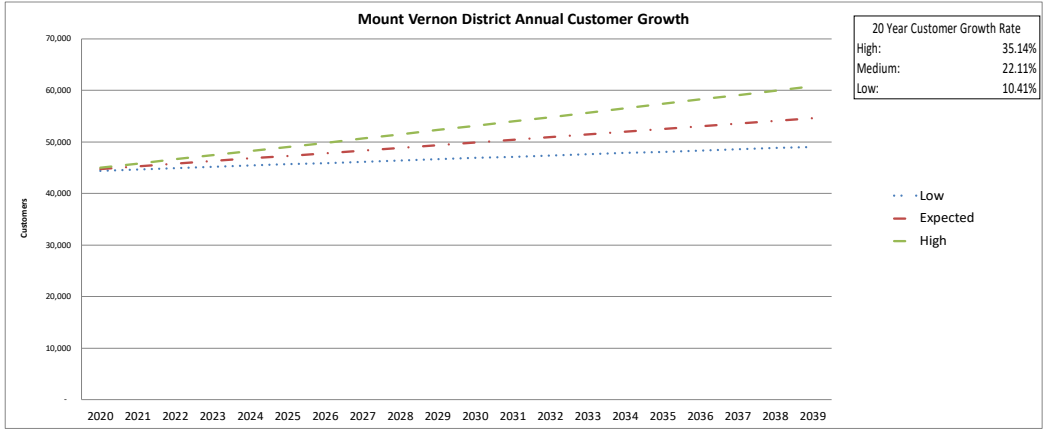
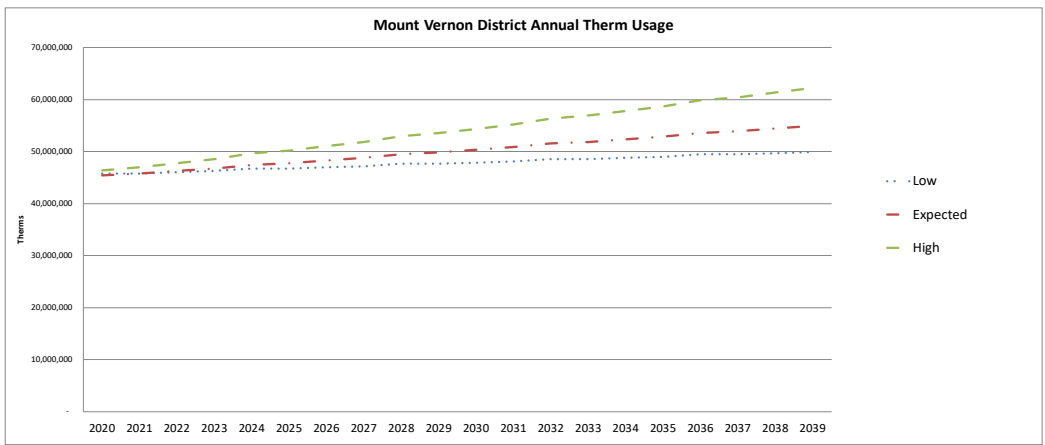
Therms Usage by Class

Table with columns for Res, Com/In/d, Total, Expected, and High. It details therm usage by class for years 2020-2039, including residential (Res), commercial/industrial (Com/In/d), and total usage, along with annual change percentages.

Customer Count Forecast

Table with columns for Res, Com/In/d, Total, Expected, and High. It provides customer count forecasts for years 2020-2039, including residential (Res), commercial/industrial (Com/In/d), and total counts, along with annual change percentages.





Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Pendleton District

Table with columns for Annual Requirements (Therms) and Annual Change. It includes sub-tables for Low, Expected, and High demand across various years from 2020 to 2039.

Table with columns for Peak Day - BaseLoad and Thermo Usage by Class. It includes sub-tables for Low, Expected, and High demand across various years from 2020 to 2039.

Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High demand across various years from 2020 to 2039.

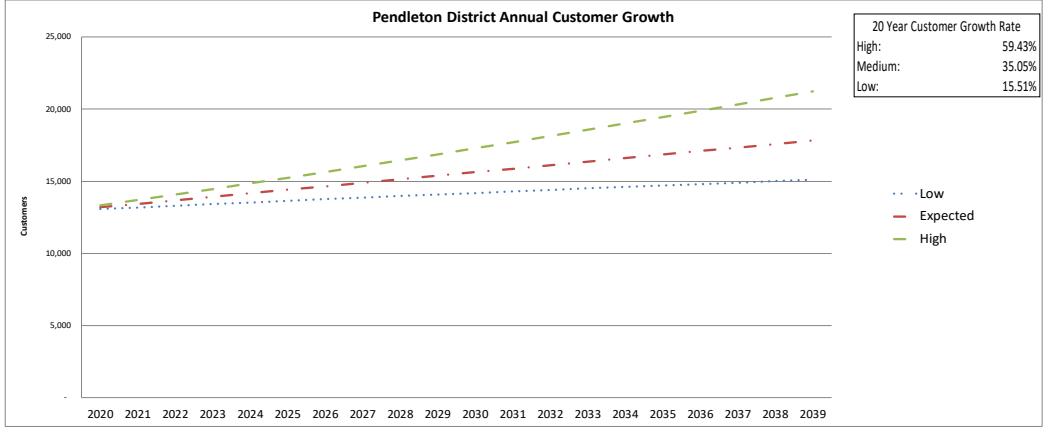
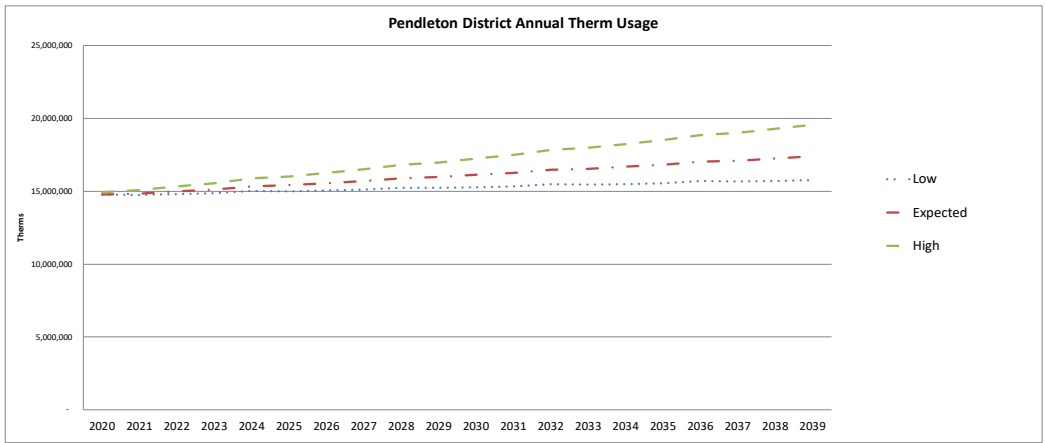
Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High demand across various years from 2020 to 2039.

Table with columns for Customer Count Forecast. It includes sub-tables for Low, Expected, and High demand across various years from 2020 to 2039.

Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High demand across various years from 2020 to 2039.

Table with columns for Customer Count Forecast. It includes sub-tables for Low, Expected, and High demand across various years from 2020 to 2039.

Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High demand across various years from 2020 to 2039.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Walla Walla District

Table with columns for Annual Requirements (Therms) and Annual Change. It includes sub-tables for Low, Expected, and High requirements and changes, with rows for years 2020-2039.

Table with columns for Peak Day - BaseLoad and Thermo Usage by Class. It includes sub-tables for Low, Expected, and High requirements and changes, with rows for years 2020-2039.

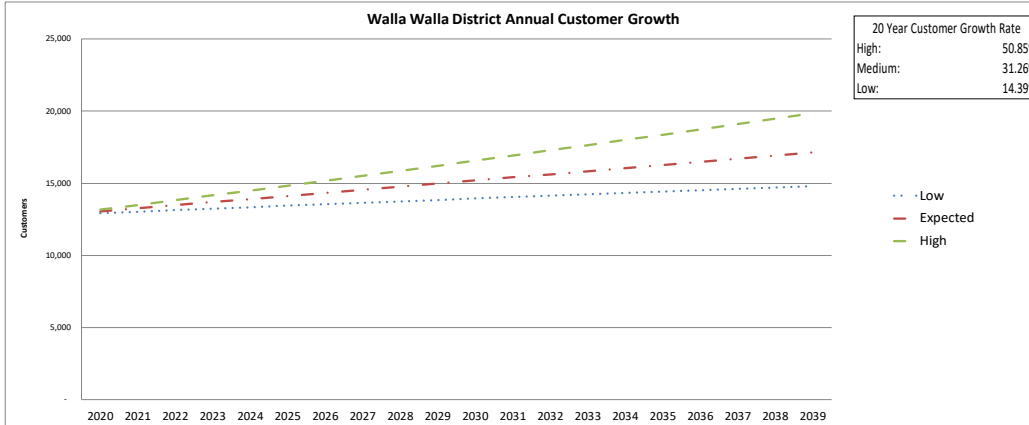
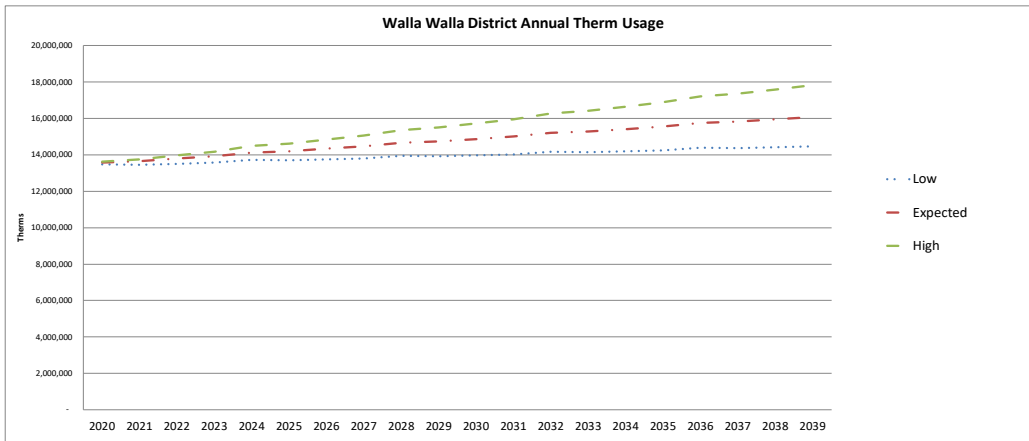
Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High requirements and changes, with rows for years 2020-2039.

Table with columns for Customer Count Forecast. It includes sub-tables for Low, Expected, and High requirements and changes, with rows for years 2020-2039.

Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High requirements and changes, with rows for years 2020-2039.

Table with columns for Customer Count Forecast. It includes sub-tables for Low, Expected, and High requirements and changes, with rows for years 2020-2039.

Table with columns for Annual Change. It includes sub-tables for Low, Expected, and High requirements and changes, with rows for years 2020-2039.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Wenatchee District

Table with columns for Annual Requirements (Therms) and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years (2020-2039).

Peak Day - BaseLoad

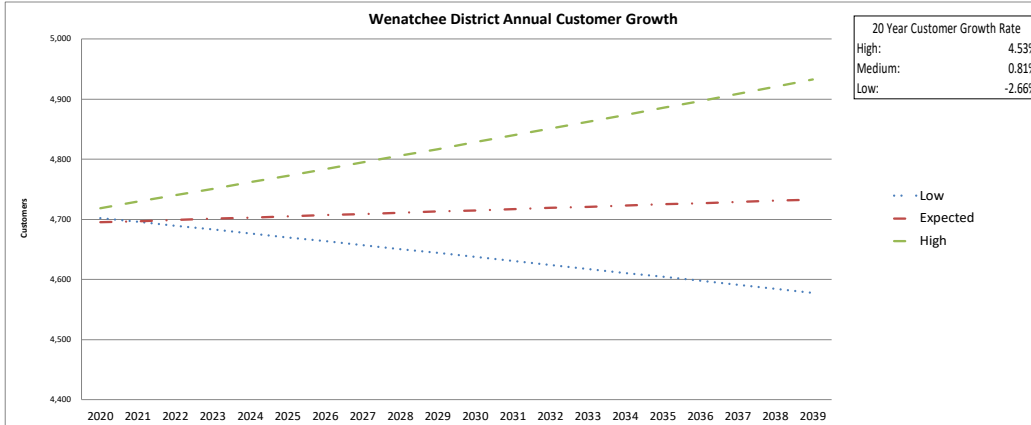
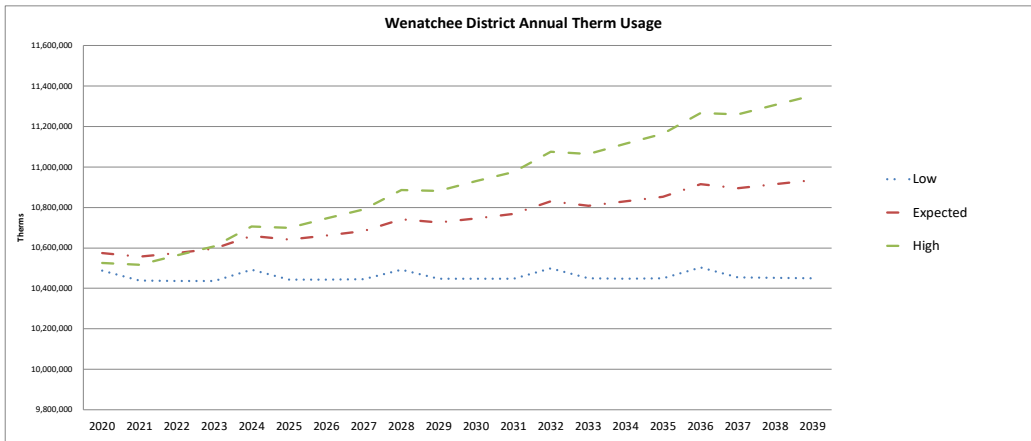
Table with columns for Low, Expected, and High demand scenarios for Peak Day - BaseLoad. It includes sub-tables for Base, Peak, and Total demand across various years (2020-2039).

Therms Usage by Class

Table with columns for Low, Expected, and High demand scenarios for Therms Usage by Class. It includes sub-tables for Res, Com/Ind, and Total usage across various years (2020-2039).

Customer Count Forecast

Table with columns for Low, Expected, and High demand scenarios for Customer Count Forecast. It includes sub-tables for Res, Com/Ind, and Total customer counts across various years (2020-2039).



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Yakima District

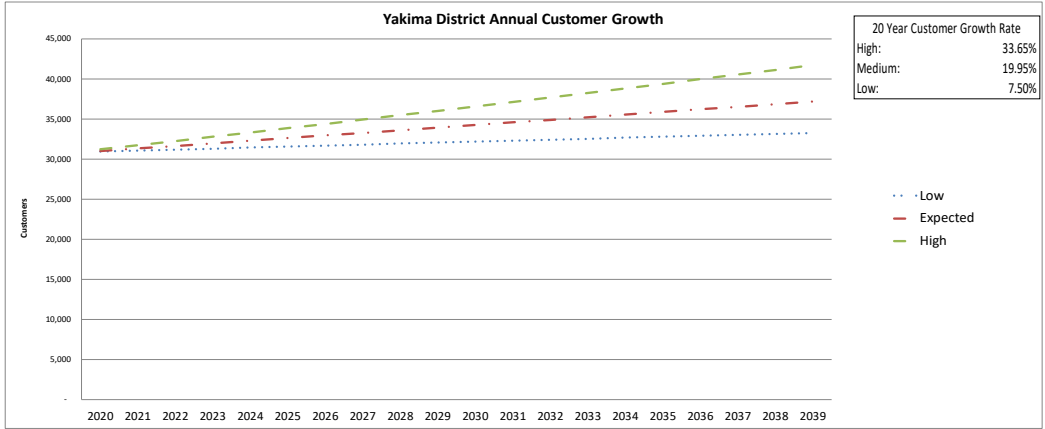
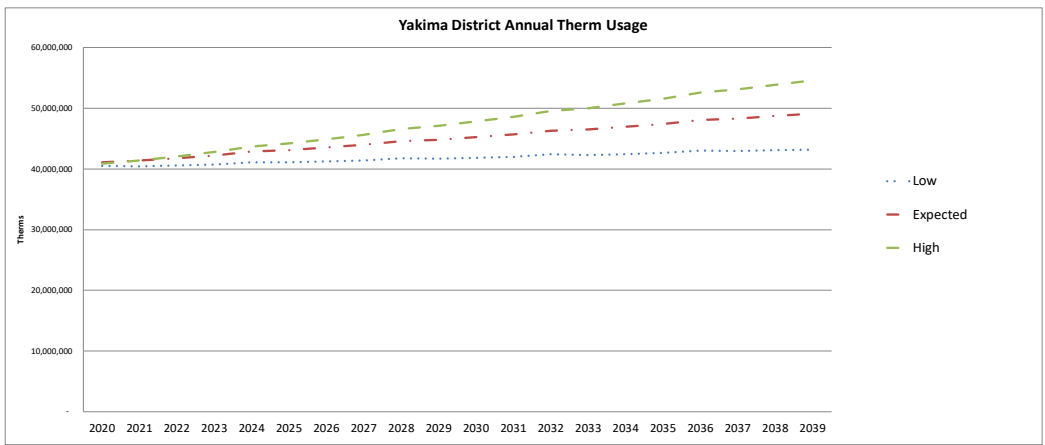
Table with columns for Heating, Low, Expected, High, and Annual Change. Rows include years 2020-2039 and various demand metrics.

Table with columns for Peak Day - BaseLoad, Low, Expected, High, and Annual Change. Rows include years 2020-2039 and various demand metrics.

Table with columns for Thermo Usage by Class, Low, Expected, High, and Annual Change. Rows include years 2020-2039 and various demand metrics.

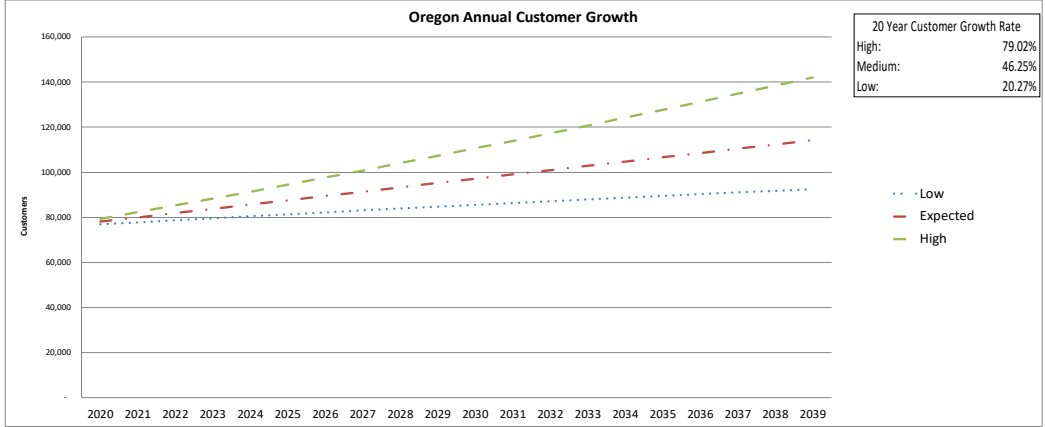
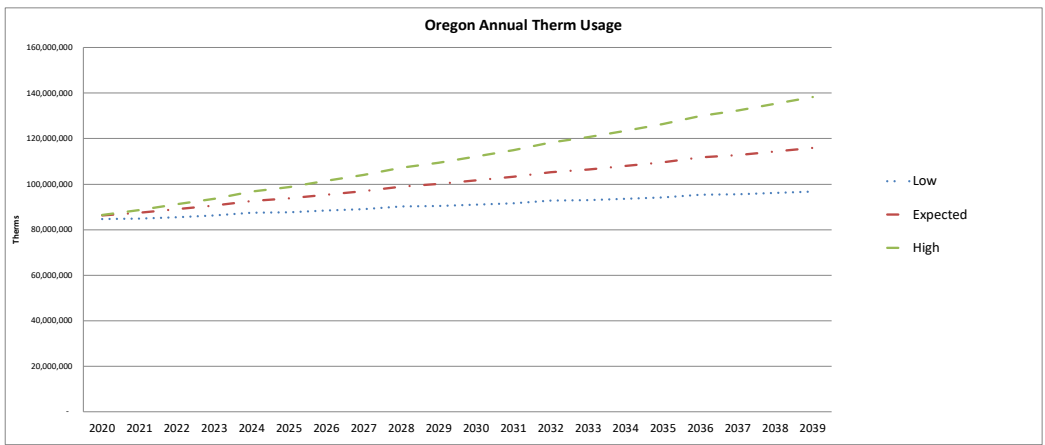
Table with columns for Customer Count Forecast, Low, Expected, High, and Annual Change. Rows include years 2020-2039 and various demand metrics.





Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Table with multiple sections: Oregon Annual Requirements (Therms), Annual Change, Peak Day - BaseLoad, Thermo Usage by Class, and Customer Count Forecast. Each section contains detailed data for years 2020-2039 across various metrics like Heating, BaseLoad, Total, and Annual Change.



Cascade Natural Gas 2020 IRP Demand Forecast Summary Tables

Washington

Table with columns for Heating, Low, Expected, High, and Total, showing annual requirements in therms for various years from 2020 to 2039.

Table with columns for Annual Change, Low, Expected, High, and Total, showing percentage changes for various years from 2020 to 2039.

Peak Day - BaseLoad

Table with columns for Low, Expected, High, and Total, showing peak day base load data for various years from 2020 to 2039.

Table with columns for Annual Change, Low, Expected, High, and Total, showing percentage changes for peak day base load for various years from 2020 to 2039.

Therms Usage by Class

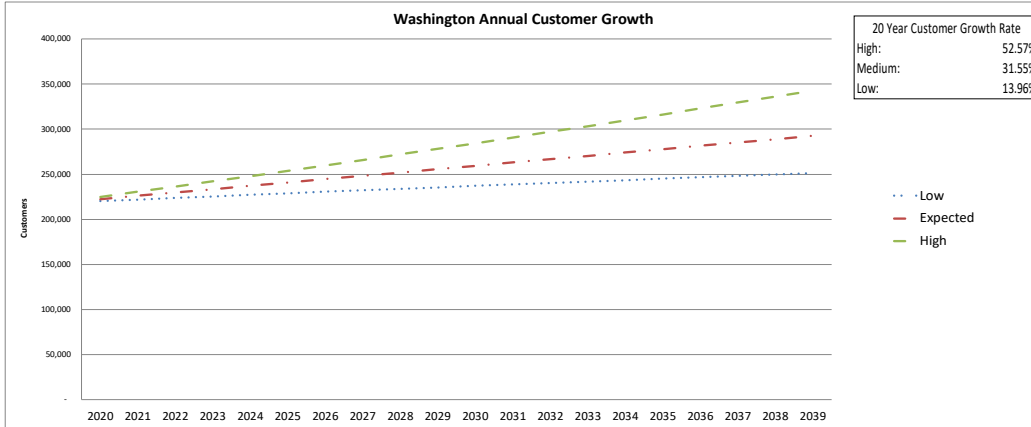
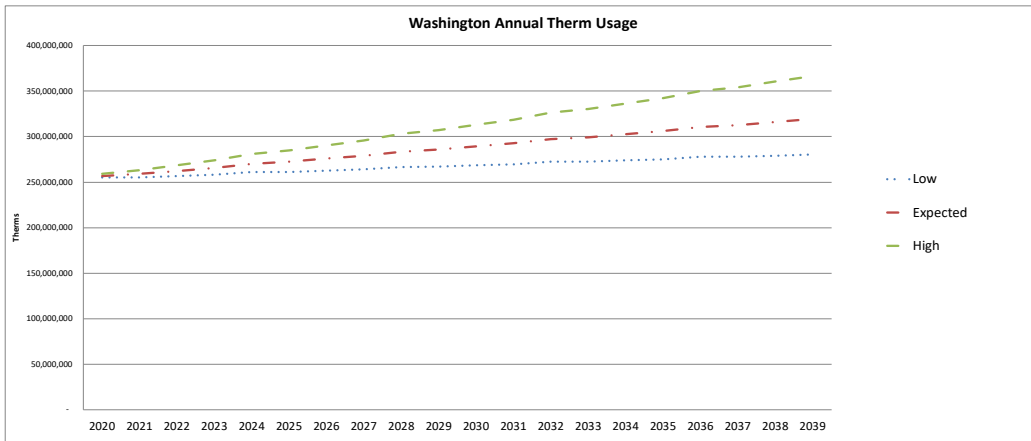
Table with columns for Res, Com/In/d, Total, Res, Com/In/d, Total, Res, Com/In/d, Total, showing therm usage by class for various years from 2020 to 2039.

Table with columns for Annual Change, Low, Expected, High, and Total, showing percentage changes for therm usage by class for various years from 2020 to 2039.

Customer Count Forecast

Table with columns for Res, Com/In/d, Total, Res, Com/In/d, Total, Res, Com/In/d, Total, showing customer count forecast for various years from 2020 to 2039.

Table with columns for Annual Change, Low, Expected, High, and Total, showing percentage changes for customer count forecast for various years from 2020 to 2039.



Cascade Natural Gas

2020 IRP Demand Forecast Summary Tables

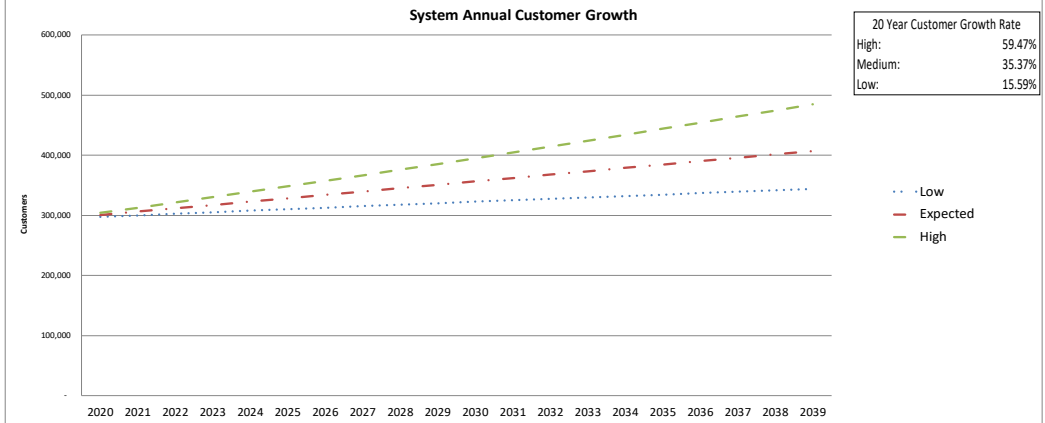
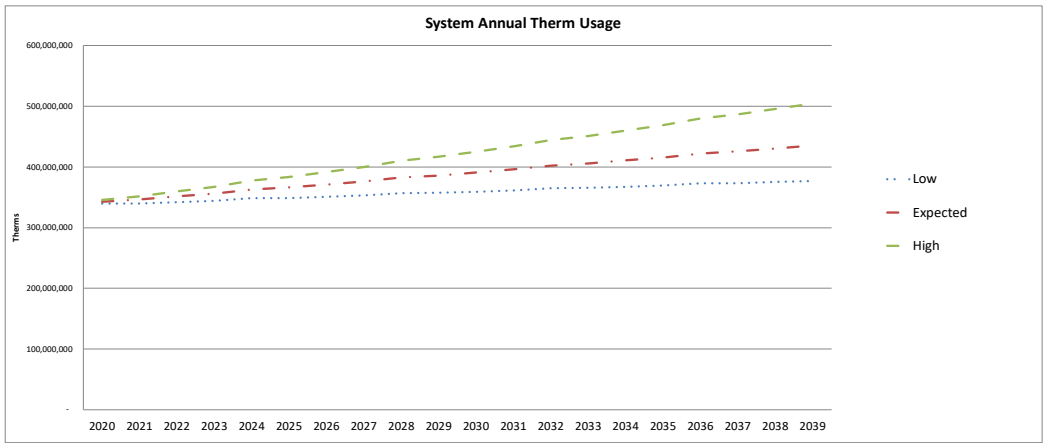
System

Table with columns for System, Annual Requirements (Therms), and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years (2020-2039).

Table with columns for System, Peak Day - Base Load, and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years (2020-2039).

Table with columns for System, Therms Usage by Class, and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years (2020-2039).

Table with columns for System, Customer Count Forecast, and Annual Change. It includes sub-tables for Low, Expected, and High demand scenarios across various years (2020-2039).









Appendix B  
Demand Forecast  
Expected Forecast

| Mission Tap                           | 2020      | 2021      | 2022      | 2023      | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|------------|
| Total Therms Pct. Growth              |           | -0.53%    | -0.01%    | -0.02%    | 0.50%      | -0.53%     | -0.02%     | -0.02%     | 0.51%      | -0.54%     |
| Residential Therms                    | 121,527   | 120,828   | 120,812   | 120,793   | 121,468    | 120,763    | 120,723    | 120,723    | 121,413    | 120,698    |
| Commercial Therms                     | 372,945   | 371,018   | 370,973   | 370,901   | 372,690    | 370,764    | 370,680    | 370,611    | 371,429    | 370,500    |
| Industrial Therms                     | -         | -         | -         | -         | -          | -          | -          | -          | -          | -          |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 494,472   | 491,845   | 491,785   | 491,694   | 494,159    | 491,527    | 491,425    | 491,334    | 493,842    | 491,199    |
| Daily Baseload Therms                 | 546       | 546       | 546       | 546       | 546        | 546        | 546        | 546        | 546        | 546        |
| Peak Day Therms                       | 5,455     | 5,455     | 5,455     | 5,455     | 5,474      | 5,474      | 5,455      | 5,455      | 5,455      | 5,455      |
| Therms Per Residential Customer       | 562       | 558       | 558       | 558       | 561        | 558        | 558        | 558        | 561        | 558        |
| Therms Per Commercial Customer        | 8,319     | 8,276     | 8,276     | 8,273     | 8,313      | 8,270      | 8,268      | 8,267      | 8,307      | 8,264      |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -          | -          | -          | -          | -          | -          |
| Residential Customers                 | 216       | 216       | 216       | 216       | 216        | 216        | 216        | 216        | 216        | 216        |
| Commercial Customers                  | 45        | 45        | 45        | 45        | 45         | 45         | 45         | 45         | 45         | 45         |
| Industrial Customers                  | -         | -         | -         | -         | -          | -          | -          | -          | -          | -          |
| Interruptible Customers               | -         | -         | -         | -         | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 261       | 261       | 261       | 261       | 261        | 261        | 261        | 261        | 261        | 261        |
|                                       |           |           |           |           |            |            |            |            |            |            |
| Nyssa-Ontario                         | 2020      | 2021      | 2022      | 2023      | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| Total Therms Pct. Growth              |           | 0.43%     | 0.80%     | 0.80%     | 1.20%      | 0.40%      | 0.79%      | 0.78%      | 1.15%      | 0.40%      |
| Residential Therms                    | 2,100,189 | 2,116,035 | 2,140,405 | 2,144,988 | 2,198,941  | 2,214,374  | 2,238,942  | 2,263,550  | 2,297,242  | 2,312,719  |
| Commercial Therms                     | 2,644,247 | 2,657,145 | 2,680,327 | 2,703,782 | 2,738,468  | 2,750,979  | 2,774,438  | 2,797,896  | 2,832,115  | 2,844,809  |
| Industrial Therms                     | 204,333   | 204,065   | 204,031   | 204,017   | 204,324    | 204,065    | 204,050    | 204,036    | 204,286    | 204,064    |
| Ind., Inst., & Cmcl. Interrup. Therms | 946,325   | 943,046   | 942,954   | 942,954   | 946,325    | 943,046    | 943,046    | 943,046    | 946,140    | 943,046    |
| Total Core Therms                     | 5,895,093 | 5,920,290 | 5,967,717 | 6,015,741 | 6,088,058  | 6,112,464  | 6,140,496  | 6,208,528  | 6,279,784  | 6,304,638  |
| Daily Baseload Therms                 | 2,984     | 3,074     | 3,039     | 3,087     | 3,101      | 3,113      | 3,164      | 3,255      | 3,237      | 3,286      |
| Peak Day Therms                       | 67,884    | 68,489    | 69,094    | 69,699    | 69,696     | 70,296     | 71,514     | 72,119     | 72,725     | 73,329     |
| Therms Per Residential Customer       | 552       | 549       | 549       | 549       | 551        | 549        | 549        | 549        | 551        | 549        |
| Therms Per Commercial Customer        | 2,821     | 2,808     | 2,805     | 2,804     | 2,813      | 2,800      | 2,798      | 2,797      | 2,806      | 2,793      |
| Therms Per Industrial Customer        | 10,330    | 10,317    | 10,315    | 10,315    | 10,330     | 10,317     | 10,316     | 10,316     | 10,328     | 10,317     |
| Residential Customers                 | 3,807     | 3,852     | 3,897     | 3,942     | 3,987      | 4,032      | 4,077      | 4,122      | 4,167      | 4,212      |
| Commercial Customers                  | 937       | 946       | 955       | 964       | 973        | 982        | 991        | 1,000      | 1,009      | 1,018      |
| Industrial Customers                  | 20        | 20        | 20        | 20        | 20         | 20         | 20         | 20         | 20         | 20         |
| Interruptible Customers               | 1         | 1         | 1         | 1         | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 4,765     | 4,819     | 4,873     | 4,927     | 4,981      | 5,035      | 5,089      | 5,143      | 5,197      | 5,251      |
|                                       |           |           |           |           |            |            |            |            |            |            |
| Pendleton                             | 2020      | 2021      | 2022      | 2023      | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| Total Therms Pct. Growth              |           | 0.22%     | 0.60%     | 0.61%     | 1.01%      | 0.20%      | 0.60%      | 0.59%      | 0.96%      | 0.21%      |
| Residential Therms                    | 2,929,029 | 2,954,728 | 2,991,967 | 3,029,537 | 3,079,944  | 3,105,025  | 3,142,604  | 3,180,184  | 3,230,146  | 3,256,331  |
| Commercial Therms                     | 2,368,212 | 2,358,854 | 2,358,574 | 2,358,572 | 2,368,212  | 2,358,854  | 2,358,853  | 2,358,854  | 2,367,653  | 2,358,850  |
| Industrial Therms                     | 161,938   | 161,166   | 161,153   | 161,153   | 161,938    | 161,166    | 161,166    | 161,166    | 161,910    | 161,166    |
| Ind., Inst., & Cmcl. Interrup. Therms | 688,430   | 686,333   | 686,236   | 686,236   | 688,430    | 686,333    | 686,333    | 686,333    | 688,236    | 686,333    |
| Total Core Therms                     | 6,147,609 | 6,161,081 | 6,197,929 | 6,235,498 | 6,298,524  | 6,311,379  | 6,348,956  | 6,386,538  | 6,447,944  | 6,464,680  |
| Daily Baseload Therms                 | 5,551     | 5,577     | 5,597     | 5,575     | 5,631      | 5,674      | 5,700      | 5,726      | 5,698      | 5,672      |
| Peak Day Therms                       | 79,963    | 80,502    | 81,041    | 81,581    | 81,385     | 81,920     | 83,198     | 83,737     | 84,277     | 84,816     |
| Therms Per Residential Customer       | 575       | 573       | 573       | 573       | 575        | 573        | 573        | 572        | 575        | 572        |
| Therms Per Commercial Customer        | 3,144     | 3,132     | 3,132     | 3,132     | 3,144      | 3,132      | 3,132      | 3,132      | 3,144      | 3,132      |
| Therms Per Industrial Customer        | 26,990    | 26,861    | 26,859    | 26,859    | 26,990     | 26,861     | 26,861     | 26,861     | 26,985     | 26,861     |
| Residential Customers                 | 5,093     | 5,159     | 5,225     | 5,291     | 5,357      | 5,423      | 5,489      | 5,555      | 5,621      | 5,687      |
| Commercial Customers                  | 753       | 753       | 753       | 753       | 753        | 753        | 753        | 753        | 753        | 753        |
| Industrial Customers                  | 6         | 6         | 6         | 6         | 6          | 6          | 6          | 6          | 6          | 6          |
| Interruptible Customers               | 1         | 1         | 1         | 1         | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 5,853     | 5,919     | 5,985     | 6,051     | 6,117      | 6,183      | 6,249      | 6,315      | 6,381      | 6,447      |
|                                       |           |           |           |           |            |            |            |            |            |            |
| Prineville                            | 2020      | 2021      | 2022      | 2023      | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| Total Therms Pct. Growth              |           | 1.37%     | 1.77%     | 1.76%     | 2.21%      | 1.25%      | 1.67%      | 1.65%      | 2.03%      | 1.19%      |
| Residential Therms                    | 1,594,201 | 1,643,679 | 1,699,940 | 1,756,563 | 1,821,809  | 1,870,249  | 1,926,900  | 1,983,550  | 2,048,525  | 2,096,823  |
| Commercial Therms                     | 1,843,742 | 1,845,036 | 1,854,028 | 1,863,456 | 1,881,609  | 1,882,740  | 1,892,167  | 1,901,590  | 1,918,596  | 1,920,444  |
| Industrial Therms                     | 198,268   | 197,469   | 197,426   | 197,426   | 198,268    | 197,469    | 197,469    | 197,469    | 198,182    | 197,469    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 3,636,211 | 3,686,183 | 3,751,394 | 3,817,446 | 3,901,686  | 3,950,458  | 4,016,536  | 4,082,609  | 4,165,304  | 4,214,736  |
| Daily Baseload Therms                 | 2,656     | 2,431     | 2,579     | 2,797     | 2,852      | 2,867      | 2,909      | 2,900      | 3,008      | 3,079      |
| Peak Day Therms                       | 45,920    | 46,770    | 47,621    | 48,471    | 48,439     | 49,274     | 51,022     | 51,873     | 52,723     | 53,573     |
| Therms Per Residential Customer       | 594       | 591       | 591       | 591       | 592        | 591        | 591        | 591        | 592        | 591        |
| Therms Per Commercial Customer        | 3,516     | 3,498     | 3,493     | 3,493     | 3,508      | 3,490      | 3,488      | 3,486      | 3,498      | 3,483      |
| Therms Per Industrial Customer        | 6,837     | 6,809     | 6,808     | 6,808     | 6,837      | 6,809      | 6,809      | 6,809      | 6,834      | 6,809      |
| Residential Customers                 | 2,686     | 2,782     | 2,878     | 2,974     | 3,070      | 3,166      | 3,262      | 3,358      | 3,454      | 3,550      |
| Commercial Customers                  | 524       | 527       | 530       | 533       | 536        | 539        | 542        | 545        | 548        | 551        |
| Industrial Customers                  | 29        | 29        | 29        | 29        | 29         | 29         | 29         | 29         | 29         | 29         |
| Interruptible Customers               | -         | -         | -         | -         | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 3,239     | 3,338     | 3,437     | 3,536     | 3,635      | 3,734      | 3,833      | 3,932      | 4,031      | 4,130      |
|                                       |           |           |           |           |            |            |            |            |            |            |
| Redmond                               | 2020      | 2021      | 2022      | 2023      | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| Total Therms Pct. Growth              |           | 2.87%     | 3.19%     | 3.13%     | 3.53%      | 2.48%      | 2.86%      | 2.78%      | 3.10%      | 2.24%      |
| Residential Therms                    | 4,341,378 | 4,498,142 | 4,672,814 | 4,849,095 | 5,050,143  | 5,205,645  | 5,380,046  | 5,556,446  | 5,754,977  | 5,909,151  |
| Commercial Therms                     | 3,929,581 | 3,991,982 | 4,070,917 | 4,151,098 | 4,251,998  | 4,312,873  | 4,393,134  | 4,473,401  | 4,571,559  | 4,633,821  |
| Industrial Therms                     | 791,795   | 833,088   | 877,191   | 921,492   | 969,889    | 1,010,479  | 1,054,801  | 1,099,124  | 1,147,437  | 1,187,870  |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 9,062,754 | 9,323,212 | 9,620,923 | 9,921,684 | 10,272,031 | 10,526,997 | 10,827,981 | 11,128,971 | 11,473,793 | 11,730,842 |
| Daily Baseload Therms                 | 7,113     | 7,442     | 7,832     | 8,205     | 8,205      | 8,340      | 8,585      | 8,933      | 9,059      | 9,430      |
| Peak Day Therms                       | 113,778   | 117,430   | 121,082   | 124,734   | 124,944    | 128,496    | 135,690    | 139,342    | 142,995    | 146,647    |
| Therms Per Residential Customer       | 761       | 757       | 757       | 757       | 761        | 757        | 757        | 757        | 760        | 757        |
| Therms Per Commercial Customer        | 3,282     | 3,266     | 3,264     | 3,263     | 3,278      | 3,262      | 3,261      | 3,260      | 3,272      | 3,258      |
| Therms Per Industrial Customer        | 39,224    | 39,075    | 39,068    | 39,070    | 39,233     | 39,083     | 39,085     | 39,087     | 39,221     | 39,088     |
| Residential Customers                 | 5,708     | 5,941     | 6,174     | 6,407     | 6,640      | 6,873      | 7,106      | 7,339      | 7,572      | 7,805      |
| Commercial Customers                  | 1,197     | 1,222     | 1,247     | 1,272     | 1,297      | 1,322      | 1,347      | 1,372      | 1,397      | 1,422      |
| Industrial Customers                  | 20        | 21        | 22        | 24        | 25         | 26         | 27         | 28         | 29         | 30         |
| Interruptible Customers               | -         | -         | -         | -         | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 6,925     | 7,185     | 7,444     | 7,703     | 7,962      | 8,221      | 8,480      | 8,739      | 8,999      | 9,258      |

Appendix B  
Demand Forecast  
Expected Forecast

|                                       | 2020      | 2021      | 2022      | 2023      | 2024      | 2025      | 2026      | 2027      | 2028      | 2029      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Stanfield</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -         | 1.03%     | 1.34%     | 1.33%     | 1.67%     | 0.96%     | 1.28%     | 1.26%     | 1.58%     | 0.91%     |
| Residential Therms                    | 198,311   | 201,434   | 205,202   | 208,987   | 213,533   | 216,605   | 220,391   | 224,177   | 228,715   | 231,776   |
| Commercial Therms                     | 79,616    | 79,351    | 79,344    | 79,344    | 79,616    | 79,351    | 79,351    | 79,351    | 79,602    | 79,351    |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 277,927   | 280,784   | 284,545   | 288,331   | 293,149   | 295,955   | 299,742   | 303,528   | 308,318   | 311,126   |
| Daily Baseload Therms                 | 200       | 203       | 205       | 206       | 209       | 212       | 215       | 218       | 218       | 219       |
| Peak Day Therms                       | 3,904     | 3,959     | 4,013     | 4,068     | 4,097     | 4,151     | 4,232     | 4,287     | 4,342     | 4,397     |
| Therms Per Residential Customer       | 572       | 570       | 570       | 570       | 572       | 570       | 570       | 570       | 572       | 570       |
| Therms Per Commercial Customer        | 2,152     | 2,145     | 2,144     | 2,144     | 2,152     | 2,145     | 2,145     | 2,145     | 2,151     | 2,145     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 347       | 353       | 360       | 367       | 373       | 380       | 387       | 393       | 400       | 407       |
| Commercial Customers                  | 37        | 37        | 37        | 37        | 37        | 37        | 37        | 37        | 37        | 37        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 384       | 390       | 397       | 404       | 410       | 417       | 424       | 430       | 437       | 444       |
| <b>Stearns (Surviver)</b>             |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -         | 0.47%     | 0.89%     | 0.87%     | 1.29%     | 0.44%     | 0.85%     | 0.84%     | 1.26%     | 0.41%     |
| Residential Therms                    | 3,771,770 | 3,798,959 | 3,842,429 | 3,885,775 | 3,946,028 | 3,972,465 | 4,015,809 | 4,059,152 | 4,120,551 | 4,145,971 |
| Commercial Therms                     | 1,084,525 | 1,080,699 | 1,080,749 | 1,080,749 | 1,084,525 | 1,080,699 | 1,080,699 | 1,080,699 | 1,084,625 | 1,080,699 |
| Industrial Therms                     | 45,079    | 44,929    | 44,929    | 44,929    | 45,079    | 44,929    | 44,929    | 44,929    | 45,081    | 44,929    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 4,901,375 | 4,924,587 | 4,968,108 | 5,011,454 | 5,075,633 | 5,098,093 | 5,141,437 | 5,184,780 | 5,250,257 | 5,271,599 |
| Daily Baseload Therms                 | 5,017     | 4,976     | 5,009     | 5,136     | 5,165     | 5,201     | 5,238     | 5,280     | 5,321     | 5,354     |
| Peak Day Therms                       | 51,713    | 52,216    | 52,720    | 53,223    | 53,908    | 54,413    | 54,735    | 55,238    | 55,743    | 56,247    |
| Therms Per Residential Customer       | 1,010     | 1,006     | 1,006     | 1,006     | 1,010     | 1,006     | 1,006     | 1,006     | 1,010     | 1,006     |
| Therms Per Commercial Customer        | 4,842     | 4,825     | 4,825     | 4,825     | 4,842     | 4,825     | 4,825     | 4,825     | 4,842     | 4,825     |
| Therms Per Industrial Customer        | 15,026    | 14,976    | 14,976    | 14,976    | 15,026    | 14,976    | 14,976    | 14,976    | 15,027    | 14,976    |
| Residential Customers                 | 3,733     | 3,776     | 3,819     | 3,862     | 3,906     | 3,949     | 3,992     | 4,035     | 4,078     | 4,121     |
| Commercial Customers                  | 224       | 224       | 224       | 224       | 224       | 224       | 224       | 224       | 224       | 224       |
| Industrial Customers                  | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 3,960     | 4,003     | 4,046     | 4,089     | 4,133     | 4,176     | 4,219     | 4,262     | 4,305     | 4,348     |
| <b>Pronghorn</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -         | 3.51%     | 3.76%     | 3.61%     | 3.87%     | 2.98%     | 3.26%     | 3.15%     | 3.49%     | 2.54%     |
| Residential Therms                    | 409,963   | 436,923   | 465,630   | 494,278   | 525,096   | 551,568   | 580,208   | 608,848   | 640,403   | 666,214   |
| Commercial Therms                     | 329,219   | 328,180   | 328,226   | 328,226   | 329,219   | 328,180   | 328,180   | 328,180   | 329,312   | 328,180   |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 739,182   | 765,102   | 793,856   | 822,504   | 854,315   | 879,748   | 908,388   | 937,028   | 969,715   | 994,394   |
| Daily Baseload Therms                 | 974       | 1,006     | 1,032     | 1,061     | 1,088     | 1,117     | 1,145     | 1,178     | 1,204     | 1,233     |
| Peak Day Therms                       | 7,045     | 7,371     | 7,696     | 8,022     | 8,470     | 8,800     | 9,000     | 9,326     | 9,653     | 9,979     |
| Therms Per Residential Customer       | 1,062     | 1,058     | 1,058     | 1,058     | 1,062     | 1,058     | 1,058     | 1,058     | 1,063     | 1,058     |
| Therms Per Commercial Customer        | 9,406     | 9,377     | 9,378     | 9,378     | 9,406     | 9,377     | 9,377     | 9,377     | 9,409     | 9,377     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 386       | 413       | 440       | 467       | 494       | 521       | 548       | 575       | 603       | 630       |
| Commercial Customers                  | 35        | 35        | 35        | 35        | 35        | 35        | 35        | 35        | 35        | 35        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 421       | 448       | 475       | 502       | 529       | 556       | 583       | 610       | 638       | 665       |
| <b>North Bend</b>                     |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -         | -0.25%    | -0.02%    | 0.00%     | 0.27%     | -0.25%    | 0.00%     | 0.00%     | 0.21%     | -0.21%    |
| Residential Therms                    | 5,751     | 5,738     | 5,737     | 5,737     | 5,751     | 5,738     | 5,738     | 5,738     | 5,749     | 5,738     |
| Commercial Therms                     | 46,234    | 46,114    | 46,105    | 46,105    | 46,234    | 46,114    | 46,114    | 46,114    | 46,217    | 46,114    |
| Industrial Therms                     | 14,079    | 14,048    | 14,046    | 14,046    | 14,079    | 14,048    | 14,048    | 14,048    | 14,073    | 14,048    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 66,063    | 65,900    | 65,888    | 65,888    | 66,063    | 65,900    | 65,900    | 65,900    | 66,039    | 65,900    |
| Daily Baseload Therms                 | 11        | 8         | (10)      | 11        | 11        | 11        | 11        | 8         | 11        | 11        |
| Peak Day Therms                       | 385       | 385       | 385       | 385       | 373       | 373       | 385       | 385       | 385       | 385       |
| Therms Per Residential Customer       | 1,438     | 1,435     | 1,434     | 1,434     | 1,438     | 1,435     | 1,435     | 1,435     | 1,437     | 1,435     |
| Therms Per Commercial Customer        | 562       | 553       | 528       | 505       | 485       | 465       | 447       | 430       | 416       | 401       |
| Therms Per Industrial Customer        | 7,039     | 7,024     | 7,023     | 7,023     | 7,039     | 7,024     | 7,024     | 7,024     | 7,037     | 7,024     |
| Residential Customers                 | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         |
| Commercial Customers                  | 79        | 83        | 87        | 91        | 95        | 99        | 103       | 107       | 111       | 115       |
| Industrial Customers                  | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 85        | 89        | 93        | 97        | 101       | 105       | 109       | 113       | 117       | 121       |

**Appendix B  
Demand Forecast  
Expected Forecast**

| Bend Loop                            | 2020        | 2021        | 2022        | 2023        | 2024        | 2025        | 2026        | 2027        | 2028        | 2029        |
|--------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Total Therms Pct. Growth             |             | 1.90%       | 2.28%       | 2.23%       | 2.63%       | 1.70%       | 2.09%       | 2.05%       | 2.43%       | 1.55%       |
| Residential Therms                   | 25,922,877  | 26,593,030  | 27,372,738  | 28,154,662  | 29,064,683  | 29,721,125  | 30,503,183  | 31,285,244  | 32,201,141  | 32,849,238  |
| Commercial Therms                    | 12,505,397  | 12,547,913  | 12,642,275  | 12,737,743  | 12,888,950  | 12,929,837  | 13,025,320  | 13,120,801  | 13,270,181  | 13,317,753  |
| Industrial Therms                    | 351,145     | 375,261     | 400,589     | 425,954     | 453,066     | 478,803     | 502,173     | 527,542     | 554,879     | 578,345     |
| Ind., Inst., & Cmcl. Interup. Therms | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Total Core Therms                    | 38,779,420  | 39,516,204  | 40,415,603  | 41,318,359  | 42,406,699  | 43,127,766  | 44,030,676  | 44,933,587  | 46,026,201  | 46,739,336  |
| Daily Baseload Therms                | 33,686      | 34,056      | 34,486      | 35,921      | 36,824      | 37,464      | 38,200      | 39,039      | 39,699      | 40,583      |
| Peak Day Therms                      | 450,970     | 461,418     | 471,865     | 482,312     | 489,112     | 499,483     | 513,653     | 524,100     | 534,548     | 544,995     |
| Therms Per Residential Customer      | 752         | 749         | 749         | 749         | 752         | 749         | 749         | 749         | 752         | 749         |
| Therms Per Commercial Customer       | 2,948       | 2,935       | 2,933       | 2,932       | 2,944       | 2,931       | 2,930       | 2,929       | 2,940       | 2,927       |
| Therms Per Industrial Customer       | 12,480      | 12,436      | 12,435      | 12,435      | 12,482      | 12,437      | 12,437      | 12,437      | 12,480      | 12,438      |
| Residential Customers                | 34,457      | 35,501      | 36,545      | 37,589      | 38,633      | 39,677      | 40,721      | 41,765      | 42,809      | 43,853      |
| Commercial Customers                 | 4,242       | 4,276       | 4,310       | 4,344       | 4,378       | 4,412       | 4,446       | 4,480       | 4,514       | 4,548       |
| Industrial Customers                 | 28          | 30          | 32          | 34          | 36          | 38          | 40          | 42          | 44          | 46          |
| Interruptible Customers              | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Total Core Customers                 | 38,727      | 39,808      | 40,888      | 41,968      | 43,048      | 44,128      | 45,208      | 46,288      | 47,368      | 48,448      |
| <b>McCleary (Aberdeen/Hoquiam)</b>   | <b>2020</b> | <b>2021</b> | <b>2022</b> | <b>2023</b> | <b>2024</b> | <b>2025</b> | <b>2026</b> | <b>2027</b> | <b>2028</b> | <b>2029</b> |
| Total Therms Pct. Growth             |             | -0.02%      | 0.32%       | 0.35%       | 0.77%       | -0.03%      | 0.35%       | 0.35%       | 0.67%       | 0.02%       |
| Residential Therms                   | 2,611,446   | 2,621,926   | 2,641,914   | 2,662,728   | 2,695,064   | 2,705,210   | 2,726,041   | 2,746,871   | 2,776,966   | 2,788,504   |
| Commercial Therms                    | 2,955,976   | 2,945,184   | 2,944,212   | 2,944,212   | 2,955,976   | 2,945,184   | 2,945,184   | 2,945,184   | 2,954,032   | 2,945,184   |
| Industrial Therms                    | 279,193     | 278,196     | 278,099     | 278,099     | 279,193     | 278,196     | 278,196     | 278,196     | 278,999     | 278,196     |
| Ind., Inst., & Cmcl. Interup. Therms | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Total Core Therms                    | 5,846,615   | 5,845,306   | 5,864,226   | 5,885,040   | 5,930,233   | 5,928,591   | 5,949,422   | 5,970,252   | 6,009,996   | 6,011,884   |
| Daily Baseload Therms                | 5,980       | 6,050       | 6,020       | 6,007       | 6,066       | 6,055       | 6,078       | 6,149       | 6,088       | 6,138       |
| Peak Day Therms                      | 52,780      | 52,992      | 53,204      | 53,416      | 53,714      | 54,012      | 54,264      | 54,564      | 54,864      | 55,168      |
| Therms Per Residential Customer      | 723         | 720         | 720         | 720         | 723         | 720         | 720         | 720         | 722         | 720         |
| Therms Per Commercial Customer       | 4,077       | 4,062       | 4,061       | 4,061       | 4,077       | 4,062       | 4,062       | 4,062       | 4,075       | 4,062       |
| Therms Per Industrial Customer       | 19,942      | 19,871      | 19,864      | 19,864      | 19,942      | 19,871      | 19,871      | 19,871      | 19,928      | 19,871      |
| Residential Customers                | 3,613       | 3,642       | 3,671       | 3,700       | 3,729       | 3,758       | 3,787       | 3,816       | 3,845       | 3,874       |
| Commercial Customers                 | 725         | 725         | 725         | 725         | 725         | 725         | 725         | 725         | 725         | 725         |
| Industrial Customers                 | 14          | 14          | 14          | 14          | 14          | 14          | 14          | 14          | 14          | 14          |
| Interruptible Customers              | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Total Core Customers                 | 4,352       | 4,381       | 4,410       | 4,439       | 4,468       | 4,497       | 4,526       | 4,555       | 4,584       | 4,613       |
| <b>Acme</b>                          | <b>2020</b> | <b>2021</b> | <b>2022</b> | <b>2023</b> | <b>2024</b> | <b>2025</b> | <b>2026</b> | <b>2027</b> | <b>2028</b> | <b>2029</b> |
| Total Therms Pct. Growth             |             | -0.37%      | -0.01%      | 0.00%       | 0.38%       | -0.37%      | 0.00%       | 0.00%       | 0.35%       | -0.35%      |
| Residential Therms                   | 54,595      | 54,395      | 54,391      | 54,391      | 54,595      | 54,395      | 54,395      | 54,395      | 54,586      | 54,395      |
| Commercial Therms                    | 31,334      | 31,218      | 31,216      | 31,216      | 31,334      | 31,218      | 31,218      | 31,218      | 31,329      | 31,218      |
| Industrial Therms                    | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Ind., Inst., & Cmcl. Interup. Therms | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Total Core Therms                    | 85,928      | 85,613      | 85,606      | 85,606      | 85,928      | 85,613      | 85,613      | 85,613      | 85,915      | 85,613      |
| Daily Baseload Therms                | 64          | 64          | 64          | 64          | 64          | 64          | 64          | 64          | 64          | 64          |
| Peak Day Therms                      | 861         | 861         | 861         | 861         | 854         | 861         | 861         | 861         | 861         | 861         |
| Therms Per Residential Customer      | 803         | 800         | 800         | 800         | 803         | 800         | 800         | 800         | 803         | 800         |
| Therms Per Commercial Customer       | 3,482       | 3,469       | 3,468       | 3,468       | 3,482       | 3,469       | 3,469       | 3,469       | 3,481       | 3,469       |
| Therms Per Industrial Customer       | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Residential Customers                | 68          | 68          | 68          | 68          | 68          | 68          | 68          | 68          | 68          | 68          |
| Commercial Customers                 | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           |
| Industrial Customers                 | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Interruptible Customers              | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Total Core Customers                 | 77          | 77          | 77          | 77          | 77          | 77          | 77          | 77          | 77          | 77          |
| <b>Arlington</b>                     | <b>2020</b> | <b>2021</b> | <b>2022</b> | <b>2023</b> | <b>2024</b> | <b>2025</b> | <b>2026</b> | <b>2027</b> | <b>2028</b> | <b>2029</b> |
| Total Therms Pct. Growth             |             | 0.93%       | 1.26%       | 1.27%       | 1.65%       | 0.87%       | 1.22%       | 1.21%       | 1.52%       | 0.85%       |
| Residential Therms                   | 3,272,870   | 3,278,404   | 3,295,276   | 3,312,856   | 3,343,540   | 3,348,812   | 3,366,400   | 3,383,987   | 3,412,744   | 3,419,222   |
| Commercial Therms                    | 1,947,403   | 1,973,123   | 2,005,379   | 2,038,078   | 2,078,867   | 2,104,109   | 2,136,822   | 2,169,535   | 2,209,351   | 2,235,097   |
| Industrial Therms                    | 438,252     | 459,794     | 482,698     | 505,701     | 530,702     | 551,922     | 574,936     | 597,950     | 622,882     | 644,051     |
| Ind., Inst., & Cmcl. Interup. Therms | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Total Core Therms                    | 5,658,525   | 5,711,321   | 5,783,353   | 5,856,324   | 5,953,109   | 6,004,843   | 6,078,158   | 6,151,472   | 6,244,977   | 6,298,370   |
| Daily Baseload Therms                | 5,522       | 5,641       | 5,684       | 5,763       | 5,879       | 5,916       | 5,995       | 6,116       | 6,156       | 6,280       |
| Peak Day Therms                      | 52,202      | 52,847      | 53,493      | 54,138      | 53,481      | 54,110      | 56,079      | 56,724      | 57,374      | 58,020      |
| Therms Per Residential Customer      | 663         | 680         | 680         | 680         | 683         | 680         | 680         | 680         | 683         | 680         |
| Therms Per Commercial Customer       | 3,121       | 3,110       | 3,109       | 3,109       | 3,121       | 3,110       | 3,110       | 3,110       | 3,120       | 3,110       |
| Therms Per Industrial Customer       | 13,801      | 13,754      | 13,750      | 13,749      | 13,799      | 13,752      | 13,751      | 13,751      | 13,792      | 13,751      |
| Residential Customers                | 4,792       | 4,818       | 4,844       | 4,870       | 4,895       | 4,921       | 4,947       | 4,973       | 4,999       | 5,025       |
| Commercial Customers                 | 624         | 634         | 645         | 655         | 666         | 677         | 687         | 698         | 708         | 719         |
| Industrial Customers                 | 32          | 33          | 35          | 37          | 38          | 40          | 42          | 43          | 45          | 47          |
| Interruptible Customers              | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Total Core Customers                 | 5,448       | 5,486       | 5,524       | 5,562       | 5,600       | 5,638       | 5,676       | 5,714       | 5,752       | 5,790       |
| <b>Bremerton (Shelton)</b>           | <b>2020</b> | <b>2021</b> | <b>2022</b> | <b>2023</b> | <b>2024</b> | <b>2025</b> | <b>2026</b> | <b>2027</b> | <b>2028</b> | <b>2029</b> |
| Total Therms Pct. Growth             |             | 0.66%       | 1.00%       | 1.36%       | 1.36%       | 0.62%       | 0.97%       | 0.96%       | 1.30%       | 0.60%       |
| Residential Therms                   | 23,424,949  | 23,741,960  | 24,144,839  | 24,549,326  | 25,049,155  | 25,360,065  | 25,764,604  | 26,169,145  | 26,669,774  | 26,978,174  |
| Commercial Therms                    | 21,821,846  | 21,832,890  | 21,917,257  | 22,003,132  | 22,186,655  | 22,176,440  | 22,262,334  | 22,348,228  | 22,508,311  | 22,519,987  |
| Industrial Therms                    | 446,366     | 444,677     | 444,647     | 444,647     | 446,366     | 444,677     | 444,677     | 444,677     | 446,305     | 444,677     |
| Ind., Inst., & Cmcl. Interup. Therms | 2,565,714   | 2,557,739   | 2,557,551   | 2,557,551   | 2,565,714   | 2,557,740   | 2,557,740   | 2,557,739   | 2,565,338   | 2,557,739   |
| Total Core Therms                    | 48,258,875  | 48,577,266  | 49,064,294  | 49,554,656  | 50,227,890  | 50,538,921  | 51,029,354  | 51,519,790  | 52,189,786  | 52,502,577  |
| Daily Baseload Therms                | 51,332      | 51,835      | 52,147      | 52,566      | 53,120      | 53,429      | 53,848      | 54,358      | 54,663      | 55,199      |
| Peak Day Therms                      | 401,404     | 405,915     | 410,426     | 414,936     | 415,988     | 420,465     | 428,469     | 432,979     | 437,490     | 442,001     |
| Therms Per Residential Customer      | 694         | 692         | 692         | 692         | 694         | 692         | 692         | 692         | 694         | 692         |
| Therms Per Commercial Customer       | 7,031       | 6,980       | 6,954       | 6,928       | 6,927       | 6,879       | 6,855       | 6,830       | 6,829       | 6,783       |
| Therms Per Industrial Customer       | 29,758      | 29,645      | 29,643      | 29,643      | 29,758      | 29,645      | 29,645      | 29,645      | 29,754      | 29,645      |
| Residential Customers                | 33,731      | 34,316      | 34,901      | 35,486      | 36,071      | 36,656      | 37,241      | 37,826      | 38,411      | 38,996      |
| Commercial Customers                 | 3,104       | 3,128       | 3,152       | 3,176       | 3,200       | 3,224       | 3,248       | 3,272       | 3,296       | 3,320       |
| Industrial Customers                 | 15          | 15          | 15          | 15          | 15          | 15          | 15          | 15          | 15          | 15          |
| Interruptible Customers              | 3           | 3           | 3           | 3           | 3           | 3           | 3           | 3           | 3           | 3           |
| Total Core Customers                 | 36,852      | 37,461      | 38,070      | 38,679      | 39,288      | 39,897      | 40,506      | 41,115      | 41,724      | 42,333      |





**Appendix B  
Demand Forecast  
Expected Forecast**

|                                       | 2020      | 2021      | 2022      | 2023      | 2024      | 2025      | 2026      | 2027      | 2028      | 2029      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Patterson</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -         | -0.23%    | -0.01%    | 0.00%     | 0.25%     | -0.23%    | 0.00%     | 0.00%     | 0.21%     | -0.21%    |
| Residential Therms                    | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Commercial Therms                     | 262,500   | 261,886   | 261,851   | 261,851   | 262,500   | 261,886   | 261,886   | 261,886   | 262,432   | 261,886   |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cncl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 262,500   | 261,886   | 261,851   | 261,851   | 262,500   | 261,886   | 261,886   | 261,886   | 262,432   | 261,886   |
| Daily Baseload Therms                 | 227       | 200       | 193       | 227       | 227       | 227       | 227       | 200       | 227       | 227       |
| Peak Day Therms                       | 1,278     | 1,278     | 1,278     | 1,278     | 1,244     | 1,244     | 1,278     | 1,278     | 1,278     | 1,278     |
| Therms Per Residential Customer       | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Therms Per Commercial Customer        | 52,500    | 52,377    | 52,370    | 52,370    | 52,500    | 52,377    | 52,377    | 52,377    | 52,486    | 52,377    |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Commercial Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| <b>Prosser</b>                        |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -         | -0.40%    | -0.05%    | 0.00%     | 0.45%     | -0.40%    | 0.00%     | 0.00%     | 0.31%     | -0.31%    |
| Residential Therms                    | 265,802   | 264,623   | 264,511   | 264,508   | 265,802   | 264,623   | 264,619   | 264,616   | 265,586   | 264,623   |
| Commercial Therms                     | 503,538   | 501,533   | 501,297   | 501,297   | 503,538   | 501,533   | 501,533   | 501,533   | 503,065   | 501,534   |
| Industrial Therms                     | 235,024   | 234,160   | 234,035   | 234,035   | 235,024   | 234,160   | 234,160   | 234,160   | 234,775   | 234,160   |
| Ind., Inst., & Cncl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 1,004,365 | 1,000,316 | 999,843   | 999,840   | 1,004,365 | 1,000,315 | 1,000,312 | 1,000,309 | 1,003,426 | 1,000,316 |
| Daily Baseload Therms                 | 1,018     | 1,033     | 1,019     | 1,019     | 1,014     | 1,018     | 1,018     | 1,033     | 1,019     | 1,030     |
| Peak Day Therms                       | 9,385     | 9,385     | 9,385     | 9,385     | 8,916     | 8,916     | 9,385     | 9,385     | 9,385     | 9,385     |
| Therms Per Residential Customer       | 599       | 596       | 596       | 596       | 599       | 596       | 596       | 596       | 599       | 596       |
| Therms Per Commercial Customer        | 3,714     | 3,699     | 3,697     | 3,697     | 3,714     | 3,699     | 3,699     | 3,699     | 3,711     | 3,699     |
| Therms Per Industrial Customer        | 47,005    | 46,832    | 46,807    | 46,807    | 47,005    | 46,832    | 46,832    | 46,832    | 46,955    | 46,832    |
| Residential Customers                 | 444       | 444       | 444       | 444       | 444       | 444       | 444       | 444       | 444       | 444       |
| Commercial Customers                  | 136       | 136       | 136       | 136       | 136       | 136       | 136       | 136       | 136       | 136       |
| Industrial Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 584       | 584       | 584       | 584       | 584       | 584       | 584       | 584       | 584       | 584       |
| <b>Quincy</b>                         |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -         | -0.33%    | -0.01%    | 0.00%     | 0.34%     | -0.33%    | 0.00%     | 0.00%     | 0.31%     | -0.31%    |
| Residential Therms                    | 26,501    | 26,403    | 26,400    | 26,400    | 26,501    | 26,403    | 26,403    | 26,403    | 26,496    | 26,403    |
| Commercial Therms                     | 692,620   | 690,321   | 690,252   | 690,252   | 692,620   | 690,321   | 690,321   | 690,321   | 692,483   | 690,321   |
| Industrial Therms                     | 109,489   | 109,169   | 109,158   | 109,158   | 109,489   | 109,169   | 109,169   | 109,169   | 109,467   | 109,169   |
| Ind., Inst., & Cncl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 828,611   | 825,893   | 825,811   | 825,811   | 828,611   | 825,893   | 825,893   | 825,893   | 828,447   | 825,893   |
| Daily Baseload Therms                 | 1,381     | 1,384     | 1,381     | 1,381     | 1,380     | 1,381     | 1,381     | 1,384     | 1,381     | 1,383     |
| Peak Day Therms                       | 6,022     | 6,022     | 6,022     | 6,022     | 5,940     | 5,940     | 6,022     | 6,022     | 6,022     | 6,022     |
| Therms Per Residential Customer       | 434       | 433       | 433       | 433       | 434       | 433       | 433       | 433       | 434       | 433       |
| Therms Per Commercial Customer        | 9,360     | 9,329     | 9,328     | 9,328     | 9,360     | 9,329     | 9,329     | 9,329     | 9,358     | 9,329     |
| Therms Per Industrial Customer        | 27,372    | 27,292    | 27,290    | 27,290    | 27,372    | 27,292    | 27,292    | 27,292    | 27,367    | 27,292    |
| Residential Customers                 | 61        | 61        | 61        | 61        | 61        | 61        | 61        | 61        | 61        | 61        |
| Commercial Customers                  | 74        | 74        | 74        | 74        | 74        | 74        | 74        | 74        | 74        | 74        |
| Industrial Customers                  | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 139       | 139       | 139       | 139       | 139       | 139       | 139       | 139       | 139       | 139       |
| <b>Sunnyside</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -         | -0.17%    | 0.18%     | 0.20%     | 0.58%     | -0.17%    | 0.19%     | 0.19%     | 0.52%     | -0.13%    |
| Residential Therms                    | 1,090,608 | 1,084,105 | 1,081,648 | 1,079,380 | 1,081,502 | 1,075,031 | 1,072,765 | 1,070,499 | 1,072,026 | 1,065,962 |
| Commercial Therms                     | 1,749,918 | 1,752,519 | 1,761,236 | 1,770,270 | 1,786,218 | 1,788,679 | 1,797,721 | 1,806,768 | 1,821,852 | 1,824,839 |
| Industrial Therms                     | 617,296   | 615,422   | 615,285   | 615,285   | 617,296   | 615,422   | 615,422   | 615,422   | 617,022   | 615,422   |
| Ind., Inst., & Cncl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 3,457,823 | 3,452,046 | 3,458,169 | 3,464,935 | 3,485,016 | 3,479,132 | 3,485,908 | 3,492,689 | 3,510,901 | 3,506,223 |
| Daily Baseload Therms                 | 2,361     | 2,104     | 2,063     | 2,419     | 2,422     | 2,435     | 2,413     | 2,150     | 2,464     | 2,463     |
| Peak Day Therms                       | 33,419    | 33,484    | 33,550    | 33,615    | 33,034    | 33,098    | 33,012    | 33,677    | 33,942    | 34,008    |
| Therms Per Residential Customer       | 572       | 570       | 570       | 570       | 572       | 570       | 570       | 570       | 572       | 570       |
| Therms Per Commercial Customer        | 3,319     | 3,305     | 3,303     | 3,301     | 3,312     | 3,299     | 3,297     | 3,296     | 3,305     | 3,292     |
| Therms Per Industrial Customer        | 36,312    | 36,201    | 36,193    | 36,193    | 36,312    | 36,201    | 36,201    | 36,201    | 36,295    | 36,201    |
| Residential Customers                 | 1,906     | 1,902     | 1,898     | 1,894     | 1,890     | 1,886     | 1,882     | 1,878     | 1,874     | 1,870     |
| Commercial Customers                  | 527       | 530       | 533       | 536       | 539       | 542       | 545       | 548       | 551       | 554       |
| Industrial Customers                  | 17        | 17        | 17        | 17        | 17        | 17        | 17        | 17        | 17        | 17        |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 2,450     | 2,449     | 2,448     | 2,447     | 2,446     | 2,445     | 2,444     | 2,443     | 2,442     | 2,441     |
| <b>Moses Lake</b>                     |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -         | 0.36%     | 0.72%     | 0.73%     | 1.12%     | 0.34%     | 0.71%     | 0.71%     | 1.05%     | 0.35%     |
| Residential Therms                    | 306,839   | 305,203   | 304,724   | 304,297   | 305,122   | 303,492   | 303,064   | 302,637   | 303,305   | 301,781   |
| Commercial Therms                     | 2,616,221 | 2,629,994 | 2,651,543 | 2,674,447 | 2,708,206 | 2,720,731 | 2,743,651 | 2,766,574 | 2,799,230 | 2,812,389 |
| Industrial Therms                     | 134,074   | 133,730   | 133,712   | 133,712   | 134,074   | 133,730   | 133,730   | 133,730   | 134,039   | 133,730   |
| Ind., Inst., & Cncl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 3,057,135 | 3,068,927 | 3,089,979 | 3,112,456 | 3,147,402 | 3,157,953 | 3,180,445 | 3,202,940 | 3,236,573 | 3,247,900 |
| Daily Baseload Therms                 | 3,731     | 3,774     | 3,790     | 3,823     | 3,855     | 3,892     | 3,924     | 3,968     | 3,984     | 4,031     |
| Peak Day Therms                       | 29,262    | 29,475    | 29,689    | 29,902    | 29,576    | 29,786    | 30,543    | 30,757    | 30,970    | 31,184    |
| Therms Per Residential Customer       | 431       | 429       | 429       | 429       | 429       | 429       | 429       | 429       | 431       | 429       |
| Therms Per Commercial Customer        | 6,844     | 6,772     | 6,726     | 6,682     | 6,666     | 6,600     | 6,560     | 6,521     | 6,506     | 6,447     |
| Therms Per Industrial Customer        | 19,153    | 19,104    | 19,102    | 19,102    | 19,153    | 19,104    | 19,104    | 19,104    | 19,148    | 19,104    |
| Residential Customers                 | 712       | 711       | 710       | 709       | 708       | 707       | 706       | 705       | 704       | 703       |
| Commercial Customers                  | 382       | 388       | 394       | 400       | 406       | 412       | 418       | 424       | 430       | 436       |
| Industrial Customers                  | 7         | 7         | 7         | 7         | 7         | 7         | 7         | 7         | 7         | 7         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 1,101     | 1,106     | 1,111     | 1,116     | 1,121     | 1,126     | 1,131     | 1,136     | 1,141     | 1,146     |





**Appendix B  
Demand Forecast  
Expected Forecast**

| 7th Day School                        | 2020              | 2021              | 2022              | 2023              | 2024              | 2025              | 2026              | 2027              | 2028              | 2029              |
|---------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| <b>Total Therms Pct. Growth</b>       |                   | -0.26%            | 0.00%             | 0.00%             | 0.26%             | -0.26%            | 0.00%             | 0.00%             | 0.26%             | -0.26%            |
| Residential Therms                    | 8,817             | 8,793             | 8,793             | 8,793             | 8,817             | 8,793             | 8,793             | 8,793             | 8,816             | 8,793             |
| Commercial Therms                     | 11,616            | 11,581            | 11,581            | 11,580            | 11,616            | 11,581            | 11,581            | 11,580            | 11,616            | 11,581            |
| Industrial Therms                     | 9,632             | 9,613             | 9,613             | 9,613             | 9,632             | 9,613             | 9,613             | 9,613             | 9,632             | 9,613             |
| Ind., Inst., & Cncl. Interrup. Therms | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Therms</b>              | <b>30,065</b>     | <b>29,987</b>     | <b>29,987</b>     | <b>29,987</b>     | <b>30,065</b>     | <b>29,987</b>     | <b>29,987</b>     | <b>29,986</b>     | <b>30,065</b>     | <b>29,987</b>     |
| Daily Baseload Therms                 | 28                | 28                | 28                | 28                | 28                | 28                | 28                | 28                | 28                | 28                |
| Peak Day Therms                       | 128               | 128               | 128               | 128               | 129               | 129               | 128               | 128               | 128               | 128               |
| Therms Per Residential Customer       | 1,102             | 1,099             | 1,099             | 1,099             | 1,102             | 1,099             | 1,099             | 1,099             | 1,102             | 1,099             |
| Therms Per Commercial Customer        | 2,245             | 2,238             | 2,238             | 2,238             | 2,245             | 2,238             | 2,238             | 2,238             | 2,245             | 2,238             |
| Therms Per Industrial Customer        | 9,632             | 9,613             | 9,613             | 9,613             | 9,632             | 9,613             | 9,613             | 9,613             | 9,632             | 9,613             |
| Residential Customers                 | 8                 | 8                 | 8                 | 8                 | 8                 | 8                 | 8                 | 8                 | 8                 | 8                 |
| Commercial Customers                  | 5                 | 5                 | 5                 | 5                 | 5                 | 5                 | 5                 | 5                 | 5                 | 5                 |
| Industrial Customers                  | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 |
| Interruptible Customers               | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Customers</b>           | <b>14</b>         | <b>14</b>         | <b>14</b>         | <b>14</b>         | <b>14</b>         | <b>14</b>         | <b>14</b>         | <b>14</b>         | <b>14</b>         | <b>14</b>         |
| <b>Yakima Training Center</b>         | <b>2020</b>       | <b>2021</b>       | <b>2022</b>       | <b>2023</b>       | <b>2024</b>       | <b>2025</b>       | <b>2026</b>       | <b>2027</b>       | <b>2028</b>       | <b>2029</b>       |
| <b>Total Therms Pct. Growth</b>       |                   | 0.62%             | 0.97%             | 0.96%             | 1.30%             | 0.58%             | 0.93%             | 0.92%             | 1.28%             | 0.54%             |
| Residential Therms                    | 19,448            | 20,098            | 20,813            | 21,528            | 22,319            | 22,940            | 23,675            | 24,390            | 25,192            | 25,822            |
| Commercial Therms                     | 371,307           | 373,074           | 376,163           | 379,240           | 383,647           | 385,390           | 388,467           | 391,544           | 396,054           | 397,707           |
| Industrial Therms                     | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| Ind., Inst., & Cncl. Interrup. Therms | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Therms</b>              | <b>390,754</b>    | <b>393,171</b>    | <b>396,976</b>    | <b>400,768</b>    | <b>405,966</b>    | <b>408,350</b>    | <b>412,142</b>    | <b>415,934</b>    | <b>421,246</b>    | <b>423,529</b>    |
| Daily Baseload Therms                 | 230               | 232               | 234               | 239               | 241               | 244               | 246               | 248               | 248               | 251               |
| Peak Day Therms                       | 4,291             | 4,332             | 4,373             | 4,414             | 4,468             | 4,510             | 4,537             | 4,578             | 4,619             | 4,660             |
| Therms Per Residential Customer       | 818               | 815               | 815               | 815               | 818               | 815               | 815               | 815               | 818               | 815               |
| Therms Per Commercial Customer        | 3,408             | 3,396             | 3,396             | 3,396             | 3,408             | 3,396             | 3,396             | 3,396             | 3,408             | 3,396             |
| Therms Per Industrial Customer        | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| Residential Customers                 | 24                | 25                | 26                | 26                | 27                | 28                | 29                | 30                | 31                | 32                |
| Commercial Customers                  | 109               | 110               | 111               | 112               | 113               | 113               | 114               | 115               | 116               | 117               |
| Industrial Customers                  | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| Interruptible Customers               | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Customers</b>           | <b>133</b>        | <b>135</b>        | <b>136</b>        | <b>138</b>        | <b>140</b>        | <b>142</b>        | <b>143</b>        | <b>145</b>        | <b>147</b>        | <b>149</b>        |
| <b>Burbank Heights Loop</b>           | <b>2020</b>       | <b>2021</b>       | <b>2022</b>       | <b>2023</b>       | <b>2024</b>       | <b>2025</b>       | <b>2026</b>       | <b>2027</b>       | <b>2028</b>       | <b>2029</b>       |
| <b>Total Therms Pct. Growth</b>       |                   | 2.94%             | 3.24%             | 3.15%             | 3.51%             | 2.54%             | 2.88%             | 2.80%             | 3.11%             | 2.27%             |
| Residential Therms                    | 6,426,001         | 6,657,893         | 6,914,876         | 7,173,256         | 7,464,193         | 7,691,723         | 7,950,202         | 8,208,685         | 8,498,833         | 8,726,568         |
| Commercial Therms                     | 4,735,349         | 4,840,827         | 4,964,728         | 5,089,669         | 5,237,364         | 5,340,769         | 5,465,749         | 5,590,773         | 5,736,926         | 5,840,709         |
| Industrial Therms                     | 272,939           | 272,168           | 272,106           | 272,106           | 272,940           | 272,168           | 272,169           | 272,169           | 272,169           | 272,168           |
| Ind., Inst., & Cncl. Interrup. Therms | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Therms</b>              | <b>11,434,289</b> | <b>11,770,888</b> | <b>12,151,709</b> | <b>12,535,031</b> | <b>12,974,496</b> | <b>13,304,661</b> | <b>13,688,139</b> | <b>14,071,627</b> | <b>14,508,573</b> | <b>14,838,445</b> |
| Daily Baseload Therms                 | 10,434            | 10,822            | 11,089            | 11,347            | 11,739            | 12,167            | 12,514            | 12,917            | 13,058            | 13,180            |
| Peak Day Therms                       | 163,379           | 168,824           | 174,269           | 179,715           | 182,350           | 187,713           | 196,051           | 201,496           | 206,941           | 212,386           |
| Therms Per Residential Customer       | 554               | 552               | 551               | 551               | 554               | 552               | 552               | 552               | 554               | 552               |
| Therms Per Commercial Customer        | 4,059             | 4,036             | 4,028             | 4,022             | 4,033             | 4,011             | 4,006             | 4,001             | 4,010             | 3,991             |
| Therms Per Industrial Customer        | 22,684            | 22,620            | 22,615            | 22,615            | 22,685            | 22,620            | 22,620            | 22,620            | 22,674            | 22,620            |
| Residential Customers                 | 11,602            | 12,071            | 12,539            | 13,008            | 13,477            | 13,946            | 14,415            | 14,883            | 15,352            | 15,821            |
| Commercial Customers                  | 1,167             | 1,200             | 1,233             | 1,266             | 1,299             | 1,332             | 1,365             | 1,398             | 1,431             | 1,464             |
| Industrial Customers                  | 12                | 12                | 12                | 12                | 12                | 12                | 12                | 12                | 12                | 12                |
| Interruptible Customers               | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Customers</b>           | <b>12,780</b>     | <b>13,282</b>     | <b>13,784</b>     | <b>14,286</b>     | <b>14,788</b>     | <b>15,289</b>     | <b>15,791</b>     | <b>16,293</b>     | <b>16,795</b>     | <b>17,297</b>     |
| <b>East Stanwood Loop</b>             | <b>2020</b>       | <b>2021</b>       | <b>2022</b>       | <b>2023</b>       | <b>2024</b>       | <b>2025</b>       | <b>2026</b>       | <b>2027</b>       | <b>2028</b>       | <b>2029</b>       |
| <b>Total Therms Pct. Growth</b>       |                   | 0.49%             | 0.84%             | 0.84%             | 1.21%             | 0.46%             | 0.82%             | 0.81%             | 1.16%             | 0.45%             |
| Residential Therms                    | 5,467,947         | 5,506,167         | 5,564,291         | 5,622,827         | 5,703,205         | 5,740,551         | 5,799,097         | 5,857,643         | 5,937,583         | 5,974,936         |
| Commercial Therms                     | 4,781,659         | 4,798,029         | 4,830,831         | 4,864,014         | 4,914,988         | 4,930,870         | 4,964,058         | 4,997,247         | 5,047,517         | 5,063,711         |
| Industrial Therms                     | 441,509           | 440,211           | 440,174           | 440,162           | 441,506           | 440,213           | 440,201           | 440,188           | 441,450           | 440,212           |
| Ind., Inst., & Cncl. Interrup. Therms | 94,193            | 93,961            | 93,951            | 93,951            | 94,193            | 93,961            | 93,961            | 93,961            | 94,174            | 93,961            |
| <b>Total Core Therms</b>              | <b>10,785,308</b> | <b>10,838,368</b> | <b>10,929,246</b> | <b>11,020,955</b> | <b>11,153,892</b> | <b>11,205,595</b> | <b>11,297,316</b> | <b>11,389,059</b> | <b>11,520,724</b> | <b>11,572,819</b> |
| Daily Baseload Therms                 | 11,394            | 11,502            | 11,564            | 11,651            | 11,730            | 11,829            | 11,916            | 12,008            | 12,086            | 12,202            |
| Peak Day Therms                       | 94,574            | 95,433            | 96,293            | 97,153            | 97,165            | 98,017            | 99,741            | 100,601           | 101,470           | 102,330           |
| Therms Per Residential Customer       | 648               | 646               | 646               | 646               | 648               | 646               | 646               | 646               | 648               | 646               |
| Therms Per Commercial Customer        | 4,891             | 4,857             | 4,840             | 4,824             | 4,826             | 4,793             | 4,778             | 4,763             | 4,765             | 4,735             |
| Therms Per Industrial Customer        | 149,873           | 149,426           | 149,413           | 149,409           | 149,874           | 149,427           | 149,422           | 149,418           | 149,855           | 149,426           |
| Residential Customers                 | 8,432             | 8,523             | 8,613             | 8,704             | 8,795             | 8,885             | 8,976             | 9,067             | 9,158             | 9,248             |
| Commercial Customers                  | 978               | 988               | 998               | 1,008             | 1,018             | 1,029             | 1,039             | 1,049             | 1,059             | 1,070             |
| Industrial Customers                  | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 |
| Interruptible Customers               | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 |
| <b>Total Core Customers</b>           | <b>9,414</b>      | <b>9,515</b>      | <b>9,615</b>      | <b>9,716</b>      | <b>9,817</b>      | <b>9,918</b>      | <b>10,019</b>     | <b>10,120</b>     | <b>10,221</b>     | <b>10,322</b>     |
| <b>Kennewick Loop</b>                 | <b>2020</b>       | <b>2021</b>       | <b>2022</b>       | <b>2023</b>       | <b>2024</b>       | <b>2025</b>       | <b>2026</b>       | <b>2027</b>       | <b>2028</b>       | <b>2029</b>       |
| <b>Total Therms Pct. Growth</b>       |                   | 2.38%             | 2.68%             | 2.96%             | 2.46%             | 2.10%             | 2.43%             | 2.37%             | 2.68%             | 1.91%             |
| Residential Therms                    | 10,309,415        | 10,634,739        | 10,999,327        | 11,365,311        | 11,779,528        | 12,098,966        | 12,465,045        | 12,831,124        | 13,246,183        | 13,562,200        |
| Commercial Therms                     | 11,010,426        | 11,219,188        | 11,466,906        | 11,716,203        | 12,011,568        | 12,216,597        | 12,465,966        | 12,715,342        | 13,009,662        | 13,214,010        |
| Industrial Therms                     | 778,556           | 776,017           | 775,881           | 775,881           | 778,556           | 776,017           | 776,017           | 776,017           | 778,285           | 776,017           |
| Ind., Inst., & Cncl. Interrup. Therms | 208,383           | 207,687           | 207,652           | 207,652           | 208,383           | 207,687           | 207,687           | 207,687           | 208,314           | 207,687           |
| <b>Total Core Therms</b>              | <b>22,306,781</b> | <b>22,837,630</b> | <b>23,449,766</b> | <b>24,065,047</b> | <b>24,778,035</b> | <b>25,299,266</b> | <b>25,914,714</b> | <b>26,530,170</b> | <b>27,241,844</b> | <b>27,760,914</b> |
| Daily Baseload Therms                 | 24,068            | 24,731            | 25,425            | 25,751            | 26,402            | 27,114            | 27,738            | 28,418            | 28,787            | 29,129            |
| Peak Day Therms                       | 288,509           | 296,760           | 305,010           | 313,261           | 318,052           | 326,220           | 338,013           | 346,264           | 354,515           | 362,765           |
| Therms Per Residential Customer       | 606               | 604               | 604               | 604               | 606               | 604               | 604               | 604               | 606               | 604               |
| Therms Per Commercial Customer        | 4,274             | 4,249             | 4,240             | 4,232             | 4,241             | 4,218             | 4,211             | 4,204             | 4,212             | 4,192             |
| Therms Per Industrial Customer        | 70,778            | 70,547            | 70,535            | 70,535            | 70,778            | 70,547            | 70,547            | 70,547            | 70,753            | 70,547            |
| Residential Customers                 | 17,001            | 17,607            | 18,214            | 18,820            | 19,427            | 20,033            | 20,640            | 21,246            | 21,853            | 22,459            |
| Commercial Customers                  | 2,576             | 2,640             | 2,704             | 2,768             | 2,832             | 2,896             | 2,960             | 3,024             | 3,088             | 3,152             |
| Industrial Customers                  | 11                | 11                | 11                | 11                | 11                | 11                | 11                | 11                | 11                | 11                |
| Interruptible Customers               | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 |
| <b>Total Core Customers</b>           | <b>19,589</b>     | <b>20,259</b>     | <b>20,930</b>     | <b>21,600</b>     | <b>22,271</b>     | <b>22,941</b>     | <b>23,612</b>     | <b>24,282</b>     | <b>24,953</b>     | <b>25,623</b>     |

Appendix B  
Demand Forecast  
Expected Forecast

|                                       | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Longview South Loop</b>            |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 0.14%      | 0.51%      | 0.55%      | 0.99%      | 0.13%      | 0.54%      | 0.53%      | 0.88%      | 0.18%      |
| Residential Therms                    | 1,090,872  | 1,116,941  | 1,147,058  | 1,177,949  | 1,213,403  | 1,238,965  | 1,269,474  | 1,299,985  | 1,335,039  | 1,360,990  |
| Commercial Therms                     | 4,172,617  | 4,155,523  | 4,154,099  | 4,154,069  | 4,172,615  | 4,155,518  | 4,155,487  | 4,155,457  | 4,169,841  | 4,155,521  |
| Industrial Therms                     | 193,058    | 192,296    | 192,237    | 192,237    | 193,058    | 192,296    | 192,296    | 192,296    | 192,296    | 192,296    |
| Ind., Inst., & CmcI. Interrup. Therms | 95,919     | 95,569     | 95,539     | 95,539     | 95,919     | 95,569     | 95,569     | 95,569     | 95,569     | 95,569     |
| Total Core Therms                     | 5,552,466  | 5,560,329  | 5,588,932  | 5,619,994  | 5,674,994  | 5,682,348  | 5,712,827  | 5,743,307  | 5,793,680  | 5,804,376  |
| Daily Baseload Therms                 | 4,455      | 4,545      | 4,527      | 4,558      | 4,601      | 4,609      | 4,640      | 4,731      | 4,711      | 4,804      |
| Peak Day Therms                       | 49,508     | 49,807     | 50,105     | 50,403     | 48,821     | 49,110     | 51,307     | 51,605     | 51,911     | 52,210     |
| Therms Per Residential Customer       | 529        | 527        | 526        | 526        | 529        | 526        | 526        | 526        | 528        | 526        |
| Therms Per Commercial Customer        | 4,610      | 4,591      | 4,589      | 4,589      | 4,610      | 4,591      | 4,591      | 4,591      | 4,606      | 4,591      |
| Therms Per Industrial Customer        | 14,851     | 14,792     | 14,787     | 14,787     | 14,851     | 14,792     | 14,792     | 14,792     | 14,841     | 14,792     |
| Residential Customers                 | 2,063      | 2,121      | 2,179      | 2,237      | 2,295      | 2,353      | 2,411      | 2,469      | 2,527      | 2,585      |
| Commercial Customers                  | 905        | 905        | 905        | 905        | 905        | 905        | 905        | 905        | 905        | 905        |
| Industrial Customers                  | 13         | 13         | 13         | 13         | 13         | 13         | 13         | 13         | 13         | 13         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 2,982      | 3,040      | 3,098      | 3,156      | 3,214      | 3,272      | 3,330      | 3,388      | 3,446      | 3,504      |
| <b>Sedro-Woolley Loop</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 0.80%      | 1.17%      | 1.17%      | 1.56%      | 0.75%      | 1.13%      | 1.11%      | 1.48%      | 0.72%      |
| Residential Therms                    | 17,817,136 | 17,971,796 | 18,194,481 | 18,418,895 | 18,718,445 | 18,869,576 | 19,094,033 | 19,318,492 | 19,616,040 | 19,767,365 |
| Commercial Therms                     | 9,974,965  | 10,058,271 | 10,177,474 | 10,297,686 | 10,459,742 | 10,539,138 | 10,659,365 | 10,779,594 | 10,940,346 | 11,020,037 |
| Industrial Therms                     | 1,179,764  | 1,175,584  | 1,175,451  | 1,175,451  | 1,179,765  | 1,175,584  | 1,175,584  | 1,175,585  | 1,179,498  | 1,175,584  |
| Ind., Inst., & CmcI. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 28,972,866 | 29,205,651 | 29,547,407 | 29,892,032 | 30,357,972 | 30,584,298 | 30,928,982 | 31,273,671 | 31,735,885 | 31,962,986 |
| Daily Baseload Therms                 | 29,147     | 29,565     | 29,831     | 30,174     | 30,600     | 30,855     | 31,202     | 31,627     | 31,886     | 32,321     |
| Peak Day Therms                       | 283,037    | 286,457    | 289,877    | 293,297    | 293,732    | 297,118    | 303,557    | 306,977    | 310,396    | 313,816    |
| Therms Per Residential Customer       | 675        | 672        | 672        | 675        | 675        | 672        | 672        | 672        | 675        | 672        |
| Therms Per Commercial Customer        | 2,949      | 2,932      | 2,927      | 2,922      | 2,929      | 2,913      | 2,908      | 2,904      | 2,910      | 2,895      |
| Therms Per Industrial Customer        | 13,463     | 13,415     | 13,413     | 13,413     | 13,463     | 13,415     | 13,415     | 13,415     | 13,460     | 13,415     |
| Residential Customers                 | 26,393     | 26,728     | 27,063     | 27,397     | 27,732     | 28,066     | 28,401     | 28,736     | 29,070     | 29,405     |
| Commercial Customers                  | 3,384      | 3,431      | 3,478      | 3,525      | 3,572      | 3,619      | 3,666      | 3,713      | 3,760      | 3,807      |
| Industrial Customers                  | 88         | 88         | 88         | 88         | 88         | 88         | 88         | 88         | 88         | 88         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 29,865     | 30,246     | 30,628     | 31,009     | 31,391     | 31,772     | 32,154     | 32,536     | 32,917     | 33,299     |
| <b>Sumas SPE Loop</b>                 |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 1.02%      | 1.38%      | 1.37%      | 1.76%      | 0.95%      | 1.32%      | 1.30%      | 1.65%      | 0.90%      |
| Residential Therms                    | 32,716,569 | 33,062,747 | 33,532,074 | 34,005,171 | 34,616,649 | 34,955,430 | 35,428,629 | 35,901,829 | 36,508,508 | 36,848,136 |
| Commercial Therms                     | 16,894,770 | 17,009,707 | 17,187,308 | 17,366,993 | 17,616,430 | 17,728,528 | 17,908,244 | 18,087,964 | 18,333,649 | 18,447,370 |
| Industrial Therms                     | 1,861,127  | 1,925,269  | 1,995,475  | 2,065,928  | 2,144,183  | 2,207,344  | 2,277,815  | 2,348,287  | 2,426,622  | 2,489,420  |
| Ind., Inst., & CmcI. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 51,472,466 | 51,997,723 | 52,714,857 | 53,438,092 | 54,377,282 | 54,891,302 | 55,614,688 | 56,338,079 | 57,268,779 | 57,784,926 |
| Daily Baseload Therms                 | 60,717     | 61,540     | 62,233     | 63,096     | 64,379     | 65,074     | 66,957     | 66,794     | 67,462     | 68,508     |
| Peak Day Therms                       | 457,687    | 464,096    | 470,505    | 476,915    | 476,938    | 483,263    | 496,145    | 502,555    | 508,966    | 515,375    |
| Therms Per Residential Customer       | 720        | 717        | 717        | 717        | 720        | 717        | 717        | 717        | 720        | 717        |
| Therms Per Commercial Customer        | 3,192      | 3,176      | 3,172      | 3,168      | 3,177      | 3,161      | 3,158      | 3,154      | 3,163      | 3,148      |
| Therms Per Industrial Customer        | 24,733     | 24,648     | 24,645     | 24,644     | 24,732     | 24,647     | 24,647     | 24,646     | 24,725     | 24,646     |
| Residential Customers                 | 45,442     | 46,103     | 46,763     | 47,424     | 48,085     | 48,746     | 49,406     | 50,067     | 50,728     | 51,388     |
| Commercial Customers                  | 5,293      | 5,356      | 5,419      | 5,482      | 5,545      | 5,608      | 5,671      | 5,734      | 5,797      | 5,860      |
| Industrial Customers                  | 75         | 78         | 81         | 84         | 87         | 90         | 92         | 95         | 98         | 101        |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 50,810     | 51,537     | 52,263     | 52,990     | 53,717     | 54,443     | 55,170     | 55,896     | 56,623     | 57,350     |
| <b>Yakima Loop</b>                    |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 1.04%      | 1.39%      | 1.41%      | 1.84%      | 0.96%      | 1.35%      | 1.33%      | 1.65%      | 0.96%      |
| Residential Therms                    | 12,881,898 | 13,013,561 | 13,192,918 | 13,376,532 | 13,619,639 | 13,748,266 | 13,931,991 | 14,115,727 | 14,348,137 | 14,483,046 |
| Commercial Therms                     | 12,891,322 | 12,987,834 | 13,131,839 | 13,280,715 | 13,489,639 | 13,583,673 | 13,732,704 | 13,881,735 | 14,077,564 | 14,179,563 |
| Industrial Therms                     | 3,204,254  | 3,277,829  | 3,362,065  | 3,447,761  | 3,548,858  | 3,621,094  | 3,706,871  | 3,792,648  | 3,889,996  | 3,964,363  |
| Ind., Inst., & CmcI. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 28,977,475 | 29,279,224 | 29,686,822 | 30,105,008 | 30,658,136 | 30,953,033 | 31,371,566 | 31,700,110 | 32,315,680 | 32,624,972 |
| Daily Baseload Therms                 | 24,287     | 24,964     | 25,058     | 25,431     | 25,726     | 26,127     | 26,499     | 27,226     | 27,291     | 27,967     |
| Peak Day Therms                       | 307,826    | 312,148    | 316,470    | 320,792    | 314,018    | 318,187    | 333,760    | 338,082    | 342,406    | 346,728    |
| Therms Per Residential Customer       | 660        | 657        | 657        | 657        | 660        | 657        | 657        | 657        | 659        | 657        |
| Therms Per Commercial Customer        | 3,638      | 3,620      | 3,616      | 3,613      | 3,626      | 3,609      | 3,606      | 3,604      | 3,613      | 3,599      |
| Therms Per Industrial Customer        | 37,977     | 37,833     | 37,816     | 37,816     | 37,979     | 37,834     | 37,835     | 37,836     | 37,947     | 37,836     |
| Residential Customers                 | 19,518     | 19,799     | 20,081     | 20,362     | 20,924     | 20,924     | 21,205     | 21,486     | 21,768     | 22,049     |
| Commercial Customers                  | 3,544      | 3,588      | 3,632      | 3,676      | 3,720      | 3,764      | 3,808      | 3,852      | 3,896      | 3,940      |
| Industrial Customers                  | 84         | 87         | 89         | 91         | 93         | 96         | 98         | 100        | 103        | 105        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 23,148     | 23,475     | 23,802     | 24,130     | 24,457     | 24,785     | 25,112     | 25,440     | 25,767     | 26,094     |
| <b>Zone 10</b>                        |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | -0.48%     | -0.11%     | -0.03%     | 0.49%      | -0.49%     | -0.05%     | -0.04%     | 0.30%      | -0.36%     |
| Residential Therms                    | 3,180,417  | 3,158,118  | 3,149,942  | 3,143,398  | 3,154,113  | 3,133,924  | 3,125,374  | 3,118,830  | 3,124,601  | 3,105,741  |
| Commercial Therms                     | 5,750,960  | 5,729,895  | 5,729,677  | 5,734,366  | 5,710,599  | 5,746,109  | 5,751,908  | 5,756,607  | 5,780,107  | 5,764,490  |
| Industrial Therms                     | 1,627,391  | 1,629,221  | 1,624,334  | 1,624,520  | 1,620,119  | 1,621,921  | 1,620,139  | 1,618,251  | 1,620,723  | 1,614,634  |
| Ind., Inst., & CmcI. Interrup. Therms | 59,902     | 59,926     | 59,277     | 59,277     | 59,303     | 59,327     | 58,728     | 58,728     | 58,605     | 58,727     |
| Total Core Therms                     | 10,628,670 | 10,577,171 | 10,565,230 | 10,561,560 | 10,613,133 | 10,561,361 | 10,556,149 | 10,552,416 | 10,584,046 | 10,545,592 |
| Daily Baseload Therms                 | 8,804      | 7,756      | 7,562      | 8,694      | 9,020      | 8,969      | 8,698      | 7,638      | 8,607      | 8,801      |
| Peak Day Therms                       | 96,719     | 96,437     | 96,155     | 95,873     | 89,099     | 88,849     | 95,026     | 94,744     | 94,447     | 94,165     |
| Therms Per Residential Customer       | 114,093    | 113,195    | 113,196    | 113,199    | 114,107    | 113,206    | 113,209    | 113,212    | 114,114    | 113,218    |
| Therms Per Commercial Customer        | 21,847     | 21,793     | 21,819     | 21,862     | 22,016     | 21,968     | 22,014     | 22,063     | 22,181     | 22,167     |
| Therms Per Industrial Customer        | 130,197    | 129,646    | 129,496    | 129,418    | 129,881    | 129,328    | 129,251    | 129,169    | 129,427    | 129,012    |
| Residential Customers                 | 5,220      | 5,199      | 5,178      | 5,157      | 5,136      | 5,115      | 5,094      | 5,073      | 5,052      | 5,031      |
| Commercial Customers                  | 1,354      | 1,350      | 1,346      | 1,342      | 1,338      | 1,334      | 1,330      | 1,326      | 1,322      | 1,318      |
| Industrial Customers                  | 54         | 54         | 54         | 54         | 54         | 54         | 54         | 54         | 54         | 54         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 6,628      | 6,603      | 6,578      | 6,553      | 6,528      | 6,503      | 6,478      | 6,453      | 6,428      | 6,403      |

**Appendix B  
Demand Forecast  
Expected Forecast**

| Zone 11                               | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Total Therms Pct. Growth              |            | 0.81%      | 1.17%      | 1.19%      | 1.61%      | 0.75%      | 1.15%      | 1.13%      | 1.46%      | 0.77%      |
| Residential Therms                    | 14,136,111 | 14,274,597 | 14,465,661 | 14,661,275 | 14,922,114 | 15,057,366 | 15,253,098 | 15,448,841 | 15,646,264 | 15,846,216 |
| Commercial Therms                     | 17,962,437 | 18,042,495 | 18,188,358 | 18,340,278 | 18,573,108 | 18,650,642 | 18,802,724 | 18,954,807 | 19,171,009 | 19,258,847 |
| Industrial Therms                     | 3,741,169  | 3,813,003  | 3,897,130  | 3,982,826  | 4,085,763  | 4,156,270  | 4,242,047  | 4,327,822  | 4,426,673  | 4,499,517  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 35,839,717 | 36,130,095 | 36,551,148 | 36,984,379 | 37,580,985 | 37,864,278 | 38,297,869 | 38,731,469 | 39,295,947 | 39,598,581 |
| Daily Baseload Therms                 | 32,365     | 33,077     | 33,143     | 33,545     | 33,879     | 34,287     | 34,659     | 35,401     | 35,454     | 36,188     |
| Peak Day Therms                       | 365,949    | 370,439    | 374,930    | 379,421    | 371,227    | 375,562    | 392,900    | 397,391    | 401,889    | 406,379    |
| Therms Per Residential Customer       | 2,950      | 2,939      | 2,938      | 2,938      | 2,950      | 2,938      | 2,938      | 2,938      | 2,948      | 2,938      |
| Therms Per Commercial Customer        | 29,322     | 29,213     | 29,205     | 29,202     | 29,311     | 29,202     | 29,200     | 29,197     | 29,192     | 29,192     |
| Therms Per Industrial Customer        | 96,443     | 96,117     | 96,091     | 96,091     | 96,444     | 96,119     | 96,119     | 96,120     | 96,392     | 96,119     |
| Residential Customers                 | 21,979     | 22,280     | 22,580     | 22,880     | 23,181     | 23,481     | 23,782     | 24,082     | 24,382     | 24,683     |
| Commercial Customers                  | 4,471      | 4,516      | 4,561      | 4,606      | 4,651      | 4,696      | 4,740      | 4,785      | 4,830      | 4,875      |
| Industrial Customers                  | 115        | 117        | 119        | 121        | 124        | 126        | 128        | 130        | 133        | 135        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 26,566     | 26,914     | 27,261     | 27,609     | 27,956     | 28,304     | 28,651     | 28,999     | 29,346     | 29,694     |

| Zone 20                               | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Total Therms Pct. Growth              |            | 2.27%      | 2.54%      | 2.49%      | 2.85%      | 1.98%      | 2.27%      | 2.27%      | 2.58%      | 1.80%      |
| Residential Therms                    | 17,690,959 | 18,244,039 | 18,865,134 | 19,489,044 | 20,197,546 | 20,740,385 | 21,364,508 | 21,988,637 | 22,697,044 | 23,236,754 |
| Commercial Therms                     | 19,680,989 | 20,003,763 | 20,397,824 | 20,794,949 | 21,276,131 | 21,592,752 | 21,990,023 | 22,387,308 | 22,864,232 | 23,181,763 |
| Industrial Therms                     | 1,383,875  | 1,379,733  | 1,379,522  | 1,379,522  | 1,383,876  | 1,379,733  | 1,379,733  | 1,379,733  | 1,383,454  | 1,379,733  |
| Ind., Inst., & Cmcl. Interrup. Therms | 302,064    | 301,051    | 301,017    | 301,017    | 302,064    | 301,051    | 301,051    | 301,051    | 301,996    | 301,051    |
| Total Core Therms                     | 39,057,887 | 39,928,585 | 40,943,498 | 41,964,553 | 43,159,617 | 44,013,921 | 45,035,316 | 46,056,729 | 47,246,725 | 48,099,301 |
| Daily Baseload Therms                 | 37,250     | 38,731     | 39,160     | 39,937     | 41,011     | 42,189     | 43,193     | 44,706     | 44,847     | 45,358     |
| Peak Day Therms                       | 504,116    | 518,024    | 531,933    | 545,841    | 552,970    | 566,709    | 587,571    | 601,480    | 615,393    | 629,301    |
| Therms Per Residential Customer       | 2,744      | 2,733      | 2,733      | 2,733      | 2,744      | 2,733      | 2,733      | 2,733      | 2,743      | 2,733      |
| Therms Per Commercial Customer        | 23,993     | 23,839     | 23,776     | 23,718     | 23,757     | 23,611     | 23,559     | 23,508     | 23,545     | 23,412     |
| Therms Per Industrial Customer        | 134,650    | 134,251    | 134,232    | 134,232    | 134,650    | 134,251    | 134,251    | 134,251    | 134,611    | 134,251    |
| Residential Customers                 | 30,434     | 31,509     | 32,583     | 33,657     | 34,732     | 35,806     | 36,880     | 37,955     | 39,029     | 40,103     |
| Commercial Customers                  | 4,446      | 4,549      | 4,652      | 4,755      | 4,858      | 4,961      | 5,064      | 5,167      | 5,270      | 5,373      |
| Industrial Customers                  | 39         | 39         | 39         | 39         | 39         | 39         | 39         | 39         | 39         | 39         |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Total Core Customers                  | 34,922     | 36,099     | 37,276     | 38,453     | 39,631     | 40,808     | 41,985     | 43,163     | 44,340     | 45,517     |

| Zone 24                               | 2020      | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Total Therms Pct. Growth              |           | 0.37%      | 0.75%      | 0.75%      | 1.14%      | 0.34%      | 0.73%      | 0.73%      | 1.11%      | 0.33%      |
| Residential Therms                    | 4,463,771 | 4,497,676  | 4,549,717  | 4,601,859  | 4,673,205  | 4,706,251  | 4,758,396  | 4,810,542  | 4,882,428  | 4,914,832  |
| Commercial Therms                     | 4,241,176 | 4,247,622  | 4,270,869  | 4,294,317  | 4,335,397  | 4,341,457  | 4,364,909  | 4,388,361  | 4,429,186  | 4,435,287  |
| Industrial Therms                     | 332,805   | 332,218    | 332,192    | 332,177    | 332,796    | 332,218    | 332,203    | 332,189    | 332,173    | 332,218    |
| Ind., Inst., & Cmcl. Interrup. Therms | 946,325   | 943,046    | 942,954    | 942,954    | 946,325    | 943,046    | 943,046    | 943,046    | 946,140    | 943,046    |
| Total Core Therms                     | 9,984,077 | 10,020,562 | 10,095,731 | 10,171,308 | 10,287,724 | 10,322,972 | 10,398,555 | 10,474,137 | 10,590,527 | 10,626,382 |
| Daily Baseload Therms                 | 5,303     | 5,406      | 5,376      | 5,435      | 5,465      | 5,488      | 5,549      | 5,653      | 5,640      | 5,700      |
| Peak Day Therms                       | 112,888   | 113,810    | 114,732    | 115,655    | 116,164    | 117,083    | 118,423    | 119,345    | 120,269    | 121,191    |
| Therms Per Residential Customer       | 1,718     | 1,711      | 1,710      | 1,710      | 1,717      | 1,710      | 1,710      | 1,710      | 1,717      | 1,717      |
| Therms Per Commercial Customer        | 7,858     | 7,824      | 7,822      | 7,820      | 7,851      | 7,817      | 7,815      | 7,815      | 7,843      | 7,810      |
| Therms Per Industrial Customer        | 53,154    | 53,035     | 53,036     | 53,035     | 53,154     | 53,035     | 53,034     | 53,033     | 53,157     | 53,035     |
| Residential Customers                 | 7,338     | 7,424      | 7,510      | 7,596      | 7,682      | 7,768      | 7,854      | 7,940      | 8,026      | 8,112      |
| Commercial Customers                  | 1,465     | 1,474      | 1,483      | 1,492      | 1,501      | 1,510      | 1,519      | 1,528      | 1,537      | 1,546      |
| Industrial Customers                  | 23        | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         |
| Interruptible Customers               | 1         | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 8,826     | 8,921      | 9,016      | 9,111      | 9,206      | 9,301      | 9,396      | 9,491      | 9,586      | 9,681      |

| Zone 26                               | 2020      | 2021      | 2022      | 2023      | 2024      | 2025      | 2026      | 2027      | 2028      | 2029      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Total Therms Pct. Growth              |           | 0.14%     | 0.50%     | 0.53%     | 0.96%     | 0.13%     | 0.52%     | 0.52%     | 0.86%     | 0.18%     |
| Residential Therms                    | 1,269,916 | 1,298,265 | 1,331,391 | 1,364,891 | 1,404,543 | 1,432,335 | 1,465,852 | 1,499,372 | 1,538,278 | 1,566,406 |
| Commercial Therms                     | 4,648,660 | 4,630,254 | 4,628,766 | 4,628,766 | 4,628,766 | 4,630,249 | 4,630,218 | 4,630,187 | 4,645,757 | 4,630,253 |
| Industrial Therms                     | 230,061   | 229,175   | 229,085   | 229,085   | 230,061   | 229,175   | 229,175   | 229,175   | 229,880   | 229,175   |
| Ind., Inst., & Cmcl. Interrup. Therms | 95,919    | 95,569    | 95,539    | 95,539    | 95,919    | 95,569    | 95,569    | 95,569    | 95,860    | 95,569    |
| Total Core Therms                     | 6,244,555 | 6,253,263 | 6,284,781 | 6,318,251 | 6,379,180 | 6,387,328 | 6,420,815 | 6,454,303 | 6,509,775 | 6,521,403 |
| Daily Baseload Therms                 | 7,215     | 7,275     | 7,251     | 7,325     | 7,370     | 7,380     | 7,413     | 7,475     | 7,490     | 7,588     |
| Peak Day Therms                       | 54,002    | 54,325    | 54,648    | 54,972    | 55,321    | 53,635    | 55,960    | 56,274    | 56,605    | 56,929    |
| Therms Per Residential Customer       | 1,775     | 1,768     | 1,767     | 1,767     | 1,774     | 1,767     | 1,767     | 1,767     | 1,774     | 1,767     |
| Therms Per Commercial Customer        | 60,346    | 60,188    | 60,174    | 60,169    | 60,324    | 60,167    | 60,162    | 60,157    | 60,288    | 60,148    |
| Therms Per Industrial Customer        | 17,027    | 16,961    | 16,955    | 16,955    | 17,027    | 16,961    | 16,961    | 16,961    | 17,014    | 16,961    |
| Residential Customers                 | 3,084     | 3,174     | 3,264     | 3,354     | 3,444     | 3,534     | 3,624     | 3,714     | 3,804     | 3,894     |
| Commercial Customers                  | 1,220     | 1,224     | 1,228     | 1,232     | 1,236     | 1,240     | 1,243     | 1,247     | 1,251     | 1,255     |
| Industrial Customers                  | 32        | 32        | 32        | 32        | 32        | 32        | 32        | 32        | 32        | 32        |
| Interruptible Customers               | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         |
| Total Core Customers                  | 4,337     | 4,431     | 4,525     | 4,619     | 4,713     | 4,807     | 4,900     | 4,994     | 5,088     | 5,182     |

| Zone 30-S                             | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Total Therms Pct. Growth              |            | 0.59%      | 0.93%      | 0.93%      | 1.30%      | 0.55%      | 0.91%      | 0.90%      | 1.23%      | 0.54%      |
| Residential Therms                    | 26,034,395 | 26,363,886 | 26,796,753 | 27,212,054 | 27,744,219 | 28,065,275 | 28,490,645 | 28,916,016 | 29,446,737 | 29,766,677 |
| Commercial Therms                     | 24,777,822 | 24,778,074 | 24,861,469 | 24,947,344 | 25,122,631 | 25,121,624 | 25,207,518 | 25,293,412 | 25,462,602 | 25,465,171 |
| Industrial Therms                     | 725,558    | 722,873    | 722,746    | 722,746    | 725,558    | 722,873    | 722,873    | 722,873    | 725,304    | 722,873    |
| Ind., Inst., & Cmcl. Interrup. Therms | 2,565,714  | 2,557,739  | 2,557,551  | 2,557,551  | 2,565,714  | 2,557,740  | 2,557,740  | 2,557,739  | 2,565,338  | 2,557,739  |
| Total Core Therms                     | 54,105,490 | 54,422,572 | 54,928,520 | 55,439,696 | 56,158,123 | 56,467,512 | 56,978,776 | 57,490,042 | 58,199,782 | 58,512,462 |
| Daily Baseload Therms                 | 57,312     | 57,885     | 58,167     | 58,573     | 59,186     | 59,484     | 59,926     | 60,507     | 60,752     | 61,336     |
| Peak Day Therms                       | 454,184    | 458,907    | 463,630    | 468,353    | 467,702    | 472,385    | 482,521    | 487,244    | 491,966    | 496,689    |
| Therms Per Residential Customer       | 1,417      | 1,412      | 1,412      | 1,412      | 1,417      | 1,417      | 1,417      | 1,417      | 1,417      | 1,417      |
| Therms Per Commercial Customer        | 11,108     | 11,043     | 11,015     | 10,989     | 11,005     | 10,941     | 10,917     | 10,893     | 10,904     | 10,846     |
| Therms Per Industrial Customer        | 49,700     | 49,516     | 49,507     | 49,507     | 49,700     | 49,516     | 49,516     | 49,516     | 49,682     | 49,516     |
| Residential Customers                 | 37,343     | 37,957     | 38,571     | 39,185     | 39,799     | 40,413     | 41,027     | 41,641     | 42,255     | 42,869     |
| Commercial Customers                  | 3,829      | 3,853      | 3,877      | 3,901      | 3,925      | 3,949      | 3,973      | 3,997      | 4,021      | 4,045      |
| Industrial Customers                  | 29         | 29         | 29         | 29         | 29         | 29         | 29         | 29         | 29         | 29         |
| Interruptible Customers               | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| Total Core Customers                  | 41,204     | 41,842     | 42,480     | 43,118     | 43,756     | 44,394     | 45,032     | 45,670     | 46,308     | 46,946     |

**Appendix B  
Demand Forecast  
Expected Forecast**

| Zone 30-W                             | 2020       | 2021       | 2022       | 2023        | 2024        | 2025        | 2026        | 2027        | 2028        | 2029        |
|---------------------------------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Total Therms Pct. Growth              |            | 0.89%      | 1.25%      | 1.24%       | 1.63%       | 0.83%       | 1.20%       | 1.18%       | 1.54%       | 0.79%       |
| Residential Therms                    | 59,398,325 | 59,942,463 | 60,709,459 | 61,483,085  | 62,505,681  | 63,037,718  | 63,811,507  | 64,585,300  | 65,596,652  | 66,133,007  |
| Commercial Therms                     | 33,758,621 | 33,996,319 | 34,358,101 | 34,723,879  | 35,227,850  | 35,459,833  | 35,825,639  | 36,191,528  | 36,688,528  | 36,923,403  |
| Industrial Therms                     | 3,921,242  | 4,001,446  | 4,094,386  | 4,187,831   | 4,296,145   | 4,375,651   | 4,469,124   | 4,562,598   | 4,671,041   | 4,749,856   |
| Ind., Inst., & Cmcl. Interrup. Therms | 94,193     | 93,961     | 93,951     | 92,951      | 94,193      | 92,961      | 92,961      | 92,961      | 94,174      | 92,961      |
| Total Core Therms                     | 97,172,381 | 98,034,189 | 99,255,897 | 100,488,747 | 102,124,469 | 102,967,163 | 104,200,270 | 105,433,386 | 107,052,395 | 107,900,226 |
| Daily Baseload Therms                 | 106,942    | 108,433    | 109,494    | 110,865     | 112,773     | 113,856     | 115,252     | 116,748     | 117,772     | 119,496     |
| Peak Day Therms                       | 890,352    | 901,686    | 913,020    | 924,355     | 924,075     | 926,075     | 938,268     | 950,373     | 969,708     | 992,392     |
| Therms Per Residential Customer       | 6,050      | 6,028      | 6,028      | 6,028       | 6,049       | 6,028       | 6,028       | 6,028       | 6,048       | 6,028       |
| Therms Per Commercial Customer        | 31,908     | 31,768     | 31,735     | 31,710      | 31,808      | 31,670      | 31,647      | 31,625      | 31,700      | 31,581      |
| Therms Per Industrial Customer        | 202,459    | 201,831    | 201,809    | 201,804     | 202,457     | 201,829     | 201,823     | 201,818     | 202,421     | 201,826     |
| Residential Customers                 | 85,222     | 86,334     | 87,446     | 88,558      | 89,670      | 90,782      | 91,893      | 93,005      | 94,117      | 95,229      |
| Commercial Customers                  | 10,319     | 10,450     | 10,581     | 10,711      | 10,842      | 10,973      | 11,104      | 11,234      | 11,365      | 11,496      |
| Industrial Customers                  | 199        | 203        | 208        | 212         | 217         | 221         | 226         | 230         | 235         | 239         |
| Interruptible Customers               | 1          | 1          | 1          | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| Total Core Customers                  | 95,741     | 96,988     | 98,235     | 99,482      | 100,730     | 101,977     | 103,224     | 104,471     | 105,718     | 106,965     |
| Zone GTN                              |            |            |            |             |             |             |             |             |             |             |
| Total Therms Pct. Growth              |            | 1.80%      | 2.18%      | 2.15%       | 2.56%       | 1.62%       | 2.02%       | 1.98%       | 2.35%       | 1.49%       |
| Residential Therms                    | 37,272,053 | 38,226,899 | 39,339,045 | 40,455,449  | 41,758,583  | 42,693,653  | 43,810,343  | 44,927,036  | 46,234,588  | 47,160,432  |
| Commercial Therms                     | 21,560,163 | 21,653,437 | 21,835,369 | 22,020,424  | 22,303,998  | 22,393,951  | 22,579,104  | 22,764,256  | 23,041,109  | 23,134,520  |
| Industrial Therms                     | 2,328,881  | 2,388,983  | 2,454,154  | 2,527,818   | 2,608,896   | 2,667,915   | 2,737,607   | 2,807,299   | 2,887,734   | 2,946,849   |
| Ind., Inst., & Cmcl. Interrup. Therms | 282,842    | 281,681    | 281,612    | 281,612     | 282,842     | 281,681     | 281,681     | 281,681     | 282,707     | 281,681     |
| Total Core Therms                     | 61,443,938 | 62,551,000 | 63,914,180 | 65,285,304  | 66,954,319  | 68,037,201  | 69,408,736  | 70,780,272  | 72,446,138  | 73,523,481  |
| Daily Baseload Therms                 | 52,834     | 53,040     | 53,400     | 54,190      | 56,199      | 57,635      | 58,481      | 59,611      | 60,972      | 61,845      |
| Peak Day Therms                       | 721,404    | 737,559    | 753,714    | 769,868     | 777,360     | 793,321     | 818,342     | 834,496     | 850,660     | 866,815     |
| Therms Per Residential Customer       | 8,561      | 8,528      | 8,528      | 8,528       | 8,561       | 8,528       | 8,528       | 8,528       | 8,528       | 8,559       |
| Therms Per Commercial Customer        | 38,361     | 38,180     | 38,148     | 38,121      | 38,248      | 38,076      | 38,054      | 38,034      | 38,158      | 37,997      |
| Therms Per Industrial Customer        | 132,191    | 131,665    | 131,642    | 131,644     | 132,202     | 131,674     | 131,676     | 131,677     | 132,159     | 131,680     |
| Residential Customers                 | 49,073     | 50,566     | 52,060     | 53,554      | 55,047      | 56,541      | 58,035      | 59,528      | 61,022      | 62,516      |
| Commercial Customers                  | 6,907      | 6,973      | 7,039      | 7,105       | 7,171       | 7,237       | 7,302       | 7,368       | 7,434       | 7,500       |
| Industrial Customers                  | 100        | 103        | 107        | 110         | 113         | 116         | 119         | 123         | 126         | 129         |
| Interruptible Customers               | 1          | 1          | 1          | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| Total Core Customers                  | 56,081     | 57,644     | 59,206     | 60,769      | 62,332      | 63,895      | 65,458      | 67,020      | 68,583      | 70,146      |
| Zone ME-OR                            |            |            |            |             |             |             |             |             |             |             |
| Total Therms Pct. Growth              |            | 0.57%      | 0.93%      | 0.94%       | 1.34%       | 0.54%       | 0.92%       | 0.91%       | 1.26%       | 0.54%       |
| Residential Therms                    | 6,180,748  | 6,281,751  | 6,406,611  | 6,532,484   | 6,686,429   | 6,785,386   | 6,911,298   | 7,037,211   | 7,189,804   | 7,289,026   |
| Commercial Therms                     | 7,361,799  | 7,349,641  | 7,363,620  | 7,378,823   | 7,423,073   | 7,410,701   | 7,425,904   | 7,441,123   | 7,481,787   | 7,471,750   |
| Industrial Therms                     | 535,102    | 533,052    | 532,985    | 532,982     | 535,102     | 533,051     | 533,048     | 533,045     | 534,977     | 533,052     |
| Ind., Inst., & Cmcl. Interrup. Therms | 688,430    | 686,333    | 686,236    | 686,236     | 688,430     | 686,333     | 686,333     | 686,333     | 688,236     | 686,333     |
| Total Core Therms                     | 14,766,079 | 14,850,777 | 14,989,452 | 15,130,525  | 15,333,035  | 15,415,471  | 15,556,583  | 15,697,712  | 15,894,804  | 15,980,160  |
| Daily Baseload Therms                 | 14,643     | 14,076     | 14,024     | 14,919      | 15,098      | 15,247      | 15,340      | 14,751      | 15,494      | 15,485      |
| Peak Day Therms                       | 184,603    | 186,569    | 188,535    | 190,501     | 189,983     | 191,924     | 196,409     | 198,375     | 200,351     | 202,317     |
| Therms Per Residential Customer       | 3,150      | 3,137      | 3,136      | 3,136       | 3,150       | 3,136       | 3,136       | 3,136       | 3,148       | 3,136       |
| Therms Per Commercial Customer        | 28,958     | 28,841     | 28,835     | 28,831      | 28,943      | 28,826      | 28,822      | 28,818      | 28,924      | 28,812      |
| Therms Per Industrial Customer        | 87,182     | 86,853     | 86,843     | 86,842      | 87,182      | 86,853      | 86,853      | 86,852      | 87,162      | 86,853      |
| Residential Customers                 | 11,294     | 11,533     | 11,772     | 12,011      | 12,250      | 12,489      | 12,728      | 12,967      | 13,206      | 13,445      |
| Commercial Customers                  | 1,871      | 1,876      | 1,880      | 1,884       | 1,889       | 1,892       | 1,898       | 1,902       | 1,907       | 1,911       |
| Industrial Customers                  | 27         | 27         | 27         | 27          | 27          | 27          | 27          | 27          | 27          | 27          |
| Interruptible Customers               | 2          | 2          | 2          | 2           | 2           | 2           | 2           | 2           | 2           | 2           |
| Total Core Customers                  | 13,193     | 13,437     | 13,680     | 13,924      | 14,167      | 14,411      | 14,654      | 14,898      | 15,141      | 15,385      |
| Zone ME-WA                            |            |            |            |             |             |             |             |             |             |             |
| Total Therms Pct. Growth              |            | 0.62%      | 0.97%      | 0.98%       | 1.36%       | 0.58%       | 0.95%       | 0.94%       | 1.29%       | 0.57%       |
| Residential Therms                    | 7,039,792  | 7,140,184  | 7,266,918  | 7,394,568   | 7,552,494   | 7,650,886   | 7,778,571   | 7,906,257   | 8,063,143   | 8,161,591   |
| Commercial Therms                     | 6,337,753  | 6,314,570  | 6,313,619  | 6,313,575   | 6,337,752   | 6,314,566   | 6,314,525   | 6,314,483   | 6,335,943   | 6,314,567   |
| Industrial Therms                     | 198,886    | 205,431    | 212,596    | 219,791     | 227,789     | 234,237     | 241,435     | 248,632     | 256,618     | 263,044     |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -           | -           | -           | -           | -           | -           | -           |
| Total Core Therms                     | 13,576,431 | 13,660,185 | 13,793,133 | 13,927,934  | 14,118,026  | 14,199,689  | 14,334,530  | 14,469,372  | 14,655,703  | 14,739,201  |
| Daily Baseload Therms                 | 13,137     | 13,284     | 13,357     | 13,368      | 13,543      | 13,681      | 13,791      | 13,941      | 14,098      | 14,278      |
| Peak Day Therms                       | 173,330    | 175,191    | 177,052    | 178,913     | 178,865     | 180,708     | 184,501     | 188,363     | 192,225     | 196,090     |
| Therms Per Residential Customer       | 600        | 598        | 598        | 598         | 600         | 598         | 598         | 598         | 600         | 598         |
| Therms Per Commercial Customer        | 4,857      | 4,840      | 4,839      | 4,839       | 4,857       | 4,840       | 4,839       | 4,839       | 4,856       | 4,840       |
| Therms Per Industrial Customer        | 10,629     | 10,594     | 10,592     | 10,592      | 10,628      | 10,593      | 10,593      | 10,593      | 10,625      | 10,592      |
| Residential Customers                 | 11,725     | 11,939     | 12,153     | 12,367      | 12,581      | 12,795      | 13,009      | 13,223      | 13,437      | 13,651      |
| Commercial Customers                  | 1,305      | 1,305      | 1,305      | 1,305       | 1,305       | 1,305       | 1,305       | 1,305       | 1,305       | 1,305       |
| Industrial Customers                  | 19         | 19         | 20         | 21          | 21          | 22          | 23          | 23          | 24          | 25          |
| Interruptible Customers               | -          | -          | -          | -           | -           | -           | -           | -           | -           | -           |
| Total Core Customers                  | 13,048     | 13,263     | 13,477     | 13,692      | 13,907      | 14,121      | 14,336      | 14,551      | 14,766      | 14,980      |
| Bellingham District                   |            |            |            |             |             |             |             |             |             |             |
| Total Therms Pct. Growth              |            | 1.01%      | 1.37%      | 1.36%       | 1.75%       | 0.94%       | 1.31%       | 1.29%       | 1.65%       | 0.90%       |
| Residential Therms                    | 32,835,665 | 33,181,400 | 33,650,715 | 34,123,911  | 34,735,754  | 35,074,063  | 35,547,261  | 36,020,462  | 36,627,578  | 36,966,789  |
| Commercial Therms                     | 17,047,270 | 17,161,524 | 17,339,044 | 17,516,729  | 17,768,870  | 17,880,344  | 18,060,680  | 18,239,779  | 18,485,931  | 18,599,186  |
| Industrial Therms                     | 1,861,717  | 1,925,857  | 1,996,064  | 2,066,516   | 2,144,773   | 2,207,932   | 2,278,403   | 2,348,875   | 2,427,211   | 2,490,008   |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -           | -           | -           | -           | -           | -           | -           |
| Total Core Therms                     | 51,744,652 | 52,268,780 | 52,985,822 | 53,709,057  | 54,649,406  | 55,162,359  | 55,885,745  | 56,609,136  | 57,540,719  | 58,055,983  |
| Daily Baseload Therms                 | 60,894     | 61,720     | 62,410     | 63,273      | 64,559      | 65,251      | 66,134      | 66,974      | 67,839      | 68,689      |
| Peak Day Therms                       | 460,517    | 466,926    | 473,336    | 479,745     | 479,677     | 486,002     | 498,975     | 505,385     | 511,796     | 518,205     |
| Therms Per Residential Customer       | 2,866      | 2,856      | 2,855      | 2,855       | 2,866       | 2,855       | 2,855       | 2,855       | 2,865       | 2,855       |
| Therms Per Commercial Customer        | 15,563     | 15,497     | 15,486     | 15,483      | 15,548      | 15,482      | 15,479      | 15,475      | 15,521      | 15,469      |
| Therms Per Industrial Customer        | 25,323     | 25,236     | 25,233     | 25,232      | 25,321      | 25,235      | 25,235      | 25,235      | 25,234      | 25,234      |
| Residential Customers                 | 45,601     | 46,262     | 46,922     | 47,583      | 48,244      | 48,904      | 49,565      | 50,226      | 50,887      | 51,547      |
| Commercial Customers                  | 5,333      | 5,396      | 5,459      | 5,522       | 5,585       | 5,648       | 5,711       | 5,774       | 5,837       | 5,900       |
| Industrial Customers                  | 76         | 79         | 82         | 85          | 88          | 91          | 93          | 96          | 99          | 102         |
| Interruptible Customers               | -          | -          | -          | -           | -           | -           | -           | -           | -           | -           |
| Total Core Customers                  | 51,010     | 51,737     | 52,463     | 53,190      | 53,917      | 54,643      | 55,370      | 56,096      | 56,823      | 57,549      |

**Appendix B  
Demand Forecast  
Expected Forecast**

|                                       | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Mount Vernon District</b>          |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 0.74%      | 1.10%      | 1.10%      | 1.49%      | 0.69%      | 1.07%      | 1.06%      | 1.41%      | 0.67%      |
| Residential Therms                    | 26,562,660 | 26,761,063 | 27,058,744 | 27,359,274 | 27,769,917 | 27,963,636 | 28,264,225 | 28,564,818 | 28,971,074 | 29,166,218 |
| Commercial Therms                     | 16,711,411 | 16,834,795 | 17,019,057 | 17,205,150 | 17,458,980 | 17,579,468 | 17,656,618 | 17,951,749 | 18,202,998 | 18,324,217 |
| Industrial Therms                     | 2,059,525  | 2,075,590  | 2,098,323  | 2,121,315  | 2,151,972  | 2,163,719  | 2,190,221  | 2,213,723  | 2,243,829  | 2,259,847  |
| Ind., Inst., & Cmcl. Interrup. Therms | 94,193     | 93,961     | 93,951     | 92,951     | 94,193     | 92,961     | 93,961     | 92,961     | 94,174     | 93,961     |
| Total Core Therms                     | 45,427,790 | 45,765,408 | 46,270,075 | 46,779,490 | 47,475,063 | 47,804,804 | 48,314,525 | 48,824,250 | 49,511,676 | 49,844,243 |
| Daily Baseload Therms                 | 46,068     | 46,713     | 47,083     | 47,592     | 48,214     | 48,605     | 49,118     | 49,774     | 50,133     | 50,807     |
| Peak Day Therms                       | 429,835    | 434,760    | 439,684    | 444,609    | 444,398    | 449,266    | 459,398    | 464,323    | 474,187    | 474,187    |
| Therms Per Residential Customer       | 3,183      | 3,173      | 3,173      | 3,173      | 3,183      | 3,173      | 3,173      | 3,173      | 3,182      | 3,173      |
| Therms Per Commercial Customer        | 16,345     | 16,272     | 16,249     | 16,228     | 16,260     | 16,188     | 16,169     | 16,149     | 16,179     | 16,112     |
| Therms Per Industrial Customer        | 177,137    | 176,594    | 176,576    | 176,571    | 177,135    | 176,593    | 176,588    | 176,584    | 177,106    | 176,592    |
| Residential Customers                 | 39,621     | 40,073     | 40,524     | 40,975     | 41,426     | 41,877     | 42,328     | 42,779     | 43,231     | 43,682     |
| Commercial Customers                  | 4,986      | 5,054      | 5,122      | 5,189      | 5,257      | 5,325      | 5,393      | 5,460      | 5,528      | 5,596      |
| Industrial Customers                  | 122        | 124        | 126        | 127        | 129        | 131        | 132        | 134        | 136        | 137        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 44,731     | 45,251     | 45,772     | 46,292     | 46,813     | 47,334     | 47,854     | 48,375     | 48,895     | 49,416     |
| <b>Bremerton District</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 0.66%      | 1.00%      | 1.00%      | 1.36%      | 0.62%      | 0.97%      | 0.96%      | 1.30%      | 0.60%      |
| Residential Therms                    | 23,424,949 | 23,741,960 | 24,144,839 | 24,549,326 | 25,049,155 | 25,360,065 | 25,764,604 | 26,169,145 | 26,699,772 | 26,978,174 |
| Commercial Therms                     | 21,821,846 | 21,832,890 | 21,917,257 | 22,003,132 | 22,166,655 | 22,174,440 | 22,246,334 | 22,348,228 | 22,508,371 | 22,519,987 |
| Industrial Therms                     | 446,366    | 444,677    | 444,647    | 444,647    | 446,366    | 444,677    | 444,677    | 444,677    | 446,365    | 444,677    |
| Ind., Inst., & Cmcl. Interrup. Therms | 2,565,714  | 2,557,739  | 2,557,551  | 2,557,551  | 2,565,714  | 2,557,740  | 2,557,740  | 2,557,739  | 2,565,738  | 2,557,739  |
| Total Core Therms                     | 48,258,875 | 48,577,266 | 49,064,294 | 49,554,656 | 50,227,890 | 50,538,921 | 51,029,354 | 51,519,790 | 52,189,786 | 52,500,577 |
| Daily Baseload Therms                 | 51,332     | 51,835     | 52,147     | 52,566     | 53,120     | 53,429     | 53,848     | 54,358     | 54,663     | 55,199     |
| Peak Day Therms                       | 401,404    | 405,915    | 410,426    | 414,936    | 419,988    | 420,465    | 428,469    | 432,979    | 437,490    | 442,001    |
| Therms Per Residential Customer       | 694        | 692        | 692        | 692        | 694        | 692        | 692        | 692        | 694        | 692        |
| Therms Per Commercial Customer        | 7,031      | 6,980      | 6,954      | 6,928      | 6,927      | 6,879      | 6,855      | 6,830      | 6,829      | 6,783      |
| Therms Per Industrial Customer        | 29,758     | 29,645     | 29,643     | 29,643     | 29,758     | 29,645     | 29,645     | 29,645     | 29,754     | 29,645     |
| Residential Customers                 | 33,731     | 34,316     | 34,901     | 35,486     | 36,071     | 36,656     | 37,241     | 37,826     | 38,411     | 38,996     |
| Commercial Customers                  | 3,104      | 3,128      | 3,152      | 3,176      | 3,200      | 3,224      | 3,248      | 3,272      | 3,296      | 3,320      |
| Industrial Customers                  | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         |
| Interruptible Customers               | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| Total Core Customers                  | 36,852     | 37,461     | 38,070     | 38,679     | 39,288     | 39,897     | 40,506     | 41,115     | 41,724     | 42,333     |
| <b>Longview District</b>              |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 0.16%      | 0.53%      | 0.56%      | 1.00%      | 0.14%      | 0.55%      | 0.54%      | 0.89%      | 0.19%      |
| Residential Therms                    | 1,269,916  | 1,298,265  | 1,331,391  | 1,364,891  | 1,404,543  | 1,432,335  | 1,465,852  | 1,499,372  | 1,538,278  | 1,566,406  |
| Commercial Therms                     | 4,386,160  | 4,368,369  | 4,366,914  | 4,366,884  | 4,386,157  | 4,368,363  | 4,368,332  | 4,368,301  | 4,383,326  | 4,368,367  |
| Industrial Therms                     | 230,061    | 229,175    | 229,085    | 229,085    | 230,061    | 229,175    | 229,175    | 229,175    | 229,175    | 229,175    |
| Ind., Inst., & Cmcl. Interrup. Therms | 95,919     | 95,569     | 95,539     | 95,539     | 95,919     | 95,569     | 95,569     | 95,569     | 95,860     | 95,569     |
| Total Core Therms                     | 5,982,055  | 5,991,378  | 6,022,929  | 6,056,399  | 6,116,680  | 6,125,442  | 6,158,929  | 6,192,417  | 6,247,344  | 6,259,517  |
| Daily Baseload Therms                 | 6,988      | 7,075      | 7,058      | 7,098      | 7,143      | 7,153      | 7,186      | 7,276      | 7,263      | 7,361      |
| Peak Day Therms                       | 52,724     | 53,047     | 53,371     | 53,694     | 52,078     | 52,391     | 54,672     | 54,996     | 55,328     | 55,651     |
| Therms Per Residential Customer       | 1,775      | 1,768      | 1,767      | 1,767      | 1,774      | 1,767      | 1,767      | 1,767      | 1,774      | 1,771      |
| Therms Per Commercial Customer        | 7,846      | 7,811      | 7,804      | 7,798      | 7,824      | 7,790      | 7,785      | 7,780      | 7,801      | 7,767      |
| Therms Per Industrial Customer        | 17,027     | 16,961     | 16,955     | 16,955     | 17,027     | 16,961     | 16,961     | 16,961     | 17,014     | 16,961     |
| Residential Customers                 | 3,084      | 3,174      | 3,264      | 3,354      | 3,444      | 3,534      | 3,624      | 3,714      | 3,804      | 3,894      |
| Commercial Customers                  | 1,215      | 1,219      | 1,223      | 1,227      | 1,231      | 1,235      | 1,238      | 1,242      | 1,246      | 1,250      |
| Industrial Customers                  | 32         | 32         | 32         | 32         | 32         | 32         | 32         | 32         | 32         | 32         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 4,332      | 4,426      | 4,520      | 4,614      | 4,708      | 4,802      | 4,895      | 4,989      | 5,083      | 5,177      |
| <b>Aberdeen District</b>              |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | -0.02%     | 0.32%      | 0.35%      | 0.77%      | -0.03%     | 0.35%      | 0.35%      | 0.67%      | 0.03%      |
| Residential Therms                    | 2,611,446  | 2,621,926  | 2,641,914  | 2,662,728  | 2,695,064  | 2,705,210  | 2,726,041  | 2,746,871  | 2,776,966  | 2,788,504  |
| Commercial Therms                     | 2,955,976  | 2,945,184  | 2,944,212  | 2,944,212  | 2,955,976  | 2,945,184  | 2,945,184  | 2,945,184  | 2,954,032  | 2,945,184  |
| Industrial Therms                     | 279,193    | 278,196    | 278,099    | 278,099    | 279,193    | 278,196    | 278,196    | 278,196    | 278,999    | 278,196    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 5,846,615  | 5,845,306  | 5,864,226  | 5,885,040  | 5,930,233  | 5,928,591  | 5,949,422  | 5,970,252  | 6,009,996  | 6,011,884  |
| Daily Baseload Therms                 | 5,980      | 6,050      | 6,020      | 6,007      | 6,066      | 6,055      | 6,078      | 6,149      | 6,088      | 6,138      |
| Peak Day Therms                       | 52,780     | 52,992     | 53,204     | 53,416     | 51,714     | 51,920     | 54,062     | 54,264     | 54,476     | 54,688     |
| Therms Per Residential Customer       | 723        | 720        | 720        | 720        | 723        | 720        | 720        | 720        | 722        | 720        |
| Therms Per Commercial Customer        | 4,077      | 4,062      | 4,061      | 4,061      | 4,077      | 4,062      | 4,062      | 4,062      | 4,075      | 4,062      |
| Therms Per Industrial Customer        | 19,942     | 19,871     | 19,864     | 19,864     | 19,942     | 19,871     | 19,871     | 19,871     | 19,928     | 19,871     |
| Residential Customers                 | 3,613      | 3,642      | 3,671      | 3,700      | 3,729      | 3,758      | 3,787      | 3,816      | 3,845      | 3,874      |
| Commercial Customers                  | 725        | 725        | 725        | 725        | 725        | 725        | 725        | 725        | 725        | 725        |
| Industrial Customers                  | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 4,352      | 4,381      | 4,410      | 4,439      | 4,468      | 4,497      | 4,526      | 4,555      | 4,584      | 4,613      |
| <b>Kennewick District</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 2.54%      | 2.84%      | 3.12%      | 2.23%      | 2.57%      | 2.50%      | 2.81%      | 2.81%      | 2.01%      |
| Residential Therms                    | 16,751,537 | 17,308,688 | 17,930,259 | 18,554,623 | 19,259,841 | 19,806,745 | 20,481,302 | 21,059,805 | 21,761,139 | 22,304,824 |
| Commercial Therms                     | 16,069,278 | 16,382,635 | 16,754,219 | 17,128,457 | 17,572,435 | 17,879,807 | 18,254,355 | 18,628,735 | 19,069,419 | 19,377,340 |
| Industrial Therms                     | 1,051,496  | 1,048,185  | 1,047,987  | 1,047,987  | 1,051,496  | 1,048,185  | 1,048,186  | 1,048,186  | 1,051,099  | 1,048,185  |
| Ind., Inst., & Cmcl. Interrup. Therms | 208,383    | 207,687    | 207,652    | 207,652    | 208,383    | 207,687    | 207,687    | 207,687    | 208,314    | 207,687    |
| Total Core Therms                     | 34,080,693 | 34,947,194 | 35,940,117 | 36,938,719 | 38,092,155 | 38,942,404 | 39,941,530 | 40,940,473 | 42,089,971 | 42,938,036 |
| Daily Baseload Therms                 | 34,783     | 35,807     | 36,581     | 37,379     | 38,422     | 39,562     | 40,533     | 41,588     | 42,127     | 42,590     |
| Peak Day Therms                       | 454,407    | 468,103    | 481,799    | 495,495    | 502,887    | 516,417    | 536,583    | 550,279    | 563,975    | 577,671    |
| Therms Per Residential Customer       | 1,733      | 1,726      | 1,725      | 1,725      | 1,733      | 1,726      | 1,726      | 1,726      | 1,732      | 1,725      |
| Therms Per Commercial Customer        | 65,526     | 65,334     | 65,310     | 65,296     | 65,467     | 65,278     | 65,266     | 65,254     | 65,401     | 65,232     |
| Therms Per Industrial Customer        | 93,462     | 93,167     | 93,150     | 93,150     | 93,462     | 93,167     | 93,167     | 93,167     | 93,427     | 93,167     |
| Residential Customers                 | 28,633     | 29,708     | 30,783     | 31,858     | 32,934     | 34,009     | 35,084     | 36,160     | 37,235     | 38,310     |
| Commercial Customers                  | 3,764      | 3,861      | 3,958      | 4,055      | 4,152      | 4,249      | 4,346      | 4,443      | 4,540      | 4,637      |
| Industrial Customers                  | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 32,420     | 33,593     | 34,765     | 35,937     | 37,110     | 38,282     | 39,454     | 40,627     | 41,799     | 42,971     |

Appendix B  
Demand Forecast  
Expected Forecast

|                                       | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Walla Walla District                  |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 0.62%      | 0.97%      | 0.98%      | 1.36%      | 0.58%      | 0.95%      | 0.94%      | 1.29%      | 0.57%      |
| Residential Therms                    | 7,039,792  | 7,140,184  | 7,266,918  | 7,394,568  | 7,552,494  | 7,650,886  | 7,778,571  | 7,906,257  | 8,063,143  | 8,161,591  |
| Commercial Therms                     | 6,337,753  | 6,314,570  | 6,313,619  | 6,313,575  | 6,337,752  | 6,314,566  | 6,314,525  | 6,314,483  | 6,335,943  | 6,314,567  |
| Industrial Therms                     | 199,886    | 205,431    | 212,596    | 219,791    | 227,789    | 233,237    | 241,435    | 248,632    | 256,618    | 263,044    |
| Ind., Inst., & CmcI. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 13,576,431 | 13,660,185 | 13,793,133 | 13,927,934 | 14,118,036 | 14,199,689 | 14,334,530 | 14,469,372 | 14,655,703 | 14,739,201 |
| Daily Baseload Therms                 | 13,137     | 13,284     | 13,357     | 13,368     | 13,543     | 13,681     | 13,791     | 13,941     | 13,908     | 13,878     |
| Peak Day Therms                       | 173,330    | 175,191    | 177,052    | 178,913    | 178,865    | 180,708    | 184,501    | 188,299    | 192,097    | 190,900    |
| Therms Per Residential Customer       | 600        | 598        | 598        | 598        | 600        | 598        | 598        | 598        | 600        | 598        |
| Therms Per Commercial Customer        | 4,857      | 4,840      | 4,839      | 4,839      | 4,857      | 4,840      | 4,839      | 4,839      | 4,856      | 4,840      |
| Therms Per Industrial Customer        | 10,629     | 10,594     | 10,592     | 10,592     | 10,628     | 10,593     | 10,593     | 10,593     | 10,625     | 10,592     |
| Residential Customers                 | 11,725     | 11,939     | 12,153     | 12,367     | 12,581     | 12,795     | 13,009     | 13,223     | 13,437     | 13,651     |
| Commercial Customers                  | 1,305      | 1,305      | 1,305      | 1,305      | 1,305      | 1,305      | 1,305      | 1,305      | 1,305      | 1,305      |
| Industrial Customers                  | 19         | 19         | 20         | 21         | 21         | 22         | 23         | 23         | 24         | 25         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 13,048     | 13,263     | 13,477     | 13,692     | 13,907     | 14,121     | 14,336     | 14,551     | 14,766     | 14,980     |
| Wenatchee District                    |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | -0.18%     | 0.18%      | 0.20%      | 0.60%      | -0.18%     | 0.20%      | 0.20%      | 0.54%      | -0.14%     |
| Residential Therms                    | 1,565,797  | 1,557,748  | 1,555,780  | 1,554,027  | 1,558,779  | 1,550,756  | 1,549,004  | 1,547,252  | 1,551,342  | 1,543,770  |
| Commercial Therms                     | 8,101,734  | 8,093,965  | 8,115,248  | 8,138,102  | 8,165,594  | 8,208,470  | 8,231,348  | 8,270,512  | 8,277,250  | 8,277,250  |
| Industrial Therms                     | 813,895    | 811,350    | 811,240    | 811,241    | 813,895    | 811,350    | 811,351    | 811,352    | 813,674    | 811,350    |
| Ind., Inst., & CmcI. Interrup. Therms | 93,681     | 93,364     | 93,365     | 93,365     | 93,681     | 93,364     | 93,364     | 93,364     | 93,364     | 93,364     |
| Total Core Therms                     | 10,575,107 | 10,556,427 | 10,575,632 | 10,596,735 | 10,660,668 | 10,641,064 | 10,662,189 | 10,683,317 | 10,741,211 | 10,725,734 |
| Daily Baseload Therms                 | 9,375      | 9,488      | 9,459      | 9,471      | 9,498      | 9,529      | 9,561      | 10,034     | 9,626      | 9,714      |
| Peak Day Therms                       | 94,980     | 95,179     | 95,378     | 95,576     | 93,877     | 94,073     | 96,182     | 96,381     | 96,589     | 96,788     |
| Therms Per Residential Customer       | 1,889      | 1,882      | 1,882      | 1,882      | 1,889      | 1,882      | 1,882      | 1,882      | 1,889      | 1,882      |
| Therms Per Commercial Customer        | 25,502     | 25,364     | 25,315     | 25,271     | 25,324     | 25,192     | 25,152     | 25,113     | 25,159     | 25,039     |
| Therms Per Industrial Customer        | 95,118     | 94,835     | 94,824     | 94,824     | 95,118     | 94,835     | 94,835     | 94,835     | 95,096     | 94,835     |
| Residential Customers                 | 3,216      | 3,212      | 3,208      | 3,204      | 3,200      | 3,196      | 3,192      | 3,188      | 3,184      | 3,180      |
| Commercial Customers                  | 1,445      | 1,451      | 1,457      | 1,463      | 1,469      | 1,475      | 1,481      | 1,487      | 1,493      | 1,499      |
| Industrial Customers                  | 34         | 34         | 34         | 34         | 34         | 34         | 34         | 34         | 34         | 34         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 4,695      | 4,697      | 4,699      | 4,701      | 4,703      | 4,705      | 4,707      | 4,709      | 4,711      | 4,713      |
| Yakima District                       |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 0.63%      | 0.99%      | 1.03%      | 1.48%      | 0.59%      | 1.00%      | 0.99%      | 1.32%      | 0.64%      |
| Residential Therms                    | 16,690,152 | 16,810,318 | 16,994,698 | 17,185,087 | 17,455,152 | 17,572,174 | 17,762,674 | 17,953,190 | 18,207,427 | 18,334,117 |
| Commercial Therms                     | 19,485,875 | 19,561,439 | 19,708,244 | 19,864,886 | 20,115,191 | 20,187,889 | 20,343,717 | 20,500,524 | 20,725,848 | 20,814,396 |
| Industrial Therms                     | 4,897,044  | 4,962,432  | 5,043,759  | 5,127,639  | 5,234,365  | 5,298,388  | 5,382,383  | 5,466,269  | 5,566,087  | 5,634,349  |
| Ind., Inst., & CmcI. Interrup. Therms | 59,902     | 59,926     | 59,277     | 59,277     | 59,303     | 59,327     | 58,728     | 58,727     | 58,605     | 58,727     |
| Total Core Therms                     | 41,132,973 | 41,394,115 | 41,805,978 | 42,236,889 | 42,864,012 | 43,117,778 | 43,547,501 | 43,978,711 | 44,557,967 | 44,841,520 |
| Daily Baseload Therms                 | 34,488     | 34,109     | 34,017     | 35,553     | 36,217     | 36,581     | 36,684     | 36,322     | 37,384     | 38,269     |
| Peak Day Therms                       | 418,674    | 422,896    | 427,118    | 431,341    | 417,776    | 421,874    | 444,010    | 448,232    | 452,442    | 456,664    |
| Therms Per Residential Customer       | 116,165    | 115,259    | 115,260    | 115,263    | 116,178    | 115,270    | 115,273    | 115,275    | 116,184    | 115,281    |
| Therms Per Commercial Customer        | 36,635     | 36,524     | 36,545     | 36,585     | 36,793     | 36,688     | 36,731     | 36,778     | 36,943     | 36,877     |
| Therms Per Industrial Customer        | 172,710    | 172,012    | 171,845    | 171,766    | 172,396    | 171,696    | 171,620    | 171,538    | 171,906    | 171,380    |
| Residential Customers                 | 25,785     | 26,068     | 26,350     | 26,632     | 26,915     | 27,197     | 27,479     | 27,762     | 28,044     | 28,327     |
| Commercial Customers                  | 5,067      | 5,108      | 5,149      | 5,190      | 5,231      | 5,272      | 5,313      | 5,354      | 5,395      | 5,436      |
| Industrial Customers                  | 151        | 153        | 155        | 158        | 160        | 162        | 164        | 167        | 169        | 171        |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Total Core Customers                  | 31,005     | 31,331     | 31,657     | 31,982     | 32,308     | 32,633     | 32,959     | 33,284     | 33,610     | 33,935     |
| Central Oregon (Bend) District        |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 1.80%      | 2.18%      | 2.15%      | 2.54%      | 1.62%      | 2.02%      | 1.98%      | 2.35%      | 1.49%      |
| Residential Therms                    | 37,272,053 | 38,226,899 | 39,339,045 | 40,455,449 | 41,758,583 | 42,693,653 | 43,810,343 | 44,927,036 | 46,234,588 | 47,160,432 |
| Commercial Therms                     | 21,560,163 | 21,653,437 | 21,835,369 | 22,020,424 | 22,303,998 | 22,393,951 | 22,579,104 | 22,764,256 | 23,041,109 | 23,134,520 |
| Industrial Therms                     | 2,328,881  | 2,388,983  | 2,458,154  | 2,527,818  | 2,608,896  | 2,667,915  | 2,737,607  | 2,807,299  | 2,887,737  | 2,948,849  |
| Ind., Inst., & CmcI. Interrup. Therms | 282,842    | 281,681    | 281,612    | 281,612    | 282,842    | 281,681    | 281,681    | 281,681    | 282,704    | 281,681    |
| Total Core Therms                     | 61,443,938 | 62,551,000 | 63,914,180 | 65,285,304 | 66,954,319 | 68,037,201 | 69,408,736 | 70,788,772 | 72,446,138 | 73,523,481 |
| Daily Baseload Therms                 | 52,234     | 53,040     | 51,940     | 56,199     | 57,635     | 58,481     | 59,611     | 60,972     | 61,945     | 63,285     |
| Peak Day Therms                       | 721,404    | 737,559    | 753,714    | 769,868    | 777,360    | 793,321    | 810,342    | 834,496    | 850,640    | 866,815    |
| Therms Per Residential Customer       | 8,561      | 8,528      | 8,527      | 8,526      | 8,561      | 8,527      | 8,527      | 8,527      | 8,527      | 8,527      |
| Therms Per Commercial Customer        | 38,361     | 38,180     | 38,148     | 38,121     | 38,248     | 38,076     | 38,054     | 38,034     | 38,158     | 37,997     |
| Therms Per Industrial Customer        | 132,191    | 131,665    | 131,642    | 131,644    | 132,202    | 131,674    | 131,676    | 131,677    | 132,159    | 131,680    |
| Residential Customers                 | 49,073     | 50,566     | 52,060     | 53,554     | 55,047     | 56,541     | 58,035     | 59,528     | 61,022     | 62,516     |
| Commercial Customers                  | 6,907      | 6,973      | 7,039      | 7,105      | 7,171      | 7,237      | 7,302      | 7,368      | 7,434      | 7,500      |
| Industrial Customers                  | 100        | 103        | 107        | 110        | 113        | 116        | 119        | 123        | 126        | 129        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 56,081     | 57,644     | 59,206     | 60,769     | 62,332     | 63,895     | 65,458     | 67,020     | 68,583     | 70,146     |
| Pendleton District                    |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 0.57%      | 0.93%      | 0.94%      | 1.34%      | 0.54%      | 0.92%      | 0.91%      | 1.26%      | 0.54%      |
| Residential Therms                    | 6,180,748  | 6,281,751  | 6,406,611  | 6,532,484  | 6,686,429  | 6,785,386  | 6,911,298  | 7,037,211  | 7,189,804  | 7,289,026  |
| Commercial Therms                     | 7,361,799  | 7,349,641  | 7,363,620  | 7,378,023  | 7,423,073  | 7,410,701  | 7,425,904  | 7,441,123  | 7,481,787  | 7,471,750  |
| Industrial Therms                     | 535,102    | 532,052    | 532,985    | 532,982    | 535,102    | 532,051    | 533,048    | 533,045    | 534,977    | 533,052    |
| Ind., Inst., & CmcI. Interrup. Therms | 688,430    | 686,333    | 686,236    | 686,236    | 688,430    | 686,333    | 686,333    | 686,333    | 686,333    | 686,333    |
| Total Core Therms                     | 14,764,079 | 14,850,777 | 14,989,452 | 15,130,525 | 15,333,035 | 15,415,471 | 15,556,583 | 15,697,712 | 15,894,804 | 15,980,140 |
| Daily Baseload Therms                 | 14,643     | 14,076     | 14,024     | 14,919     | 15,098     | 15,247     | 15,340     | 14,751     | 15,494     | 15,485     |
| Peak Day Therms                       | 184,603    | 186,569    | 188,535    | 190,501    | 189,983    | 191,924    | 196,409    | 198,375    | 200,351    | 202,317    |
| Therms Per Residential Customer       | 3,150      | 3,137      | 3,136      | 3,136      | 3,150      | 3,136      | 3,136      | 3,136      | 3,148      | 3,136      |
| Therms Per Commercial Customer        | 28,958     | 28,841     | 28,835     | 28,831     | 28,943     | 28,826     | 28,822     | 28,818     | 28,924     | 28,812     |
| Therms Per Industrial Customer        | 87,182     | 86,853     | 86,843     | 86,842     | 87,182     | 86,853     | 86,853     | 86,852     | 87,162     | 86,853     |
| Residential Customers                 | 11,294     | 11,533     | 11,772     | 12,011     | 12,250     | 12,489     | 12,728     | 12,967     | 13,206     | 13,445     |
| Commercial Customers                  | 1,874      | 1,879      | 1,883      | 1,887      | 1,892      | 1,896      | 1,901      | 1,905      | 1,910      | 1,914      |
| Industrial Customers                  | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Total Core Customers                  | 13,197     | 13,441     | 13,684     | 13,928     | 14,171     | 14,415     | 14,658     | 14,902     | 15,145     | 15,389     |

**Appendix B  
Demand Forecast  
Expected Forecast**

|  | 2020        | 2021        | 2022        | 2023        | 2024        | 2025        | 2026        | 2027        | 2028        | 2029        |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Eastern Oregon (Ontario) District</b> |             |             |             |             |             |             |             |             |             |             |
| Total Therms Pct. Growth                 |             | 0.37%       | 0.75%       | 0.75%       | 1.14%       | 0.34%       | 0.73%       | 0.73%       | 1.11%       | 0.33%       |
| Residential Therms                       | 4,463,771   | 4,497,676   | 4,549,717   | 4,601,859   | 4,673,205   | 4,706,251   | 4,758,396   | 4,810,542   | 4,882,428   | 4,914,832   |
| Commercial Therms                        | 4,241,176   | 4,247,622   | 4,270,869   | 4,294,317   | 4,335,397   | 4,341,457   | 4,364,909   | 4,388,361   | 4,429,186   | 4,435,287   |
| Industrial Therms                        | 332,805     | 332,218     | 332,192     | 332,177     | 332,796     | 332,218     | 332,203     | 332,109     | 332,218     | 332,218     |
| Ind., Inst., & CmcI. Interrup. Therms    | 946,325     | 943,046     | 942,954     | 942,954     | 946,325     | 943,046     | 943,046     | 943,046     | 946,140     | 943,046     |
| Total Core Therms                        | 9,984,077   | 10,020,562  | 10,096,731  | 10,171,308  | 10,287,724  | 10,322,972  | 10,398,555  | 10,474,137  | 10,590,527  | 10,625,382  |
| Daily Baseload Therms                    | 5,303       | 5,406       | 5,376       | 5,435       | 5,465       | 5,488       | 5,549       | 5,653       | 5,640       | 5,700       |
| Peak Day Therms                          | 112,888     | 113,810     | 114,732     | 115,655     | 116,164     | 117,083     | 118,423     | 119,345     | 120,269     | 121,191     |
| Therms Per Residential Customer          | 1,718       | 1,711       | 1,710       | 1,710       | 1,717       | 1,710       | 1,710       | 1,710       | 1,717       | 1,710       |
| Therms Per Commercial Customer           | 7,858       | 7,824       | 7,822       | 7,820       | 7,851       | 7,817       | 7,815       | 7,813       | 7,843       | 7,810       |
| Therms Per Industrial Customer           | 53,154      | 53,035      | 53,036      | 53,035      | 53,154      | 53,035      | 53,034      | 53,033      | 53,157      | 53,035      |
| Residential Customers                    | 7,338       | 7,424       | 7,510       | 7,596       | 7,682       | 7,768       | 7,854       | 7,940       | 8,026       | 8,112       |
| Commercial Customers                     | 1,465       | 1,474       | 1,483       | 1,492       | 1,501       | 1,510       | 1,519       | 1,528       | 1,537       | 1,546       |
| Industrial Customers                     | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          |
| Interruptible Customers                  | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| Total Core Customers                     | 8,826       | 8,921       | 9,016       | 9,111       | 9,206       | 9,301       | 9,396       | 9,491       | 9,586       | 9,681       |
| <b>Oregon</b>                            |             |             |             |             |             |             |             |             |             |             |
| Total Therms Pct. Growth                 |             | 1.42%       | 1.80%       | 1.78%       | 2.19%       | 1.30%       | 1.69%       | 1.67%       | 2.04%       | 1.21%       |
| Residential Therms                       | 47,916,572  | 49,006,327  | 50,295,374  | 51,589,793  | 53,118,218  | 54,185,291  | 55,480,038  | 56,774,789  | 58,306,820  | 59,364,289  |
| Commercial Therms                        | 33,163,138  | 33,250,700  | 33,469,858  | 33,693,564  | 34,062,469  | 34,146,109  | 34,369,917  | 34,593,740  | 34,952,082  | 35,041,557  |
| Industrial Therms                        | 3,196,788   | 3,254,252   | 3,323,331   | 3,392,978   | 3,476,794   | 3,533,184   | 3,602,859   | 3,672,534   | 3,755,486   | 3,812,118   |
| Ind., Inst., & CmcI. Interrup. Therms    | 1,917,597   | 1,911,059   | 1,910,801   | 1,910,801   | 1,917,597   | 1,911,059   | 1,911,059   | 1,911,059   | 1,917,080   | 1,911,059   |
| Total Core Therms                        | 86,194,095  | 87,422,339  | 88,999,364  | 90,587,136  | 92,575,077  | 93,775,644  | 95,363,874  | 96,952,122  | 98,931,469  | 100,129,023 |
| Daily Baseload Therms                    | 72,781      | 72,522      | 71,341      | 76,553      | 78,199      | 79,216      | 80,500      | 81,376      | 82,979      | 84,470      |
| Peak Day Therms                          | 1,018,895   | 1,037,938   | 1,056,981   | 1,076,024   | 1,083,507   | 1,102,328   | 1,133,174   | 1,152,217   | 1,171,280   | 1,190,323   |
| Therms Per Residential Customer          | 13,429      | 13,375      | 13,373      | 13,373      | 13,428      | 13,374      | 13,374      | 13,374      | 13,424      | 13,373      |
| Therms Per Commercial Customer           | 75,177      | 74,846      | 74,806      | 74,733      | 75,042      | 74,719      | 74,691      | 74,666      | 74,925      | 74,619      |
| Therms Per Industrial Customer           | 272,527     | 271,553     | 271,520     | 271,521     | 272,538     | 271,561     | 271,562     | 271,563     | 272,479     | 271,563     |
| Residential Customers                    | 67,704      | 69,523      | 71,341      | 73,160      | 74,979      | 76,797      | 78,616      | 80,435      | 82,253      | 84,072      |
| Commercial Customers                     | 10,246      | 10,325      | 10,405      | 10,484      | 10,563      | 10,643      | 10,722      | 10,802      | 10,881      | 10,961      |
| Industrial Customers                     | 151         | 154         | 157         | 160         | 164         | 167         | 170         | 173         | 176         | 179         |
| Interruptible Customers                  | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           |
| Total Core Customers                     | 78,105      | 80,006      | 81,907      | 83,808      | 85,710      | 87,611      | 89,512      | 91,413      | 93,315      | 95,216      |
| <b>Washington</b>                        |             |             |             |             |             |             |             |             |             |             |
| Total Therms Pct. Growth                 |             | 0.93%       | 1.28%       | 1.28%       | 1.67%       | 0.86%       | 1.23%       | 1.22%       | 1.56%       | 0.84%       |
| Residential Therms                       | 128,751,914 | 130,421,550 | 132,575,257 | 134,748,334 | 137,480,711 | 139,115,888 | 141,289,555 | 143,463,253 | 146,166,718 | 147,810,392 |
| Commercial Therms                        | 112,917,244 | 113,495,371 | 114,477,814 | 115,483,128 | 116,955,730 | 117,517,855 | 118,522,595 | 119,528,332 | 120,947,979 | 121,540,495 |
| Industrial Therms                        | 11,838,183  | 11,980,893  | 12,161,799  | 12,346,322  | 12,579,910  | 12,719,861  | 12,904,526  | 13,089,085  | 13,313,702  | 13,458,832  |
| Ind., Inst., & CmcI. Interrup. Therms    | 3,117,792   | 3,108,246   | 3,107,336   | 3,107,336   | 3,117,193   | 3,107,647   | 3,107,048   | 3,107,047   | 3,115,974   | 3,107,047   |
| Total Core Therms                        | 256,625,132 | 259,006,060 | 262,322,206 | 265,685,120 | 270,133,543 | 272,461,251 | 275,823,724 | 279,181,717 | 283,544,373 | 285,916,766 |
| Daily Baseload Therms                    | 263,045     | 266,440     | 268,133     | 272,307     | 276,781     | 279,845     | 282,932     | 286,416     | 288,831     | 292,645     |
| Peak Day Therms                          | 2,538,651   | 2,575,010   | 2,611,368   | 2,647,727   | 2,637,260   | 2,673,116   | 2,756,843   | 2,793,202   | 2,829,588   | 2,865,946   |
| Therms Per Residential Customer          | 129,629     | 128,672     | 128,671     | 128,674     | 129,642     | 128,682     | 128,685     | 128,688     | 129,644     | 128,689     |
| Therms Per Commercial Customer           | 183,381     | 182,683     | 182,563     | 182,489     | 183,077     | 182,399     | 182,337     | 182,282     | 182,764     | 182,185     |
| Therms Per Industrial Customer           | 641,105     | 638,916     | 638,682     | 638,598     | 640,788     | 638,596     | 638,516     | 638,429     | 640,171     | 638,278     |
| Residential Customers                    | 195,007     | 198,391     | 201,774     | 205,157     | 208,541     | 211,925     | 215,308     | 218,692     | 222,076     | 225,459     |
| Commercial Customers                     | 26,944      | 27,246      | 27,549      | 27,851      | 28,154      | 28,457      | 28,759      | 29,062      | 29,364      | 29,667      |
| Industrial Customers                     | 486         | 494         | 501         | 508         | 516         | 523         | 531         | 538         | 546         | 553         |
| Interruptible Customers                  | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           |
| Total Core Customers                     | 222,446     | 226,139     | 229,833     | 233,526     | 237,220     | 240,914     | 244,607     | 248,301     | 251,995     | 255,688     |
| <b>System</b>                            |             |             |             |             |             |             |             |             |             |             |
| Total Therms Pct. Growth                 |             | 1.05%       | 1.41%       | 1.41%       | 1.81%       | 0.97%       | 1.35%       | 1.33%       | 1.68%       | 0.93%       |
| Residential Therms                       | 176,668,485 | 179,427,877 | 182,870,631 | 186,338,127 | 190,598,928 | 193,301,179 | 196,769,593 | 200,238,041 | 204,473,538 | 207,174,681 |
| Commercial Therms                        | 146,080,382 | 146,746,071 | 147,947,672 | 149,176,692 | 151,018,199 | 151,663,964 | 152,892,512 | 154,122,072 | 155,900,061 | 156,582,051 |
| Industrial Therms                        | 15,034,971  | 15,235,146  | 15,485,130  | 15,739,300  | 16,056,704  | 16,253,045  | 16,507,385  | 16,761,619  | 17,069,188  | 17,270,959  |
| Ind., Inst., & CmcI. Interrup. Therms    | 5,035,389   | 5,019,305   | 5,018,137   | 5,018,137   | 5,034,789   | 5,018,706   | 5,018,107   | 5,018,107   | 5,033,054   | 5,018,107   |
| Total Core Therms                        | 342,819,227 | 346,428,399 | 351,321,570 | 356,272,256 | 362,708,621 | 366,236,894 | 371,187,598 | 376,139,839 | 382,475,842 | 388,045,789 |
| Daily Baseload Therms                    | 335,826     | 338,961     | 339,474     | 340,860     | 354,980     | 359,062     | 363,452     | 367,792     | 371,811     | 377,115     |
| Peak Day Therms                          | 3,557,546   | 3,612,949   | 3,668,350   | 3,723,751   | 3,720,767   | 3,775,445   | 3,890,017   | 3,945,419   | 4,000,067   | 4,054,269   |
| Therms Per Residential Customer          | 143,058     | 142,048     | 142,045     | 142,047     | 143,069     | 142,057     | 142,059     | 142,061     | 143,068     | 142,067     |
| Therms Per Commercial Customer           | 258,559     | 257,529     | 257,369     | 257,262     | 258,119     | 257,118     | 257,029     | 256,947     | 257,689     | 256,804     |
| Therms Per Industrial Customer           | 913,632     | 910,469     | 910,202     | 910,119     | 913,326     | 910,159     | 910,078     | 909,992     | 912,650     | 909,846     |
| Residential Customers                    | 262,711     | 267,913     | 273,115     | 278,317     | 283,520     | 288,722     | 293,924     | 299,126     | 304,329     | 309,531     |
| Commercial Customers                     | 37,190      | 37,572      | 37,954      | 38,335      | 38,717      | 39,099      | 39,481      | 39,863      | 40,245      | 40,627      |
| Industrial Customers                     | 637         | 648         | 658         | 669         | 680         | 690         | 701         | 712         | 722         | 733         |
| Interruptible Customers                  | 13          | 13          | 13          | 13          | 13          | 13          | 13          | 13          | 13          | 13          |
| Total Core Customers                     | 300,551     | 306,145     | 311,740     | 317,335     | 322,930     | 328,525     | 334,120     | 339,714     | 345,310     | 350,904     |







**Appendix B  
Demand Forecast  
Expected Forecast**

| Mission Tap                           | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
|---------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Total Therms Pct. Growth</b>       | -0.02%      | -0.02%      | 0.50%       | -0.53%      | -0.02%      | -0.02%      | 0.51%       | -0.53%      | -0.02%      | -0.01%      |
| Residential Therms                    | 120,678     | 120,659     | 121,338     | 120,638     | 120,618     | 120,594     | 121,273     | 120,568     | 120,548     | 120,534     |
| Commercial Therms                     | 370,420     | 370,344     | 372,141     | 370,209     | 370,150     | 370,059     | 371,859     | 369,946     | 369,863     | 369,808     |
| Industrial Therms                     | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Ind., Inst., & Cmcl. Interrup. Therms | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| <b>Total Core Therms</b>              | 491,099     | 491,003     | 493,479     | 490,847     | 490,768     | 490,653     | 493,132     | 490,514     | 490,411     | 490,342     |
| Daily BaseLoad Therms                 | 546         | 546         | 546         | 546         | 546         | 546         | 546         | 546         | 546         | 546         |
| Peak Day Therms                       | 5,474       | 5,474       | 5,455       | 5,455       | 5,455       | 5,455       | 5,474       | 5,455       | 5,455       | 5,455       |
| Therms Per Residential Customer       | 558         | 558         | 561         | 558         | 557         | 557         | 560         | 557         | 557         | 557         |
| Therms Per Commercial Customer        | 8,262       | 8,261       | 8,301       | 8,258       | 8,256       | 8,254       | 8,294       | 8,252       | 8,250       | 8,249       |
| Therms Per Industrial Customer        | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Residential Customers                 | 216         | 216         | 216         | 216         | 216         | 216         | 216         | 216         | 216         | 216         |
| Commercial Customers                  | 45          | 45          | 45          | 45          | 45          | 45          | 45          | 45          | 45          | 45          |
| Industrial Customers                  | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Interruptible Customers               | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| <b>Total Core Customers</b>           | 261         | 261         | 261         | 261         | 261         | 261         | 261         | 261         | 261         | 261         |
| <b>Nyssa-Ontario</b>                  | <b>2030</b> | <b>2031</b> | <b>2032</b> | <b>2033</b> | <b>2034</b> | <b>2035</b> | <b>2036</b> | <b>2037</b> | <b>2038</b> | <b>2039</b> |
| <b>Total Therms Pct. Growth</b>       | 0.76%       | 0.76%       | 1.15%       | 0.34%       | 0.74%       | 0.74%       | 1.12%       | 0.33%       | 0.72%       | 0.70%       |
| Residential Therms                    | 2,337,304   | 2,361,890   | 2,396,452   | 2,410,824   | 2,435,407   | 2,440,235   | 2,495,202   | 2,509,407   | 2,533,996   | 2,558,325   |
| Commercial Therms                     | 2,868,270   | 2,891,731   | 2,926,919   | 2,938,345   | 2,941,800   | 2,985,560   | 3,021,142   | 3,032,482   | 3,055,940   | 3,079,082   |
| Industrial Therms                     | 204,050     | 204,036     | 204,324     | 204,045     | 204,031     | 204,036     | 204,324     | 204,064     | 204,050     | 204,017     |
| Ind., Inst., & Cmcl. Interrup. Therms | 943,046     | 943,046     | 946,325     | 942,954     | 942,954     | 943,046     | 946,325     | 943,046     | 943,046     | 942,954     |
| <b>Total Core Therms</b>              | 6,352,670   | 6,400,702   | 6,474,020   | 6,496,168   | 6,544,191   | 6,592,876   | 6,666,993   | 6,689,000   | 6,737,032   | 6,784,371   |
| Daily BaseLoad Therms                 | 3,282       | 3,293       | 3,406       | 3,369       | 3,417       | 3,443       | 3,443       | 3,443       | 3,443       | 3,443       |
| Peak Day Therms                       | 73,297      | 73,897      | 75,145      | 75,749      | 76,354      | 76,959      | 76,899      | 78,169      | 78,774      | 79,379      |
| Therms Per Residential Customer       | 549         | 549         | 551         | 549         | 549         | 549         | 551         | 549         | 549         | 549         |
| Therms Per Commercial Customer        | 2,792       | 2,790       | 2,800       | 2,787       | 2,785       | 2,784       | 2,794       | 2,781       | 2,780       | 2,778       |
| Therms Per Industrial Customer        | 10,316      | 10,316      | 10,330      | 10,315      | 10,315      | 10,316      | 10,316      | 10,317      | 10,316      | 10,315      |
| Residential Customers                 | 4,257       | 4,302       | 4,347       | 4,392       | 4,437       | 4,482       | 4,527       | 4,572       | 4,617       | 4,662       |
| Commercial Customers                  | 1,027       | 1,036       | 1,045       | 1,054       | 1,063       | 1,072       | 1,090       | 1,099       | 1,109       | 1,108       |
| Industrial Customers                  | 20          | 20          | 20          | 20          | 20          | 20          | 20          | 20          | 20          | 20          |
| Interruptible Customers               | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| <b>Total Core Customers</b>           | 5,305       | 5,359       | 5,413       | 5,467       | 5,521       | 5,575       | 5,629       | 5,683       | 5,737       | 5,791       |
| <b>Pendleton</b>                      | <b>2030</b> | <b>2031</b> | <b>2032</b> | <b>2033</b> | <b>2034</b> | <b>2035</b> | <b>2036</b> | <b>2037</b> | <b>2038</b> | <b>2039</b> |
| <b>Total Therms Pct. Growth</b>       | 0.58%       | 0.58%       | 0.97%       | 0.16%       | 0.57%       | 0.58%       | 0.96%       | 0.16%       | 0.56%       | 0.54%       |
| Residential Therms                    | 3,292,907   | 3,330,482   | 3,381,782   | 3,405,258   | 3,442,828   | 3,480,787   | 3,532,691   | 3,555,941   | 3,593,521   | 3,630,689   |
| Commercial Therms                     | 2,358,853   | 2,358,854   | 2,368,213   | 2,358,574   | 2,358,572   | 2,358,850   | 2,368,213   | 2,358,853   | 2,358,854   | 2,358,574   |
| Industrial Therms                     | 161,166     | 161,166     | 161,938     | 161,153     | 161,153     | 161,166     | 161,938     | 161,166     | 161,166     | 161,153     |
| Ind., Inst., & Cmcl. Interrup. Therms | 686,333     | 686,333     | 688,430     | 686,236     | 686,236     | 686,333     | 688,430     | 686,333     | 686,333     | 686,236     |
| <b>Total Core Therms</b>              | 6,499,259   | 6,536,836   | 6,600,362   | 6,611,220   | 6,648,789   | 6,687,137   | 6,751,273   | 6,762,293   | 6,799,874   | 6,836,651   |
| Daily BaseLoad Therms                 | 5,779       | 5,823       | 5,851       | 5,871       | 5,845       | 5,817       | 5,947       | 4,688       | 4,680       | 4,702       |
| Peak Day Therms                       | 84,596      | 85,131      | 86,433      | 86,973      | 87,512      | 88,051      | 87,806      | 89,130      | 89,669      | 90,208      |
| Therms Per Residential Customer       | 572         | 572         | 575         | 572         | 572         | 572         | 574         | 572         | 572         | 572         |
| Therms Per Commercial Customer        | 3,132       | 3,132       | 3,144       | 3,132       | 3,132       | 3,132       | 3,144       | 3,132       | 3,132       | 3,132       |
| Therms Per Industrial Customer        | 26,861      | 26,861      | 26,990      | 26,859      | 26,859      | 26,861      | 26,990      | 26,861      | 26,861      | 26,859      |
| Residential Customers                 | 5,753       | 5,819       | 5,885       | 5,951       | 6,017       | 6,083       | 6,149       | 6,215       | 6,281       | 6,347       |
| Commercial Customers                  | 753         | 753         | 753         | 753         | 753         | 753         | 753         | 753         | 753         | 753         |
| Industrial Customers                  | 6           | 6           | 6           | 6           | 6           | 6           | 6           | 6           | 6           | 6           |
| Interruptible Customers               | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| <b>Total Core Customers</b>           | 6,513       | 6,579       | 6,645       | 6,711       | 6,777       | 6,843       | 6,909       | 6,975       | 7,041       | 7,107       |
| <b>Prineville</b>                     | <b>2030</b> | <b>2031</b> | <b>2032</b> | <b>2033</b> | <b>2034</b> | <b>2035</b> | <b>2036</b> | <b>2037</b> | <b>2038</b> | <b>2039</b> |
| <b>Total Therms Pct. Growth</b>       | 1.57%       | 1.54%       | 1.97%       | 1.02%       | 1.48%       | 1.48%       | 1.89%       | 0.96%       | 1.39%       | 1.35%       |
| Residential Therms                    | 2,153,472   | 2,210,120   | 2,277,055   | 2,322,900   | 2,379,523   | 2,436,695   | 2,504,662   | 2,549,998   | 2,606,648   | 2,662,696   |
| Commercial Therms                     | 1,929,867   | 1,939,294   | 1,957,345   | 1,967,115   | 1,976,998   | 1,995,216   | 1,995,850   | 2,005,273   | 2,014,228   | 2,014,228   |
| Industrial Therms                     | 197,469     | 197,469     | 198,268     | 197,426     | 197,426     | 197,469     | 198,268     | 197,469     | 197,469     | 197,426     |
| Ind., Inst., & Cmcl. Interrup. Therms | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| <b>Total Core Therms</b>              | 4,280,808   | 4,346,884   | 4,432,667   | 4,478,013   | 4,544,065   | 4,611,162   | 4,696,145   | 4,743,317   | 4,809,390   | 4,874,351   |
| Daily BaseLoad Therms                 | 3,108       | 3,119       | 3,193       | 3,210       | 3,260       | 3,335       | 3,038       | 3,080       | 3,154       | 3,179       |
| Peak Day Therms                       | 53,453      | 54,288      | 56,125      | 56,975      | 57,825      | 58,676      | 58,467      | 60,317      | 61,227      | 62,078      |
| Therms Per Residential Customer       | 591         | 591         | 593         | 591         | 591         | 591         | 593         | 591         | 591         | 590         |
| Therms Per Commercial Customer        | 3,481       | 3,479       | 3,493       | 3,473       | 3,473       | 3,473       | 3,486       | 3,469       | 3,467       | 3,464       |
| Therms Per Industrial Customer        | 6,809       | 6,809       | 6,837       | 6,808       | 6,808       | 6,809       | 6,837       | 6,809       | 6,809       | 6,808       |
| Residential Customers                 | 3,646       | 3,742       | 3,838       | 3,934       | 4,030       | 4,126       | 4,222       | 4,318       | 4,414       | 4,510       |
| Commercial Customers                  | 554         | 557         | 560         | 563         | 566         | 569         | 572         | 575         | 578         | 581         |
| Industrial Customers                  | 29          | 29          | 29          | 29          | 29          | 29          | 29          | 29          | 29          | 29          |
| Interruptible Customers               | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| <b>Total Core Customers</b>           | 4,229       | 4,328       | 4,427       | 4,526       | 4,625       | 4,724       | 4,823       | 4,922       | 5,021       | 5,120       |
| <b>Redmond</b>                        | <b>2030</b> | <b>2031</b> | <b>2032</b> | <b>2033</b> | <b>2034</b> | <b>2035</b> | <b>2036</b> | <b>2037</b> | <b>2038</b> | <b>2039</b> |
| <b>Total Therms Pct. Growth</b>       | 2.57%       | 2.50%       | 2.90%       | 1.89%       | 2.33%       | 2.31%       | 2.68%       | 1.72%       | 2.13%       | 2.05%       |
| Residential Therms                    | 6,085,555   | 6,261,949   | 6,447,761   | 6,612,337   | 6,788,617   | 6,967,455   | 7,176,521   | 7,320,259   | 7,496,669   | 7,670,258   |
| Commercial Therms                     | 4,714,061   | 4,794,292   | 4,896,901   | 4,953,237   | 5,033,418   | 5,115,240   | 5,219,282   | 5,275,736   | 5,356,003   | 5,434,022   |
| Industrial Therms                     | 1,232,192   | 1,276,514   | 1,326,096   | 1,364,946   | 1,409,246   | 1,453,905   | 1,504,189   | 1,542,634   | 1,586,997   | 1,630,917   |
| Ind., Inst., & Cmcl. Interrup. Therms | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| <b>Total Core Therms</b>              | 12,031,808  | 12,332,755  | 12,670,758  | 12,930,520  | 13,231,282  | 13,536,600  | 13,899,992  | 14,138,679  | 14,439,669  | 14,735,478  |
| Daily BaseLoad Therms                 | 9,696       | 9,812       | 10,176      | 10,286      | 10,531      | 10,849      | 8,708       | 8,888       | 9,199       | 9,237       |
| Peak Day Therms                       | 146,255     | 149,807     | 157,603     | 161,255     | 164,907     | 168,558     | 167,568     | 175,863     | 179,515     | 183,167     |
| Therms Per Residential Customer       | 757         | 761         | 757         | 757         | 757         | 757         | 761         | 757         | 757         | 757         |
| Therms Per Commercial Customer        | 3,257       | 3,257       | 3,271       | 3,254       | 3,253       | 3,254       | 3,268       | 3,252       | 3,252       | 3,250       |
| Therms Per Industrial Customer        | 39,090      | 39,091      | 39,245      | 39,084      | 39,085      | 39,095      | 39,249      | 39,097      | 39,098      | 39,089      |
| Residential Customers                 | 8,038       | 8,271       | 8,504       | 8,737       | 8,970       | 9,203       | 9,436       | 9,669       | 9,902       | 10,135      |
| Commercial Customers                  | 1,447       | 1,472       | 1,497       | 1,522       | 1,547       | 1,572       | 1,597       | 1,622       | 1,647       | 1,672       |
| Industrial Customers                  | 32          | 33          | 34          | 35          | 36          | 37          | 38          | 39          | 41          | 42          |
| Interruptible Customers               | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| <b>Total Core Customers</b>           | 9,517       | 9,776       | 10,035      | 10,294      | 10,553      | 10,812      | 11,072      | 11,331      | 11,590      | 11,849      |

**Appendix B  
Demand Forecast  
Expected Forecast**

|                                       | 2030      | 2031      | 2032      | 2033      | 2034      | 2035      | 2036      | 2037      | 2038      | 2039      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Stanfield</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 1.22%     | 1.20%     | 1.54%     | 0.83%     | 1.16%     | 1.16%     | 1.48%     | 0.78%     | 1.11%     | 1.09%     |
| Residential Therms                    | 235,562   | 239,348   | 243,979   | 246,925   | 250,711   | 254,519   | 259,201   | 262,118   | 265,904   | 269,666   |
| Commercial Therms                     | 79,351    | 79,351    | 79,616    | 79,344    | 79,344    | 79,351    | 79,616    | 79,351    | 79,351    | 79,344    |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 314,912   | 318,699   | 323,595   | 326,269   | 330,054   | 333,870   | 338,817   | 341,469   | 345,255   | 349,010   |
| Daily BaseLoad Therms                 | 224       | 227       | 230       | 232       | 233       | 233       | 239       | 242       | 245       | 247       |
| Peak Day Therms                       | 4,424     | 4,478     | 4,561     | 4,616     | 4,671     | 4,725     | 4,751     | 4,835     | 4,890     | 4,944     |
| Therms Per Residential Customer       | 570       | 570       | 572       | 570       | 570       | 570       | 572       | 570       | 570       | 570       |
| Therms Per Commercial Customer        | 2,145     | 2,145     | 2,152     | 2,144     | 2,144     | 2,145     | 2,152     | 2,145     | 2,145     | 2,144     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 413       | 420       | 427       | 433       | 440       | 447       | 453       | 460       | 467       | 473       |
| Commercial Customers                  | 37        | 37        | 37        | 37        | 37        | 37        | 37        | 37        | 37        | 37        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 450       | 457       | 464       | 470       | 477       | 484       | 490       | 497       | 504       | 510       |
| <b>Stearns (Surviver)</b>             |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.82%     | 0.82%     | 1.23%     | 0.39%     | 0.80%     | 0.79%     | 1.20%     | 0.36%     | 0.77%     | 0.77%     |
| Residential Therms                    | 4,189,315 | 4,232,658 | 4,294,538 | 4,319,616 | 4,362,963 | 4,406,164 | 4,466,795 | 4,492,980 | 4,536,324 | 4,579,817 |
| Commercial Therms                     | 1,080,699 | 1,080,699 | 1,084,525 | 1,080,749 | 1,080,749 | 1,080,699 | 1,084,525 | 1,080,699 | 1,080,699 | 1,080,749 |
| Industrial Therms                     | 44,929    | 44,929    | 45,079    | 44,929    | 44,929    | 44,929    | 45,079    | 44,929    | 44,929    | 44,929    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 5,314,943 | 5,358,286 | 5,424,143 | 5,445,295 | 5,488,641 | 5,531,792 | 5,598,400 | 5,618,608 | 5,661,952 | 5,705,496 |
| Daily BaseLoad Therms                 | 5,386     | 5,423     | 5,464     | 5,497     | 5,460     | 5,494     | 5,526     | 5,562     | 5,604     | 5,637     |
| Peak Day Therms                       | 56,938    | 57,443    | 57,759    | 58,262    | 58,765    | 59,269    | 59,971    | 60,277    | 60,781    | 61,284    |
| Therms Per Residential Customer       | 1,006     | 1,006     | 1,010     | 1,006     | 1,006     | 1,010     | 1,006     | 1,006     | 1,006     | 1,006     |
| Therms Per Commercial Customer        | 4,825     | 4,825     | 4,842     | 4,825     | 4,825     | 4,825     | 4,842     | 4,825     | 4,825     | 4,825     |
| Therms Per Industrial Customer        | 14,976    | 14,976    | 15,026    | 14,976    | 14,976    | 14,976    | 15,026    | 14,976    | 14,976    | 14,976    |
| Residential Customers                 | 4,164     | 4,207     | 4,251     | 4,294     | 4,337     | 4,380     | 4,423     | 4,466     | 4,509     | 4,552     |
| Commercial Customers                  | 224       | 224       | 224       | 224       | 224       | 224       | 224       | 224       | 224       | 224       |
| Industrial Customers                  | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 4,391     | 4,434     | 4,478     | 4,521     | 4,564     | 4,607     | 4,650     | 4,693     | 4,736     | 4,779     |
| <b>Pronghorn</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 2.88%     | 2.80%     | 3.13%     | 2.27%     | 2.58%     | 2.50%     | 2.86%     | 2.00%     | 2.34%     | 2.30%     |
| Residential Therms                    | 694,853   | 723,493   | 755,353   | 780,962   | 809,610   | 838,139   | 870,486   | 895,496   | 924,136   | 952,911   |
| Commercial Therms                     | 328,180   | 328,180   | 329,219   | 328,226   | 328,226   | 328,180   | 329,219   | 328,180   | 328,180   | 328,226   |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 1,023,033 | 1,051,673 | 1,084,573 | 1,109,188 | 1,137,836 | 1,166,319 | 1,199,705 | 1,223,676 | 1,252,316 | 1,281,137 |
| Daily BaseLoad Therms                 | 1,260     | 1,288     | 1,322     | 1,347     | 1,376     | 1,404     | 1,432     | 1,460     | 1,494     | 1,519     |
| Peak Day Therms                       | 10,449    | 10,779    | 10,957    | 11,282    | 11,608    | 11,934    | 12,429    | 12,586    | 12,912    | 13,238    |
| Therms Per Residential Customer       | 1,058     | 1,058     | 1,063     | 1,058     | 1,058     | 1,058     | 1,063     | 1,058     | 1,058     | 1,058     |
| Therms Per Commercial Customer        | 9,377     | 9,377     | 9,406     | 9,378     | 9,378     | 9,377     | 9,406     | 9,377     | 9,377     | 9,378     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 657       | 684       | 711       | 738       | 765       | 792       | 819       | 846       | 873       | 900       |
| Commercial Customers                  | 35        | 35        | 35        | 35        | 35        | 35        | 35        | 35        | 35        | 35        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 692       | 719       | 746       | 773       | 800       | 827       | 854       | 881       | 908       | 935       |
| <b>North Bend</b>                     |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.00%     | 0.00%     | 0.25%     | -0.26%    | 0.00%     | 0.02%     | 0.25%     | -0.25%    | 0.00%     | -0.02%    |
| Residential Therms                    | 5,738     | 5,738     | 5,751     | 5,737     | 5,737     | 5,738     | 5,751     | 5,738     | 5,738     | 5,737     |
| Commercial Therms                     | 46,114    | 46,114    | 46,233    | 46,105    | 46,105    | 46,114    | 46,233    | 46,114    | 46,114    | 46,105    |
| Industrial Therms                     | 14,048    | 14,048    | 14,079    | 14,048    | 14,046    | 14,048    | 14,079    | 14,048    | 14,048    | 14,046    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 65,900    | 65,900    | 66,063    | 65,891    | 65,888    | 65,900    | 66,063    | 65,900    | 65,900    | 65,888    |
| Daily BaseLoad Therms                 | 11        | 11        | 8         | (1)       | (6)       | (6)       | (6)       | (6)       | (7)       | (10)      |
| Peak Day Therms                       | 372       | 372       | 384       | 384       | 384       | 384       | 372       | 384       | 384       | 384       |
| Therms Per Residential Customer       | 1,425     | 1,425     | 1,428     | 1,434     | 1,434     | 1,435     | 1,438     | 1,435     | 1,435     | 1,434     |
| Therms Per Commercial Customer        | 387       | 375       | 344       | 352       | 342       | 332       | 324       | 314       | 306       | 298       |
| Therms Per Industrial Customer        | 7,024     | 7,024     | 7,039     | 7,024     | 7,023     | 7,024     | 7,039     | 7,024     | 7,024     | 7,023     |
| Residential Customers                 | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         |
| Commercial Customers                  | 119       | 123       | 127       | 131       | 135       | 139       | 143       | 147       | 151       | 155       |
| Industrial Customers                  | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 125       | 129       | 133       | 137       | 141       | 145       | 149       | 153       | 157       | 161       |

**Appendix B  
Demand Forecast  
Expected Forecast**

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| Bend Loop  | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>                  | 1.93%      | 1.90%      | 2.30%      | 1.38%      | 1.79%      | 1.77%      | 2.17%      | 1.26%      | 1.67%      | 1.64%      |
| <b>Residential Therms</b>                        | 33,631,290 | 34,413,340 | 35,348,412 | 35,974,405 | 36,756,330 | 37,541,452 | 38,490,208 | 39,105,574 | 39,887,633 | 40,666,224 |
| <b>Commercial Therms</b>                         | 13,407,240 | 13,502,725 | 13,656,075 | 13,692,478 | 13,787,947 | 13,884,641 | 14,039,633 | 14,075,615 | 14,171,096 | 14,265,317 |
| <b>Industrial Therms</b>                         | 603,715    | 629,084    | 656,912    | 679,824    | 705,188    | 730,626    | 758,832    | 781,435    | 806,895    | 832,090    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>                         | 47,842,245 | 48,545,149 | 49,661,399 | 50,346,707 | 51,249,466 | 52,156,719 | 53,288,674 | 53,962,625 | 54,865,534 | 55,763,631 |
| <b>Daily BaseLoad Therms</b>                     | 41,372     | 41,998     | 42,829     | 43,476     | 42,121     | 42,973     | 43,575     | 44,288     | 45,090     | 45,684     |
| <b>Peak Day Therms</b>                           | 551,335    | 561,705    | 576,336    | 586,783    | 597,230    | 607,677    | 613,558    | 628,572    | 639,019    | 649,466    |
| <b>Therms Per Residential Customer</b>           | 749        | 749        | 752        | 749        | 749        | 749        | 752        | 749        | 749        | 749        |
| <b>Therms Per Commercial Customer</b>            | 2,926      | 2,925      | 2,937      | 2,923      | 2,922      | 2,924      | 2,934      | 2,920      | 2,920      | 2,918      |
| <b>Therms Per Industrial Customer</b>            | 12,438     | 12,438     | 12,484     | 12,437     | 12,437     | 12,438     | 12,484     | 12,438     | 12,439     | 12,437     |
| <b>Residential Customers</b>                     | 44,897     | 45,941     | 46,985     | 48,029     | 49,073     | 50,117     | 51,161     | 52,205     | 53,249     | 54,293     |
| <b>Commercial Customers</b>                      | 4,582      | 4,616      | 4,650      | 4,684      | 4,718      | 4,752      | 4,786      | 4,820      | 4,854      | 4,888      |
| <b>Industrial Customers</b>                      | 49         | 51         | 53         | 55         | 57         | 59         | 61         | 63         | 65         | 67         |
| <b>Interruptible Customers</b>                   | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>                      | 49,528     | 50,608     | 51,688     | 52,768     | 53,848     | 54,928     | 56,008     | 57,088     | 58,168     | 59,248     |
| <b>McCleary (Aberdeen/Hoquiam)</b>               | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>                  | 0.35%      | 0.25%      | 0.73%      | -0.07%     | 0.34%      | 0.37%      | 0.72%      | -0.04%     | 0.34%      | 0.20%      |
| <b>Residential Therms</b>                        | 2,809,327  | 2,830,155  | 2,862,335  | 2,870,909  | 2,891,723  | 2,913,449  | 2,945,952  | 2,955,108  | 2,975,938  | 2,995,815  |
| <b>Commercial Therms</b>                         | 2,945,184  | 2,945,184  | 2,955,976  | 2,944,212  | 2,944,212  | 2,945,184  | 2,955,976  | 2,945,184  | 2,945,184  | 2,944,212  |
| <b>Industrial Therms</b>                         | 278,196    | 278,196    | 279,193    | 278,099    | 278,099    | 278,196    | 279,193    | 278,196    | 278,196    | 278,099    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>                         | 6,032,708  | 6,053,536  | 6,097,504  | 6,093,220  | 6,114,035  | 6,136,830  | 6,181,121  | 6,178,488  | 6,199,319  | 6,218,127  |
| <b>Daily BaseLoad Therms</b>                     | 6,165      | 6,153      | 6,231      | 6,200      | 6,186      | 6,237      | 6,234      | 6,335      | 6,330      | 4,901      |
| <b>Peak Day Therms</b>                           | 52,947     | 53,153     | 55,324     | 55,536     | 55,748     | 55,960     | 54,180     | 56,384     | 56,596     | 56,808     |
| <b>Therms Per Residential Customer</b>           | 720        | 720        | 723        | 720        | 720        | 720        | 723        | 720        | 720        | 720        |
| <b>Therms Per Commercial Customer</b>            | 4,062      | 4,062      | 4,077      | 4,061      | 4,061      | 4,062      | 4,077      | 4,062      | 4,062      | 4,061      |
| <b>Therms Per Industrial Customer</b>            | 19,871     | 19,871     | 19,942     | 19,864     | 19,864     | 19,871     | 19,942     | 19,871     | 19,871     | 19,864     |
| <b>Residential Customers</b>                     | 3,903      | 3,932      | 3,961      | 3,990      | 4,019      | 4,048      | 4,077      | 4,106      | 4,135      | 4,164      |
| <b>Commercial Customers</b>                      | 725        | 725        | 725        | 725        | 725        | 725        | 725        | 725        | 725        | 725        |
| <b>Industrial Customers</b>                      | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         |
| <b>Interruptible Customers</b>                   | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>                      | 4,642      | 4,671      | 4,700      | 4,729      | 4,758      | 4,787      | 4,816      | 4,845      | 4,874      | 4,903      |
| <b>Acme</b>                                      | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>                  | 0.00%      | 0.00%      | 0.37%      | -0.37%     | 0.00%      | 0.01%      | 0.37%      | -0.37%     | 0.00%      | -0.01%     |
| <b>Residential Therms</b>                        | 54,395     | 54,395     | 54,595     | 54,391     | 54,391     | 54,395     | 54,595     | 54,395     | 54,395     | 54,391     |
| <b>Commercial Therms</b>                         | 31,218     | 31,218     | 31,334     | 31,216     | 31,216     | 31,218     | 31,334     | 31,218     | 31,218     | 31,216     |
| <b>Industrial Therms</b>                         | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>                         | 85,613     | 85,613     | 85,928     | 85,606     | 85,606     | 85,613     | 85,928     | 85,613     | 85,613     | 85,606     |
| <b>Daily BaseLoad Therms</b>                     | 64         | 64         | 64         | 64         | 64         | 64         | 64         | 64         | 64         | 64         |
| <b>Peak Day Therms</b>                           | 854        | 854        | 861        | 861        | 861        | 861        | 854        | 861        | 861        | 861        |
| <b>Therms Per Residential Customer</b>           | 800        | 800        | 803        | 800        | 800        | 800        | 803        | 800        | 800        | 800        |
| <b>Therms Per Commercial Customer</b>            | 3,469      | 3,469      | 3,482      | 3,468      | 3,468      | 3,469      | 3,482      | 3,469      | 3,469      | 3,468      |
| <b>Therms Per Industrial Customer</b>            | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Residential Customers</b>                     | 68         | 68         | 68         | 68         | 68         | 68         | 68         | 68         | 68         | 68         |
| <b>Commercial Customers</b>                      | 9          | 9          | 9          | 9          | 9          | 9          | 9          | 9          | 9          | 9          |
| <b>Industrial Customers</b>                      | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Interruptible Customers</b>                   | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>                      | 77         | 77         | 77         | 77         | 77         | 77         | 77         | 77         | 77         | 77         |
| <b>Arlington</b>                                 | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>                  | 1.16%      | 1.15%      | 1.51%      | 0.74%      | 1.11%      | 1.12%      | 1.46%      | 0.71%      | 1.06%      | 1.03%      |
| <b>Residential Therms</b>                        | 3,436,809  | 3,454,395  | 3,484,889  | 3,488,882  | 3,506,462  | 3,524,805  | 3,555,559  | 3,560,048  | 3,577,635  | 3,594,443  |
| <b>Commercial Therms</b>                         | 2,267,809  | 2,300,521  | 2,341,811  | 2,365,566  | 2,398,264  | 2,431,510  | 2,473,273  | 2,497,089  | 2,529,802  | 2,561,934  |
| <b>Industrial Therms</b>                         | 667,064    | 690,078    | 715,611    | 736,025    | 759,028    | 782,207    | 808,060    | 828,319    | 851,333    | 874,150    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>                         | 6,371,682  | 6,444,994  | 6,542,310  | 6,590,473  | 6,663,754  | 6,738,521  | 6,836,892  | 6,885,456  | 6,958,770  | 7,030,527  |
| <b>Daily BaseLoad Therms</b>                     | 4,355      | 4,309      | 4,513      | 4,550      | 4,629      | 4,755      | 4,782      | 4,981      | 6,034      | 6,049      |
| <b>Peak Day Therms</b>                           | 57,260     | 57,809     | 59,960     | 60,606     | 61,251     | 61,994     | 61,044     | 63,192     | 63,837     | 64,482     |
| <b>Therms Per Residential Customer</b>           | 680        | 680        | 683        | 680        | 680        | 680        | 683        | 680        | 680        | 680        |
| <b>Therms Per Commercial Customer</b>            | 3,110      | 3,110      | 3,121      | 3,109      | 3,109      | 3,121      | 3,109      | 3,109      | 3,109      | 3,109      |
| <b>Therms Per Industrial Customer</b>            | 13,750     | 13,750     | 13,798     | 13,747     | 13,747     | 13,749     | 13,797     | 13,749     | 13,749     | 13,746     |
| <b>Residential Customers</b>                     | 5,051      | 5,076      | 5,102      | 5,128      | 5,154      | 5,180      | 5,206      | 5,232      | 5,258      | 5,283      |
| <b>Commercial Customers</b>                      | 729        | 740        | 750        | 761        | 771        | 782        | 793        | 803        | 814        | 824        |
| <b>Industrial Customers</b>                      | 49         | 50         | 52         | 54         | 55         | 57         | 59         | 60         | 62         | 64         |
| <b>Interruptible Customers</b>                   | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>                      | 5,828      | 5,866      | 5,905      | 5,943      | 5,981      | 6,019      | 6,057      | 6,095      | 6,133      | 6,171      |
| <b>Bremerton (Shelton)</b>                       | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>                  | 0.93%      | 0.93%      | 1.28%      | 0.54%      | 0.90%      | 0.90%      | 1.25%      | 0.51%      | 0.87%      | 0.85%      |
| <b>Residential Therms</b>                        | 27,382,712 | 27,787,249 | 28,297,618 | 28,594,376 | 28,998,862 | 29,405,358 | 29,921,821 | 30,214,443 | 30,618,964 | 31,023,395 |
| <b>Commercial Therms</b>                         | 22,605,882 | 22,691,778 | 22,856,306 | 22,861,978 | 22,947,853 | 23,035,325 | 23,201,117 | 23,207,121 | 23,293,015 | 23,377,281 |
| <b>Industrial Therms</b>                         | 444,677    | 444,677    | 446,366    | 444,647    | 444,647    | 444,677    | 446,366    | 444,677    | 444,677    | 444,647    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 2,557,739  | 2,557,740  | 2,565,714  | 2,557,551  | 2,557,551  | 2,557,739  | 2,565,714  | 2,557,740  | 2,557,740  | 2,557,551  |
| <b>Total Core Therms</b>                         | 52,991,011 | 53,481,444 | 54,166,004 | 54,458,553 | 54,948,912 | 55,443,099 | 56,135,018 | 56,423,980 | 56,914,414 | 57,400,074 |
| <b>Daily BaseLoad Therms</b>                     | 55,642     | 55,945     | 56,460     | 56,760     | 57,179     | 57,937     | 56,782     | 56,882     | 55,198     | 55,081     |
| <b>Peak Day Therms</b>                           | 442,852    | 447,329    | 455,533    | 460,044    | 464,555    | 469,066    | 469,716    | 478,087    | 482,598    | 487,109    |
| <b>Therms Per Residential Customer</b>           | 692        | 692        | 694        | 692        | 692        | 692        | 694        | 692        | 692        | 692        |
| <b>Therms Per Commercial Customer</b>            | 6,760      | 6,738      | 6,739      | 6,693      | 6,671      | 6,650      | 6,652      | 6,608      | 6,588      | 6,567      |
| <b>Therms Per Industrial Customer</b>            | 29,645     | 29,645     | 29,758     | 29,643     | 29,643     | 29,645     | 29,758     | 29,645     | 29,645     | 29,643     |
| <b>Residential Customers</b>                     | 39,581     | 40,166     | 40,751     | 41,336     | 41,921     | 42,506     | 43,091     | 43,676     | 44,261     | 44,846     |
| <b>Commercial Customers</b>                      | 3,344      | 3,368      | 3,392      | 3,416      | 3,440      | 3,464      | 3,488      | 3,512      | 3,536      | 3,560      |
| <b>Industrial Customers</b>                      | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         |
| <b>Interruptible Customers</b>                   | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| <b>Total Core Customers</b>                      | 42,942     | 43,551     | 44,160     | 44,769     | 45,378     | 45,987     | 46,596     | 47,205     | 47,814     | 48,423     |





**Appendix B  
Demand Forecast  
Expected Forecast**

|                                       | 2030      | 2031      | 2032      | 2033      | 2034      | 2035      | 2036      | 2037      | 2038      | 2039      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Patterson</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.00%     | 0.00%     | 0.23%     | -0.25%    | 0.00%     | 0.01%     | 0.23%     | -0.23%    | 0.00%     | -0.01%    |
| Residential Therms                    | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Commercial Therms                     | 261,886   | 261,886   | 262,500   | 261,851   | 261,851   | 261,886   | 262,500   | 261,886   | 261,886   | 261,851   |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 261,886   | 261,886   | 262,500   | 261,851   | 261,851   | 261,886   | 262,500   | 261,886   | 261,886   | 261,851   |
| Daily BaseLoad Therms                 | 227       | 227       | 200       | 193       | 227       | 227       | 227       | 227       | 200       | 193       |
| Peak Day Therms                       | 1,244     | 1,244     | 1,278     | 1,278     | 1,278     | 1,278     | 1,244     | 1,278     | 1,278     | 1,278     |
| Therms Per Residential Customer       | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Therms Per Commercial Customer        | 52,377    | 52,377    | 52,500    | 52,370    | 52,370    | 52,377    | 52,500    | 52,377    | 52,377    | 52,370    |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Commercial Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| <b>Prosser</b>                        |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.00%     | 0.00%     | 0.41%     | -0.45%    | 0.00%     | 0.05%     | 0.41%     | -0.40%    | 0.00%     | -0.05%    |
| Residential Therms                    | 264,619   | 264,615   | 265,803   | 264,514   | 264,511   | 264,616   | 265,802   | 264,623   | 264,620   | 264,507   |
| Commercial Therms                     | 501,533   | 501,533   | 503,538   | 501,297   | 501,297   | 501,534   | 503,538   | 501,533   | 501,533   | 501,297   |
| Industrial Therms                     | 234,160   | 234,160   | 235,024   | 234,035   | 234,035   | 234,160   | 235,024   | 234,160   | 234,160   | 234,035   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 1,000,312 | 1,000,308 | 1,004,365 | 999,847   | 999,843   | 1,000,309 | 1,004,364 | 1,000,316 | 1,000,313 | 999,839   |
| Daily BaseLoad Therms                 | 1,014     | 1,018     | 1,033     | 1,019     | 1,030     | 1,030     | 1,018     | 1,033     | 1,033     | 756       |
| Peak Day Therms                       | 8,916     | 8,916     | 9,385     | 9,385     | 9,385     | 9,385     | 8,916     | 9,385     | 9,385     | 9,385     |
| Therms Per Residential Customer       | 596       | 596       | 599       | 596       | 596       | 596       | 596       | 596       | 596       | 596       |
| Therms Per Commercial Customer        | 3,699     | 3,699     | 3,714     | 3,697     | 3,697     | 3,699     | 3,714     | 3,699     | 3,699     | 3,697     |
| Therms Per Industrial Customer        | 46,832    | 46,832    | 47,005    | 46,807    | 46,807    | 46,832    | 47,005    | 46,832    | 46,832    | 46,807    |
| Residential Customers                 | 444       | 444       | 444       | 444       | 444       | 444       | 444       | 444       | 444       | 444       |
| Commercial Customers                  | 136       | 136       | 136       | 136       | 136       | 136       | 136       | 136       | 136       | 136       |
| Industrial Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 584       | 584       | 584       | 584       | 584       | 584       | 584       | 584       | 584       | 584       |
| <b>Quincy</b>                         |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.00%     | 0.00%     | 0.33%     | -0.34%    | 0.00%     | 0.01%     | 0.33%     | -0.33%    | 0.00%     | -0.01%    |
| Residential Therms                    | 26,403    | 26,403    | 26,501    | 26,400    | 26,400    | 26,403    | 26,501    | 26,403    | 26,403    | 26,400    |
| Commercial Therms                     | 690,321   | 690,321   | 692,620   | 690,252   | 690,252   | 690,321   | 692,620   | 690,321   | 690,321   | 690,252   |
| Industrial Therms                     | 109,169   | 109,169   | 109,889   | 109,158   | 109,158   | 109,169   | 109,889   | 109,169   | 109,169   | 109,158   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 825,893   | 825,893   | 828,611   | 825,811   | 825,811   | 825,893   | 828,611   | 825,893   | 825,893   | 825,811   |
| Daily BaseLoad Therms                 | 1,380     | 1,381     | 1,384     | 1,381     | 1,381     | 1,383     | 1,381     | 1,381     | 1,384     | 1,381     |
| Peak Day Therms                       | 5,940     | 5,940     | 6,022     | 6,022     | 6,022     | 6,022     | 5,940     | 6,022     | 6,022     | 6,022     |
| Therms Per Residential Customer       | 433       | 433       | 434       | 433       | 433       | 433       | 434       | 433       | 433       | 433       |
| Therms Per Commercial Customer        | 9,329     | 9,329     | 9,360     | 9,328     | 9,328     | 9,329     | 9,360     | 9,329     | 9,329     | 9,328     |
| Therms Per Industrial Customer        | 27,292    | 27,292    | 27,372    | 27,290    | 27,290    | 27,292    | 27,372    | 27,292    | 27,292    | 27,290    |
| Residential Customers                 | 61        | 61        | 61        | 61        | 61        | 61        | 61        | 61        | 61        | 61        |
| Commercial Customers                  | 74        | 74        | 74        | 74        | 74        | 74        | 74        | 74        | 74        | 74        |
| Industrial Customers                  | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 139       | 139       | 139       | 139       | 139       | 139       | 139       | 139       | 139       | 139       |
| <b>Sunnyside</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.19%     | 0.19%     | 0.56%     | -0.19%    | 0.19%     | 0.21%     | 0.56%     | -0.17%    | 0.19%     | 0.17%     |
| Residential Therms                    | 1,063,693 | 1,061,425 | 1,063,293 | 1,056,708 | 1,054,441 | 1,052,356 | 1,054,184 | 1,047,820 | 1,045,555 | 1,043,105 |
| Commercial Therms                     | 1,833,887 | 1,842,928 | 1,858,819 | 1,860,674 | 1,869,707 | 1,879,088 | 1,895,113 | 1,897,177 | 1,906,224 | 1,914,913 |
| Industrial Therms                     | 615,422   | 615,422   | 617,296   | 615,285   | 615,285   | 615,422   | 617,296   | 615,422   | 615,422   | 615,285   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 3,513,003 | 3,519,775 | 3,539,409 | 3,532,667 | 3,539,433 | 3,546,866 | 3,566,593 | 3,560,419 | 3,567,201 | 3,573,303 |
| Daily BaseLoad Therms                 | 2,476     | 2,490     | 2,189     | 2,147     | 2,518     | 2,537     | 2,535     | 2,508     | 2,070     | 2,193     |
| Peak Day Therms                       | 33,419    | 33,484    | 34,204    | 34,270    | 34,335    | 34,401    | 33,805    | 34,531    | 34,597    | 34,462    |
| Therms Per Residential Customer       | 570       | 570       | 572       | 570       | 570       | 570       | 572       | 570       | 570       | 570       |
| Therms Per Commercial Customer        | 3,291     | 3,289     | 3,300     | 3,286     | 3,285     | 3,294     | 3,294     | 3,281     | 3,280     | 3,278     |
| Therms Per Industrial Customer        | 36,201    | 36,201    | 36,312    | 36,193    | 36,193    | 36,201    | 36,312    | 36,201    | 36,201    | 36,193    |
| Residential Customers                 | 1,866     | 1,862     | 1,858     | 1,854     | 1,850     | 1,846     | 1,842     | 1,838     | 1,834     | 1,830     |
| Commercial Customers                  | 557       | 560       | 563       | 566       | 569       | 572       | 575       | 578       | 581       | 584       |
| Industrial Customers                  | 17        | 17        | 17        | 17        | 17        | 17        | 17        | 17        | 17        | 17        |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 2,440     | 2,439     | 2,438     | 2,437     | 2,436     | 2,435     | 2,434     | 2,433     | 2,432     | 2,431     |
| <b>Moses Lake</b>                     |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.69%     | 0.69%     | 1.07%     | 0.28%     | 0.67%     | 0.69%     | 1.05%     | 0.28%     | 0.66%     | 0.63%     |
| Residential Therms                    | 301,354   | 300,926   | 301,688   | 300,021   | 299,594   | 299,970   | 299,216   | 298,360   | 297,933   | 297,456   |
| Commercial Therms                     | 2,835,300 | 2,858,211 | 2,892,193 | 2,903,546 | 2,926,450 | 2,949,869 | 2,964,166 | 2,995,697 | 3,018,619 | 3,041,002 |
| Industrial Therms                     | 133,730   | 133,730   | 134,074   | 133,712   | 133,712   | 133,730   | 134,074   | 133,730   | 133,730   | 133,712   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 3,270,384 | 3,292,866 | 3,327,955 | 3,337,279 | 3,359,756 | 3,382,814 | 3,418,210 | 3,427,787 | 3,450,282 | 3,472,170 |
| Daily BaseLoad Therms                 | 4,048     | 4,085     | 4,130     | 4,145     | 4,177     | 4,225     | 4,246     | 4,278     | 4,324     | 2,917     |
| Peak Day Therms                       | 30,835    | 31,044    | 31,825    | 32,038    | 32,252    | 32,466    | 32,093    | 32,893    | 33,106    | 33,320    |
| Therms Per Residential Customer       | 429       | 429       | 431       | 429       | 429       | 429       | 431       | 429       | 429       | 429       |
| Therms Per Commercial Customer        | 6,411     | 6,376     | 6,367     | 6,309     | 6,277     | 6,246     | 6,240     | 6,186     | 6,157     | 6,128     |
| Therms Per Industrial Customer        | 19,104    | 19,104    | 19,153    | 19,102    | 19,102    | 19,104    | 19,153    | 19,104    | 19,104    | 19,102    |
| Residential Customers                 | 702       | 701       | 700       | 699       | 698       | 697       | 696       | 695       | 694       | 693       |
| Commercial Customers                  | 442       | 448       | 454       | 460       | 466       | 472       | 478       | 484       | 490       | 496       |
| Industrial Customers                  | 7         | 7         | 7         | 7         | 7         | 7         | 7         | 7         | 7         | 7         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 1,151     | 1,156     | 1,161     | 1,166     | 1,171     | 1,176     | 1,181     | 1,186     | 1,191     | 1,196     |





Appendix B  
Demand Forecast  
Expected Forecast

| 7th Day School                        | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
|---------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Total Therms Pct. Growth              | 0.00%       | 0.00%       | 0.26%       | -0.26%      | 0.00%       | 0.00%       | 0.26%       | -0.26%      | 0.00%       | 0.00%       |
| Residential Therms                    | 8,793       | 8,793       | 8,817       | 8,793       | 8,793       | 8,793       | 8,817       | 8,793       | 8,793       | 8,793       |
| Commercial Therms                     | 11,581      | 11,580      | 11,616      | 11,581      | 11,581      | 11,580      | 11,616      | 11,581      | 11,581      | 11,580      |
| Industrial Therms                     | 9,613       | 9,613       | 9,632       | 9,613       | 9,613       | 9,613       | 9,632       | 9,613       | 9,613       | 9,613       |
| Ind., Inst., & Cmcl. Interrup. Therms | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Total Core Therms                     | 29,987      | 29,986      | 30,065      | 29,987      | 29,987      | 29,986      | 30,065      | 29,987      | 29,987      | 29,987      |
| Daily Baseload Therms                 | 28          | 28          | 28          | 28          | 28          | 28          | 28          | 26          | 28          | 28          |
| Peak Day Therms                       | 129         | 129         | 128         | 128         | 128         | 128         | 128         | 128         | 128         | 128         |
| Therms Per Residential Customer       | 1,099       | 1,099       | 1,102       | 1,099       | 1,099       | 1,099       | 1,102       | 1,099       | 1,099       | 1,099       |
| Therms Per Commercial Customer        | 2,238       | 2,238       | 2,245       | 2,238       | 2,238       | 2,238       | 2,245       | 2,238       | 2,238       | 2,238       |
| Therms Per Industrial Customer        | 9,613       | 9,613       | 9,632       | 9,613       | 9,613       | 9,613       | 9,632       | 9,613       | 9,613       | 9,613       |
| Residential Customers                 | 8           | 8           | 8           | 8           | 8           | 8           | 8           | 8           | 8           | 8           |
| Commercial Customers                  | 5           | 5           | 5           | 5           | 5           | 5           | 5           | 5           | 5           | 5           |
| Industrial Customers                  | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| Interruptible Customers               | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Total Core Customers                  | 14          | 14          | 14          | 14          | 14          | 14          | 14          | 14          | 14          | 14          |
| <b>Yakima Training Center</b>         | <b>2030</b> | <b>2031</b> | <b>2032</b> | <b>2033</b> | <b>2034</b> | <b>2035</b> | <b>2036</b> | <b>2037</b> | <b>2038</b> | <b>2039</b> |
| Total Therms Pct. Growth              | 0.90%       | 0.89%       | 1.24%       | 0.52%       | 0.86%       | 0.85%       | 1.21%       | 0.49%       | 0.84%       | 0.82%       |
| Residential Therms                    | 26,537      | 27,252      | 28,042      | 28,685      | 29,399      | 30,113      | 30,934      | 31,546      | 32,261      | 32,976      |
| Commercial Therms                     | 400,784     | 403,861     | 408,388     | 410,037     | 413,114     | 416,178     | 420,749     | 422,340     | 425,417     | 428,508     |
| Industrial Therms                     | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Ind., Inst., & Cmcl. Interrup. Therms | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Total Core Therms                     | 427,321     | 431,112     | 436,430     | 438,721     | 442,514     | 446,291     | 451,682     | 453,886     | 457,678     | 461,485     |
| Daily Baseload Therms                 | 253         | 255         | 258         | 260         | 262         | 265         | 267         | 269         | 271         | 274         |
| Peak Day Therms                       | 4,715       | 4,757       | 4,784       | 4,825       | 4,866       | 4,907       | 4,962       | 4,989       | 5,030       | 5,071       |
| Therms Per Residential Customer       | 815         | 815         | 817         | 815         | 815         | 814         | 817         | 814         | 814         | 814         |
| Therms Per Commercial Customer        | 3,396       | 3,396       | 3,408       | 3,396       | 3,396       | 3,396       | 3,408       | 3,396       | 3,396       | 3,396       |
| Therms Per Industrial Customer        | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Residential Customers                 | 33          | 33          | 34          | 35          | 36          | 37          | 38          | 39          | 40          | 40          |
| Commercial Customers                  | 118         | 119         | 120         | 121         | 122         | 123         | 123         | 124         | 125         | 126         |
| Industrial Customers                  | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Interruptible Customers               | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Total Core Customers                  | 151         | 152         | 154         | 156         | 158         | 160         | 161         | 163         | 165         | 167         |
| <b>Burbank Heights Loop</b>           | <b>2030</b> | <b>2031</b> | <b>2032</b> | <b>2033</b> | <b>2034</b> | <b>2035</b> | <b>2036</b> | <b>2037</b> | <b>2038</b> | <b>2039</b> |
| Total Therms Pct. Growth              | 2.58%       | 2.52%       | 2.88%       | 1.95%       | 2.34%       | 2.31%       | 2.66%       | 1.77%       | 2.14%       | 2.07%       |
| Residential Therms                    | 8,984,040   | 9,242,515   | 9,540,663   | 9,757,396   | 10,015,776  | 10,276,359  | 10,578,846  | 10,793,324  | 11,051,808  | 11,307,859  |
| Commercial Therms                     | 5,965,713   | 6,090,715   | 6,241,459   | 6,339,332   | 6,464,273   | 6,590,655   | 6,743,472   | 6,840,670   | 6,965,674   | 7,089,116   |
| Industrial Therms                     | 272,169     | 272,169     | 272,940     | 272,105     | 272,106     | 272,169     | 272,940     | 272,168     | 272,169     | 272,106     |
| Ind., Inst., & Cmcl. Interrup. Therms | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Total Core Therms                     | 15,221,921  | 15,605,400  | 16,055,061  | 16,368,833  | 16,752,155  | 17,139,183  | 17,595,258  | 17,906,163  | 18,289,651  | 18,669,081  |
| Daily Baseload Therms                 | 13,813      | 14,246      | 14,662      | 14,902      | 15,112      | 15,200      | 15,979      | 16,326      | 16,756      | 16,433      |
| Peak Day Therms                       | 214,530     | 219,894     | 228,722     | 234,167     | 239,613     | 245,058     | 246,711     | 255,949     | 261,394     | 266,839     |
| Therms Per Residential Customer       | 552         | 552         | 554         | 551         | 551         | 551         | 554         | 551         | 551         | 551         |
| Therms Per Commercial Customer        | 3,986       | 3,982       | 3,995       | 3,973       | 3,969       | 3,967       | 3,967       | 3,960       | 3,957       | 3,953       |
| Therms Per Industrial Customer        | 22,620      | 22,620      | 22,684      | 22,615      | 22,615      | 22,620      | 22,684      | 22,620      | 22,620      | 22,615      |
| Residential Customers                 | 16,290      | 16,759      | 17,227      | 17,696      | 18,165      | 18,634      | 19,103      | 19,572      | 20,040      | 20,509      |
| Commercial Customers                  | 1,497       | 1,530       | 1,563       | 1,596       | 1,629       | 1,662       | 1,695       | 1,728       | 1,761       | 1,794       |
| Industrial Customers                  | 12          | 12          | 12          | 12          | 12          | 12          | 12          | 12          | 12          | 12          |
| Interruptible Customers               | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| Total Core Customers                  | 17,798      | 18,300      | 18,802      | 19,304      | 19,806      | 20,307      | 20,809      | 21,311      | 21,813      | 22,315      |
| <b>East Stanwood Loop</b>             | <b>2030</b> | <b>2031</b> | <b>2032</b> | <b>2033</b> | <b>2034</b> | <b>2035</b> | <b>2036</b> | <b>2037</b> | <b>2038</b> | <b>2039</b> |
| Total Therms Pct. Growth              | 0.79%       | 0.79%       | 1.15%       | 0.40%       | 0.77%       | 0.77%       | 1.12%       | 0.39%       | 0.75%       | 0.73%       |
| Residential Therms                    | 6,033,482   | 6,092,028   | 6,173,743   | 6,208,861   | 6,267,398   | 6,326,412   | 6,409,006   | 6,443,716   | 6,502,262   | 6,560,311   |
| Commercial Therms                     | 5,096,899   | 5,130,088   | 5,181,650   | 5,196,141   | 5,229,325   | 5,262,928   | 5,314,979   | 5,329,397   | 5,362,586   | 5,395,344   |
| Industrial Therms                     | 440,201     | 440,190     | 441,504     | 440,185     | 440,174     | 440,189     | 441,506     | 440,212     | 440,200     | 440,162     |
| Ind., Inst., & Cmcl. Interrup. Therms | 93,961      | 93,961      | 94,193      | 93,951      | 93,951      | 93,961      | 94,193      | 93,961      | 93,961      | 93,951      |
| Total Core Therms                     | 11,664,543  | 11,756,266  | 11,891,900  | 11,939,139  | 12,030,847  | 12,123,490  | 12,259,684  | 12,307,286  | 12,399,008  | 12,489,768  |
| Daily Baseload Therms                 | 12,254      | 12,351      | 12,462      | 12,521      | 12,608      | 12,726      | 12,786      | 12,742      | 12,854      | 12,851      |
| Peak Day Therms                       | 102,290     | 103,143     | 104,918     | 105,778     | 106,637     | 107,497     | 107,425     | 109,204     | 110,085     | 110,945     |
| Therms Per Residential Customer       | 646         | 646         | 648         | 646         | 646         | 646         | 646         | 646         | 646         | 646         |
| Therms Per Commercial Customer        | 4,721       | 4,707       | 4,710       | 4,687       | 4,667       | 4,655       | 4,659       | 4,630       | 4,618       | 4,605       |
| Therms Per Industrial Customer        | 149,422     | 149,418     | 149,873     | 149,417     | 149,413     | 149,418     | 149,874     | 149,426     | 149,422     | 149,409     |
| Residential Customers                 | 9,339       | 9,430       | 9,520       | 9,611       | 9,702       | 9,792       | 9,883       | 9,974       | 10,064      | 10,155      |
| Commercial Customers                  | 1,080       | 1,090       | 1,100       | 1,110       | 1,121       | 1,131       | 1,141       | 1,151       | 1,161       | 1,172       |
| Industrial Customers                  | 3           | 3           | 3           | 3           | 3           | 3           | 3           | 3           | 3           | 3           |
| Interruptible Customers               | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| Total Core Customers                  | 10,423      | 10,523      | 10,624      | 10,725      | 10,826      | 10,927      | 11,028      | 11,129      | 11,230      | 11,331      |
| <b>Kennewick Loop</b>                 | <b>2030</b> | <b>2031</b> | <b>2032</b> | <b>2033</b> | <b>2034</b> | <b>2035</b> | <b>2036</b> | <b>2037</b> | <b>2038</b> | <b>2039</b> |
| Total Therms Pct. Growth              | 2.22%       | 2.17%       | 2.51%       | 1.67%       | 2.04%       | 2.01%       | 2.35%       | 1.53%       | 1.88%       | 1.83%       |
| Residential Therms                    | 13,929,227  | 14,295,352  | 14,719,842  | 15,025,507  | 15,391,490  | 15,759,586  | 16,189,951  | 16,491,757  | 16,857,836  | 17,221,603  |
| Commercial Therms                     | 13,463,383  | 13,712,751  | 14,013,916  | 14,209,471  | 14,458,768  | 14,710,165  | 15,015,049  | 15,208,916  | 15,458,292  | 15,705,416  |
| Industrial Therms                     | 776,017     | 776,017     | 778,556     | 775,881     | 775,881     | 776,017     | 776,556     | 776,017     | 776,017     | 775,881     |
| Ind., Inst., & Cmcl. Interrup. Therms | 207,687     | 207,687     | 208,383     | 207,652     | 207,652     | 207,687     | 208,383     | 207,687     | 207,687     | 207,652     |
| Total Core Therms                     | 28,376,344  | 28,991,806  | 29,720,698  | 30,218,511  | 30,833,792  | 31,453,454  | 32,191,939  | 32,684,376  | 33,299,831  | 33,910,552  |
| Daily Baseload Therms                 | 30,667      | 30,791      | 31,489      | 31,973      | 32,431      | 32,738      | 33,855      | 32,412      | 34,845      | 32,322      |
| Peak Day Therms                       | 367,057     | 375,224     | 387,517     | 395,768     | 404,019     | 412,269     | 416,061     | 428,771     | 437,022     | 445,272     |
| Therms Per Residential Customer       | 604         | 604         | 606         | 604         | 604         | 604         | 604         | 604         | 604         | 604         |
| Therms Per Commercial Customer        | 4,186       | 4,180       | 4,190       | 4,169       | 4,164       | 4,160       | 4,170       | 4,151       | 4,146       | 4,141       |
| Therms Per Industrial Customer        | 70,547      | 70,547      | 70,778      | 70,535      | 70,535      | 70,547      | 70,778      | 70,547      | 70,547      | 70,535      |
| Residential Customers                 | 23,066      | 23,672      | 24,279      | 24,885      | 25,492      | 26,098      | 26,705      | 27,311      | 27,917      | 28,524      |
| Commercial Customers                  | 3,216       | 3,280       | 3,344       | 3,408       | 3,472       | 3,536       | 3,600       | 3,664       | 3,728       | 3,792       |
| Industrial Customers                  | 11          | 11          | 11          | 11          | 11          | 11          | 11          | 11          | 11          | 11          |
| Interruptible Customers               | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| Total Core Customers                  | 26,294      | 26,964      | 27,635      | 28,305      | 28,976      | 29,646      | 30,317      | 30,987      | 31,658      | 32,328      |

Appendix B  
Demand Forecast  
Expected Forecast

|                                       | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Longview South Loop</b>            |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.53%      | 0.52%      | 0.93%      | 0.07%      | 0.51%      | 0.55%      | 0.92%      | 0.10%      | 0.50%      | 0.47%      |
| Residential Therms                    | 1,391,501  | 1,422,009  | 1,458,474  | 1,482,526  | 1,513,017  | 1,544,035  | 1,581,002  | 1,605,055  | 1,635,566  | 1,665,509  |
| Commercial Therms                     | 4,155,484  | 4,155,451  | 4,172,620  | 4,154,131  | 4,154,103  | 4,172,615  | 4,172,615  | 4,155,520  | 4,155,490  | 4,154,065  |
| Industrial Therms                     | 192,296    | 192,296    | 193,058    | 192,237    | 192,237    | 192,296    | 192,296    | 192,296    | 192,296    | 192,237    |
| Ind., Inst., & Cmcl. Interrup. Therms | 95,569     | 95,569     | 95,919     | 95,539     | 95,539     | 95,569     | 95,919     | 95,569     | 95,569     | 95,539     |
| Total Core Therms                     | 5,834,850  | 5,865,326  | 5,920,071  | 5,924,433  | 5,954,896  | 5,987,355  | 6,042,594  | 6,048,411  | 6,078,921  | 6,107,350  |
| Daily BaseLoad Therms                 | 6,787      | 6,794      | 6,887      | 6,865      | 6,896      | 6,991      | 6,948      | 6,945      | 7,038      | 7,016      |
| Peak Day Therms                       | 50,558     | 50,846     | 53,113     | 53,411     | 53,709     | 54,008     | 52,303     | 54,613     | 54,911     | 55,209     |
| Therms Per Residential Customer       | 526        | 526        | 529        | 526        | 526        | 526        | 529        | 526        | 526        | 526        |
| Therms Per Commercial Customer        | 4,591      | 4,591      | 4,610      | 4,589      | 4,589      | 4,591      | 4,610      | 4,591      | 4,591      | 4,589      |
| Therms Per Industrial Customer        | 14,792     | 14,792     | 14,851     | 14,787     | 14,787     | 14,792     | 14,851     | 14,792     | 14,792     | 14,787     |
| Residential Customers                 | 2,643      | 2,701      | 2,759      | 2,817      | 2,875      | 2,933      | 2,991      | 3,049      | 3,107      | 3,165      |
| Commercial Customers                  | 905        | 905        | 905        | 905        | 905        | 905        | 905        | 905        | 905        | 905        |
| Industrial Customers                  | 13         | 13         | 13         | 13         | 13         | 13         | 13         | 13         | 13         | 13         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 3,562      | 3,620      | 3,678      | 3,736      | 3,794      | 3,852      | 3,910      | 3,968      | 4,026      | 4,084      |
| <b>Sedro-Woolley Loop</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 1.08%      | 1.07%      | 1.45%      | 0.64%      | 1.03%      | 1.03%      | 1.41%      | 0.61%      | 0.99%      | 0.97%      |
| Residential Therms                    | 19,991,819 | 20,216,271 | 20,521,159 | 20,663,187 | 20,887,601 | 21,114,061 | 21,422,481 | 21,562,977 | 21,787,436 | 22,009,753 |
| Commercial Therms                     | 11,140,249 | 11,260,461 | 11,425,294 | 11,499,768 | 11,619,979 | 11,741,360 | 11,908,054 | 11,981,792 | 12,102,021 | 12,221,019 |
| Industrial Therms                     | 1,175,584  | 1,175,584  | 1,179,764  | 1,175,451  | 1,175,451  | 1,175,585  | 1,179,764  | 1,175,584  | 1,175,584  | 1,175,451  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 32,307,652 | 32,652,317 | 33,126,218 | 33,338,405 | 33,683,031 | 34,031,007 | 34,510,299 | 34,720,353 | 35,065,042 | 35,406,223 |
| Daily BaseLoad Therms                 | 32,661     | 32,910     | 33,345     | 33,345     | 33,941     | 34,383     | 34,623     | 33,813     | 33,452     | 33,700     |
| Peak Day Therms                       | 314,048    | 317,434    | 324,076    | 327,496    | 330,916    | 334,336    | 334,365    | 341,175    | 344,595    | 348,015    |
| Therms Per Residential Customer       | 672        | 672        | 672        | 672        | 672        | 672        | 672        | 672        | 672        | 672        |
| Therms Per Commercial Customer        | 2,891      | 2,887      | 2,894      | 2,879      | 2,875      | 2,872      | 2,879      | 2,865      | 2,861      | 2,858      |
| Therms Per Industrial Customer        | 13,415     | 13,415     | 13,463     | 13,413     | 13,413     | 13,415     | 13,463     | 13,415     | 13,415     | 13,413     |
| Residential Customers                 | 29,739     | 30,074     | 30,408     | 30,743     | 31,078     | 31,412     | 31,747     | 32,081     | 32,416     | 32,751     |
| Commercial Customers                  | 3,854      | 3,901      | 3,948      | 3,995      | 4,042      | 4,089      | 4,136      | 4,183      | 4,230      | 4,277      |
| Industrial Customers                  | 88         | 88         | 88         | 88         | 88         | 88         | 88         | 88         | 88         | 88         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 33,680     | 34,062     | 34,444     | 34,825     | 35,207     | 35,588     | 35,970     | 36,352     | 36,733     | 37,115     |
| <b>Sumas SPE Loop</b>                 |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 1.25%      | 1.24%      | 1.61%      | 0.80%      | 1.19%      | 1.19%      | 1.56%      | 0.76%      | 1.14%      | 1.11%      |
| Residential Therms                    | 37,321,324 | 37,794,514 | 38,416,965 | 38,736,470 | 39,209,567 | 39,682,217 | 40,317,057 | 40,633,619 | 41,106,818 | 41,575,227 |
| Commercial Therms                     | 18,627,076 | 18,806,785 | 19,059,769 | 19,163,878 | 19,343,563 | 19,525,627 | 19,781,417 | 19,885,048 | 20,064,768 | 20,242,005 |
| Industrial Therms                     | 2,559,891  | 2,630,362  | 2,710,312  | 2,771,153  | 2,841,605  | 2,912,438  | 2,993,367  | 3,053,592  | 3,124,064  | 3,194,116  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 58,508,291 | 59,231,661 | 60,187,046 | 60,671,500 | 61,394,734 | 62,125,282 | 63,091,841 | 63,572,259 | 64,295,650 | 65,011,349 |
| Daily BaseLoad Therms                 | 69,629     | 70,312     | 71,172     | 71,839     | 72,702     | 73,761     | 74,677     | 75,563     | 76,427     | 77,823     |
| Peak Day Therms                       | 514,890    | 521,215    | 534,605    | 541,015    | 547,424    | 553,834    | 562,444    | 566,654    | 579,473    | 587,823    |
| Therms Per Residential Customer       | 717        | 717        | 720        | 717        | 717        | 717        | 720        | 717        | 717        | 717        |
| Therms Per Commercial Customer        | 3,145      | 3,142      | 3,151      | 3,135      | 3,133      | 3,130      | 3,139      | 3,125      | 3,122      | 3,119      |
| Therms Per Industrial Customer        | 24,646     | 24,646     | 24,731     | 24,642     | 24,642     | 24,645     | 24,730     | 24,645     | 24,645     | 24,641     |
| Residential Customers                 | 52,049     | 52,710     | 53,371     | 54,031     | 54,692     | 55,353     | 56,013     | 56,674     | 57,335     | 57,996     |
| Commercial Customers                  | 5,923      | 5,986      | 6,049      | 6,112      | 6,175      | 6,238      | 6,301      | 6,364      | 6,427      | 6,490      |
| Industrial Customers                  | 104        | 107        | 110        | 112        | 115        | 118        | 121        | 124        | 127        | 130        |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 58,076     | 58,803     | 59,529     | 60,256     | 60,982     | 61,709     | 62,436     | 63,162     | 63,889     | 64,615     |
| <b>Yakima Loop</b>                    |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 1.28%      | 1.27%      | 1.66%      | 0.79%      | 1.22%      | 1.24%      | 1.60%      | 0.77%      | 1.16%      | 1.11%      |
| Residential Therms                    | 14,666,742 | 14,850,431 | 15,095,229 | 15,212,901 | 15,396,514 | 15,585,211 | 15,832,923 | 15,952,627 | 16,136,363 | 16,314,709 |
| Commercial Therms                     | 14,328,566 | 14,477,574 | 14,686,522 | 14,770,050 | 14,918,925 | 15,073,464 | 15,284,817 | 15,371,523 | 15,520,553 | 15,663,619 |
| Industrial Therms                     | 4,050,140  | 4,135,913  | 4,238,136  | 4,305,749  | 4,391,445  | 4,479,182  | 4,582,737  | 4,650,980  | 4,736,757  | 4,820,336  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 33,045,447 | 33,463,918 | 34,019,887 | 34,288,699 | 34,706,884 | 35,137,857 | 35,700,477 | 35,975,130 | 36,393,673 | 36,798,664 |
| Daily BaseLoad Therms                 | 27,948     | 28,359     | 29,111     | 29,150     | 29,523     | 30,220     | 30,220     | 30,592     | 31,372     | 31,382     |
| Peak Day Therms                       | 339,033    | 343,201    | 359,496    | 364,018    | 368,341    | 372,663    | 364,048    | 381,309    | 385,631    | 389,953    |
| Therms Per Residential Customer       | 657        | 657        | 659        | 656        | 656        | 657        | 659        | 657        | 657        | 656        |
| Therms Per Commercial Customer        | 3,597      | 3,594      | 3,607      | 3,589      | 3,586      | 3,586      | 3,598      | 3,582      | 3,580      | 3,576      |
| Therms Per Industrial Customer        | 37,836     | 37,837     | 37,983     | 37,821     | 37,821     | 37,838     | 37,984     | 37,839     | 37,839     | 37,822     |
| Residential Customers                 | 22,330     | 22,611     | 22,892     | 23,173     | 23,454     | 23,736     | 24,017     | 24,298     | 24,579     | 24,860     |
| Commercial Customers                  | 3,984      | 4,028      | 4,072      | 4,116      | 4,160      | 4,204      | 4,248      | 4,292      | 4,336      | 4,380      |
| Industrial Customers                  | 107        | 109        | 112        | 114        | 116        | 118        | 121        | 123        | 125        | 127        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 26,422     | 26,749     | 27,077     | 27,404     | 27,731     | 28,059     | 28,386     | 28,714     | 29,041     | 29,369     |
| <b>Zone 10</b>                        |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | -0.05%     | -0.04%     | 0.42%      | -0.55%     | -0.05%     | 0.03%      | 0.42%      | -0.49%     | -0.05%     | -0.10%     |
| Residential Therms                    | 3,099,190  | 3,092,636  | 3,101,485  | 3,077,974  | 3,071,429  | 3,066,453  | 3,075,166  | 3,083,363  | 3,046,819  | 3,038,667  |
| Commercial Therms                     | 5,770,205  | 5,774,993  | 5,806,264  | 5,780,908  | 5,784,617  | 5,793,193  | 5,824,580  | 5,803,103  | 5,806,822  | 5,807,564  |
| Industrial Therms                     | 1,612,849  | 1,611,013  | 1,615,644  | 1,606,370  | 1,604,486  | 1,603,775  | 1,608,137  | 1,600,077  | 1,598,266  | 1,595,407  |
| Ind., Inst., & Cmcl. Interrup. Therms | 58,129     | 58,128     | 58,105     | 58,079     | 57,481     | 57,529     | 57,506     | 57,529     | 56,929     | 56,882     |
| Total Core Therms                     | 10,540,374 | 10,536,770 | 10,581,317 | 10,523,331 | 10,518,014 | 10,520,949 | 10,565,389 | 10,514,071 | 10,508,835 | 10,498,520 |
| Daily BaseLoad Therms                 | 8,918      | 8,865      | 7,539      | 7,356      | 8,503      | 8,691      | 8,779      | 6,749      | 5,554      | 6,562      |
| Peak Day Therms                       | 87,581     | 87,331     | 93,314     | 93,032     | 92,750     | 92,468     | 86,074     | 91,904     | 91,621     | 91,339     |
| Therms Per Residential Customer       | 113,221    | 113,224    | 114,129    | 113,230    | 113,233    | 113,238    | 114,142    | 113,245    | 113,248    | 113,250    |
| Therms Per Commercial Customer        | 22,219     | 22,275     | 22,431     | 22,380     | 22,440     | 22,519     | 22,686     | 22,657     | 22,727     | 22,787     |
| Therms Per Industrial Customer        | 128,935    | 128,856    | 129,246    | 128,630    | 128,548    | 128,542    | 128,928    | 128,381    | 128,302    | 128,155    |
| Residential Customers                 | 5,010      | 4,989      | 4,968      | 4,947      | 4,926      | 4,905      | 4,884      | 4,863      | 4,842      | 4,821      |
| Commercial Customers                  | 1,314      | 1,310      | 1,306      | 1,302      | 1,298      | 1,294      | 1,290      | 1,286      | 1,282      | 1,278      |
| Industrial Customers                  | 54         | 54         | 54         | 54         | 54         | 54         | 54         | 54         | 54         | 54         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 6,378      | 6,353      | 6,328      | 6,303      | 6,278      | 6,253      | 6,228      | 6,203      | 6,178      | 6,153      |

**Appendix B  
Demand Forecast  
Expected Forecast**

|                                       | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Zone 11</b>                        |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 1.09%      | 1.08%      | 1.48%      | 0.62%      | 1.05%      | 1.07%      | 1.43%      | 0.61%      | 1.01%      | 0.96%      |
| Residential Therms                    | 16,035,916 | 16,231,609 | 16,494,237 | 16,617,825 | 16,813,439 | 17,014,459 | 17,280,190 | 17,405,938 | 17,601,682 | 17,791,699 |
| Commercial Therms                     | 19,410,896 | 19,562,954 | 19,794,723 | 19,880,473 | 20,012,393 | 20,171,159 | 20,405,370 | 20,415,447 | 20,627,528 | 20,727,528 |
| Industrial Therms                     | 4,585,295  | 4,671,075  | 4,775,031  | 4,840,798  | 4,926,491  | 5,014,333  | 5,119,610  | 5,186,115  | 5,271,900  | 5,355,377  |
| Ind., Inst., & Cmcl. Interrup. Therms |            |            |            |            |            |            |            |            |            |            |
| Total Core Therms                     | 40,032,107 | 40,465,638 | 41,063,991 | 41,319,096 | 41,752,324 | 42,199,951 | 42,805,170 | 43,067,500 | 43,501,109 | 43,919,529 |
| Daily BaseLoad Therms                 | 36,163     | 36,581     | 37,338     | 37,347     | 37,750     | 38,503     | 38,492     | 38,639     | 39,230     | 39,641     |
| Peak Day Therms                       | 397,246    | 401,581    | 419,859    | 424,349    | 428,840    | 433,331    | 423,273    | 442,320    | 446,810    | 451,301    |
| Therms Per Residential Customer       | 2,938      | 2,938      | 2,949      | 2,937      | 2,937      | 2,937      | 2,949      | 2,937      | 2,937      | 2,937      |
| Therms Per Commercial Customer        | 29,190     | 29,187     | 29,291     | 29,178     | 29,176     | 29,179     | 29,282     | 29,175     | 29,173     | 29,166     |
| Therms Per Industrial Customer        | 96,119     | 96,120     | 96,447     | 96,094     | 96,094     | 96,120     | 96,447     | 96,120     | 96,121     | 96,095     |
| Residential Customers                 | 24,983     | 25,283     | 25,584     | 25,884     | 26,185     | 26,485     | 26,785     | 27,086     | 27,386     | 27,686     |
| Commercial Customers                  | 4,920      | 4,965      | 5,010      | 5,055      | 5,100      | 5,145      | 5,190      | 5,234      | 5,279      | 5,324      |
| Industrial Customers                  | 137        | 140        | 142        | 144        | 146        | 149        | 151        | 153        | 155        | 158        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 30,041     | 30,389     | 30,737     | 31,084     | 31,432     | 31,779     | 32,127     | 32,474     | 32,822     | 33,169     |
| <b>Zone 20</b>                        |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 2.12%      | 2.08%      | 2.44%      | 1.58%      | 1.96%      | 1.94%      | 2.28%      | 1.45%      | 1.82%      | 1.77%      |
| Residential Therms                    | 23,860,968 | 24,484,984 | 25,210,997 | 25,729,137 | 26,353,067 | 26,981,352 | 27,717,470 | 28,229,647 | 28,853,775 | 29,473,118 |
| Commercial Therms                     | 23,579,034 | 23,976,297 | 24,466,561 | 24,767,014 | 25,164,139 | 25,565,308 | 26,061,680 | 26,359,937 | 26,757,222 | 27,150,165 |
| Industrial Therms                     | 1,379,733  | 1,379,733  | 1,383,876  | 1,379,522  | 1,379,522  | 1,379,733  | 1,383,876  | 1,379,733  | 1,379,733  | 1,379,522  |
| Ind., Inst., & Cmcl. Interrup. Therms | 301,051    | 301,051    | 302,064    | 301,017    | 301,017    | 301,051    | 302,064    | 301,051    | 301,051    | 301,017    |
| Total Core Therms                     | 49,120,686 | 50,142,065 | 51,363,397 | 52,176,690 | 53,197,745 | 54,227,445 | 55,465,090 | 56,270,367 | 57,291,781 | 58,380,822 |
| Daily BaseLoad Therms                 | 46,943     | 48,138     | 49,685     | 50,055     | 50,737     | 51,180     | 53,096     | 51,866     | 55,161     | 50,470     |
| Peak Day Therms                       | 635,411    | 649,151    | 671,031    | 684,939    | 698,848    | 712,756    | 717,857    | 740,578    | 754,486    | 768,395    |
| Therms Per Residential Customer       | 2,733      | 2,733      | 2,744      | 2,733      | 2,733      | 2,744      | 2,733      | 2,733      | 2,733      | 2,733      |
| Therms Per Commercial Customer        | 23,366     | 23,321     | 23,368     | 23,233     | 23,192     | 23,155     | 23,206     | 23,079     | 23,042     | 23,004     |
| Therms Per Industrial Customer        | 134,251    | 134,251    | 134,650    | 134,232    | 134,232    | 134,251    | 134,251    | 134,251    | 134,251    | 134,232    |
| Residential Customers                 | 41,177     | 42,252     | 43,326     | 44,400     | 45,475     | 46,549     | 47,623     | 48,698     | 49,772     | 50,846     |
| Commercial Customers                  | 5,476      | 5,579      | 5,682      | 5,785      | 5,888      | 5,991      | 6,094      | 6,197      | 6,300      | 6,403      |
| Industrial Customers                  | 39         | 39         | 39         | 39         | 39         | 39         | 39         | 39         | 39         | 39         |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Total Core Customers                  | 46,695     | 47,872     | 49,049     | 50,227     | 51,404     | 52,581     | 53,758     | 54,936     | 56,113     | 57,290     |
| <b>Zone 24</b>                        |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.71%      | 0.71%      | 1.10%      | 0.30%      | 0.69%      | 0.69%      | 1.08%      | 0.28%      | 0.67%      | 0.66%      |
| Residential Therms                    | 4,966,974  | 5,019,116  | 5,092,078  | 5,123,298  | 5,175,441  | 5,227,697  | 5,301,508  | 5,331,989  | 5,384,135  | 5,436,157  |
| Commercial Therms                     | 4,458,741  | 4,482,196  | 4,523,848  | 4,528,894  | 4,552,342  | 4,576,025  | 4,618,072  | 4,622,960  | 4,646,411  | 4,669,618  |
| Industrial Therms                     | 332,203    | 332,189    | 332,796    | 332,206    | 332,192    | 332,189    | 332,796    | 332,218    | 332,203    | 332,177    |
| Ind., Inst., & Cmcl. Interrup. Therms | 943,046    | 943,046    | 946,325    | 942,954    | 942,954    | 943,046    | 946,325    | 943,046    | 943,046    | 942,954    |
| Total Core Therms                     | 10,700,964 | 10,776,547 | 10,895,047 | 10,927,351 | 11,002,928 | 11,078,957 | 11,198,701 | 11,230,213 | 11,305,795 | 11,380,906 |
| Daily BaseLoad Therms                 | 5,712      | 5,733      | 5,859      | 5,827      | 5,886      | 4,986      | 5,938      | 5,042      | 4,861      | 4,830      |
| Peak Day Therms                       | 121,679    | 122,597    | 123,960    | 124,882    | 125,805    | 126,727    | 127,195    | 128,573    | 129,495    | 130,418    |
| Therms Per Residential Customer       | 1,710      | 1,710      | 1,717      | 1,710      | 1,710      | 1,710      | 1,717      | 1,710      | 1,710      | 1,710      |
| Therms Per Commercial Customer        | 7,808      | 7,807      | 7,837      | 7,803      | 7,802      | 7,801      | 7,831      | 7,798      | 7,796      | 7,795      |
| Therms Per Industrial Customer        | 53,034     | 53,033     | 53,154     | 53,036     | 53,036     | 53,033     | 53,154     | 53,035     | 53,034     | 53,035     |
| Residential Customers                 | 8,198      | 8,284      | 8,370      | 8,456      | 8,542      | 8,628      | 8,714      | 8,800      | 8,886      | 8,972      |
| Commercial Customers                  | 1,555      | 1,564      | 1,573      | 1,582      | 1,591      | 1,600      | 1,609      | 1,618      | 1,627      | 1,636      |
| Industrial Customers                  | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 9,776      | 9,871      | 9,966      | 10,061     | 10,156     | 10,251     | 10,346     | 10,441     | 10,536     | 10,631     |
| <b>Zone 26</b>                        |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.51%      | 0.51%      | 0.91%      | 0.07%      | 0.50%      | 0.53%      | 0.90%      | 0.10%      | 0.49%      | 0.46%      |
| Residential Therms                    | 1,599,925  | 1,633,442  | 1,673,808  | 1,699,988  | 1,733,488  | 1,767,513  | 1,808,433  | 1,834,562  | 1,868,028  | 1,901,033  |
| Commercial Therms                     | 4,630,215  | 4,630,181  | 4,648,663  | 4,628,799  | 4,628,770  | 4,630,185  | 4,648,658  | 4,630,252  | 4,630,221  | 4,628,732  |
| Industrial Therms                     | 229,175    | 229,175    | 230,061    | 229,085    | 229,085    | 229,175    | 230,061    | 229,175    | 229,175    | 229,085    |
| Ind., Inst., & Cmcl. Interrup. Therms | 95,569     | 95,569     | 95,919     | 95,539     | 95,539     | 95,569     | 95,919     | 95,569     | 95,569     | 95,539     |
| Total Core Therms                     | 6,554,884  | 6,588,367  | 6,648,451  | 6,653,411  | 6,686,882  | 6,722,442  | 6,783,071  | 6,789,558  | 6,823,047  | 6,854,389  |
| Daily BaseLoad Therms                 | 7,569      | 7,579      | 7,643      | 7,616      | 7,690      | 7,789      | 7,745      | 7,744      | 7,809      | 7,781      |
| Peak Day Therms                       | 55,209     | 55,522     | 57,907     | 58,231     | 58,554     | 58,878     | 57,104     | 59,533     | 59,856     | 60,180     |
| Therms Per Residential Customer       | 1,767      | 1,767      | 1,774      | 1,767      | 1,767      | 1,767      | 1,774      | 1,767      | 1,767      | 1,766      |
| Therms Per Commercial Customer        | 60,144     | 60,139     | 60,287     | 60,123     | 60,119     | 60,124     | 60,272     | 60,116     | 60,113     | 60,113     |
| Therms Per Industrial Customer        | 16,961     | 16,961     | 17,027     | 16,955     | 16,955     | 16,961     | 17,027     | 16,961     | 16,961     | 16,955     |
| Residential Customers                 | 3,984      | 4,074      | 4,164      | 4,254      | 4,344      | 4,434      | 4,524      | 4,614      | 4,704      | 4,794      |
| Commercial Customers                  | 1,259      | 1,263      | 1,267      | 1,271      | 1,274      | 1,278      | 1,282      | 1,286      | 1,290      | 1,294      |
| Industrial Customers                  | 32         | 32         | 32         | 32         | 32         | 32         | 32         | 32         | 32         | 32         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 5,276      | 5,370      | 5,464      | 5,558      | 5,652      | 5,746      | 5,840      | 5,933      | 6,027      | 6,121      |
| <b>Zone 30-S</b>                      |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.87%      | 0.87%      | 1.22%      | 0.48%      | 0.84%      | 0.85%      | 1.20%      | 0.46%      | 0.82%      | 0.80%      |
| Residential Therms                    | 30,192,059 | 30,617,405 | 31,159,953 | 31,445,285 | 31,890,585 | 32,318,807 | 32,867,773 | 33,169,551 | 33,594,922 | 34,017,210 |
| Commercial Therms                     | 25,551,066 | 25,636,963 | 25,812,282 | 25,898,191 | 25,892,065 | 25,980,509 | 26,157,093 | 26,152,305 | 26,238,199 | 26,324,493 |
| Industrial Therms                     | 722,873    | 722,873    | 725,558    | 722,746    | 722,746    | 722,873    | 725,558    | 722,873    | 722,873    | 722,746    |
| Ind., Inst., & Cmcl. Interrup. Therms | 2,557,739  | 2,557,740  | 2,565,714  | 2,557,551  | 2,557,551  | 2,557,739  | 2,565,714  | 2,557,740  | 2,557,739  | 2,557,551  |
| Total Core Therms                     | 59,023,718 | 59,534,980 | 60,263,508 | 60,551,773 | 61,062,947 | 61,579,929 | 62,316,138 | 62,602,468 | 63,113,734 | 63,619,001 |
| Daily BaseLoad Therms                 | 61,808     | 62,098     | 62,691     | 62,960     | 63,366     | 60,173     | 63,016     | 60,017     | 61,529     | 59,982     |
| Peak Day Therms                       | 495,799    | 500,482    | 510,858    | 515,580    | 520,303    | 525,026    | 523,896    | 534,471    | 539,194    | 543,917    |
| Therms Per Residential Customer       | 1,412      | 1,412      | 1,417      | 1,411      | 1,411      | 1,412      | 1,412      | 1,412      | 1,412      | 1,411      |
| Therms Per Commercial Customer        | 10,823     | 10,800     | 10,816     | 10,754     | 10,732     | 10,713     | 10,729     | 10,671     | 10,650     | 10,628     |
| Therms Per Industrial Customer        | 49,516     | 49,516     | 49,700     | 49,507     | 49,507     | 49,516     | 49,700     | 49,516     | 49,516     | 49,507     |
| Residential Customers                 | 43,483     | 44,097     | 44,711     | 45,325     | 45,939     | 46,553     | 47,167     | 47,781     | 48,395     | 49,009     |
| Commercial Customers                  | 4,069      | 4,093      | 4,117      | 4,141      | 4,165      | 4,189      | 4,213      | 4,237      | 4,261      | 4,285      |
| Industrial Customers                  | 29         | 29         | 29         | 29         | 29         | 29         | 29         | 29         | 29         | 29         |
| Interruptible Customers               | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| Total Core Customers                  | 47,584     | 48,222     | 48,860     | 49,498     | 50,136     | 50,774     | 51,412     | 52,050     | 52,688     | 53,326     |

**Appendix B  
Demand Forecast  
Expected Forecast**

| Zone 30-W  | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Total Therms Pct. Growth</b>                  | 1.14%       | 1.13%       | 1.51%       | 0.71%       | 1.09%       | 1.09%       | 1.46%       | 0.67%       | 1.05%       | 1.02%       |
| <b>Residential Therms</b>                        | 66,906,782  | 67,680,557  | 68,720,557  | 69,220,736  | 69,994,363  | 70,775,843  | 71,827,905  | 72,323,708  | 73,097,500  | 73,863,070  |
| <b>Commercial Therms</b>                         | 37,289,222  | 37,655,043  | 38,166,348  | 38,392,462  | 38,748,240  | 39,118,613  | 39,635,546  | 39,850,516  | 40,216,365  | 40,577,411  |
| <b>Industrial Therms</b>                         | 4,843,330   | 4,936,803   | 5,047,781   | 5,122,401   | 5,216,846   | 5,311,007   | 5,423,287   | 5,490,295   | 5,591,769   | 5,684,468   |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 92,961      | 92,961      | 94,193      | 93,951      | 92,951      | 92,961      | 94,193      | 92,961      | 92,961      | 92,951      |
| <b>Total Core Therms</b>                         | 109,133,294 | 110,366,363 | 112,028,879 | 112,820,550 | 114,053,400 | 115,299,424 | 116,980,931 | 117,766,479 | 118,999,595 | 120,218,900 |
| <b>Daily BaseLoad Therms</b>                     | 121,084     | 122,143     | 123,677     | 124,691     | 126,042     | 127,809     | 129,049     | 129,160     | 128,952     | 119,777     |
| <b>Peak Day Therms</b>                           | 991,249     | 1,002,442   | 1,026,411   | 1,037,746   | 1,049,080   | 1,060,414   | 1,058,438   | 1,083,099   | 1,094,433   | 1,105,767   |
| <b>Therms Per Residential Customer</b>           | 6,028       | 6,028       | 6,049       | 6,027       | 6,027       | 6,028       | 6,049       | 6,028       | 6,028       | 6,027       |
| <b>Therms Per Commercial Customer</b>            | 31,559      | 31,539      | 31,631      | 31,490      | 31,471      | 31,459      | 31,553      | 31,422      | 31,404      | 31,378      |
| <b>Therms Per Industrial Customer</b>            | 201,822     | 201,817     | 202,453     | 201,808     | 201,803     | 201,815     | 202,452     | 201,823     | 201,819     | 201,797     |
| <b>Residential Customers</b>                     | 96,341      | 97,453      | 98,565      | 99,677      | 100,788     | 101,900     | 103,012     | 104,124     | 105,236     | 106,348     |
| <b>Commercial Customers</b>                      | 11,627      | 11,757      | 11,888      | 12,019      | 12,150      | 12,280      | 12,411      | 12,542      | 12,672      | 12,803      |
| <b>Industrial Customers</b>                      | 244         | 248         | 253         | 258         | 262         | 267         | 271         | 276         | 280         | 285         |
| <b>Interruptible Customers</b>                   | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| <b>Total Core Customers</b>                      | 108,212     | 109,459     | 110,707     | 111,954     | 113,201     | 114,448     | 115,695     | 116,943     | 118,190     | 119,437     |
| <b>Zone GTN</b>                                  | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
| <b>Total Therms Pct. Growth</b>                  | 1.87%       | 1.87%       | 2.24%       | 1.31%       | 1.74%       | 1.72%       | 2.12%       | 1.21%       | 1.62%       | 1.58%       |
| <b>Residential Therms</b>                        | 48,277,117  | 49,393,790  | 50,731,877  | 51,621,356  | 52,737,741  | 53,860,568  | 55,218,388  | 56,094,237  | 57,210,928  | 58,320,628  |
| <b>Commercial Therms</b>                         | 23,319,649  | 23,504,771  | 23,791,765  | 23,871,571  | 24,056,627  | 24,245,340  | 24,535,571  | 24,615,705  | 24,800,857  | 24,982,175  |
| <b>Industrial Therms</b>                         | 3,016,541   | 3,086,231   | 3,168,949   | 3,225,146   | 3,294,808   | 3,365,165   | 3,448,962   | 3,504,743   | 3,574,435   | 3,643,381   |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 281,681     | 281,681     | 282,842     | 281,612     | 281,612     | 281,681     | 282,842     | 281,681     | 281,681     | 281,612     |
| <b>Total Core Therms</b>                         | 74,894,987  | 76,266,473  | 77,975,434  | 78,999,685  | 80,370,809  | 81,752,753  | 83,485,763  | 84,496,366  | 85,867,901  | 87,227,796  |
| <b>Daily BaseLoad Therms</b>                     | 64,449      | 65,257      | 66,651      | 67,170      | 66,108      | 64,684      | 65,105      | 66,127      | 67,434      | 68,145      |
| <b>Peak Day Therms</b>                           | 873,138     | 889,099     | 915,288     | 931,443     | 947,598     | 963,752     | 968,924     | 996,071     | 1,012,226   | 1,028,381   |
| <b>Therms Per Residential Customer</b>           | 8,527       | 8,527       | 8,527       | 8,526       | 8,526       | 8,527       | 8,560       | 8,527       | 8,527       | 8,526       |
| <b>Therms Per Commercial Customer</b>            | 37,980      | 37,964      | 38,097      | 37,932      | 37,918      | 37,908      | 38,043      | 37,883      | 37,872      | 37,858      |
| <b>Therms Per Industrial Customer</b>            | 131,681     | 131,683     | 132,216     | 131,661     | 131,661     | 131,687     | 132,220     | 131,689     | 131,690     | 131,665     |
| <b>Residential Customers</b>                     | 64,009      | 65,503      | 66,997      | 68,490      | 69,984      | 71,478      | 72,971      | 74,465      | 75,959      | 77,452      |
| <b>Commercial Customers</b>                      | 7,566       | 7,632       | 7,698       | 7,764       | 7,830       | 7,896       | 7,962       | 8,028       | 8,094       | 8,160       |
| <b>Industrial Customers</b>                      | 132         | 135         | 138         | 142         | 145         | 148         | 151         | 154         | 157         | 161         |
| <b>Interruptible Customers</b>                   | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| <b>Total Core Customers</b>                      | 71,709      | 73,272      | 74,834      | 76,397      | 77,960      | 79,523      | 81,086      | 82,649      | 84,211      | 85,774      |
| <b>Zone ME-OR</b>                                | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
| <b>Total Therms Pct. Growth</b>                  | 0.88%       | 0.88%       | 1.26%       | 0.46%       | 0.85%       | 0.86%       | 1.23%       | 0.44%       | 0.82%       | 0.80%       |
| <b>Residential Therms</b>                        | 7,414,938   | 7,540,846   | 7,697,812   | 7,791,431   | 7,917,303   | 8,044,485   | 8,203,481   | 8,296,341   | 8,422,255   | 8,546,768   |
| <b>Commercial Therms</b>                         | 7,486,956   | 7,502,169   | 7,545,611   | 7,531,483   | 7,546,699   | 7,563,197   | 7,606,858   | 7,593,849   | 7,609,054   | 7,622,942   |
| <b>Industrial Therms</b>                         | 533,048     | 533,045     | 535,102     | 532,989     | 532,986     | 533,045     | 535,102     | 533,052     | 533,049     | 532,982     |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 686,333     | 686,333     | 688,430     | 686,236     | 686,236     | 686,333     | 688,430     | 686,333     | 686,333     | 686,236     |
| <b>Total Core Therms</b>                         | 16,121,275  | 16,262,393  | 16,466,956  | 16,542,138  | 16,683,224  | 16,827,060  | 17,033,872  | 17,109,574  | 17,250,690  | 17,388,928  |
| <b>Daily BaseLoad Therms</b>                     | 15,794      | 15,944      | 15,314      | 15,249      | 16,184      | 16,166      | 16,255      | 15,219      | 14,535      | 12,425      |
| <b>Peak Day Therms</b>                           | 201,638     | 203,579     | 208,225     | 210,191     | 212,157     | 214,123     | 213,302     | 218,065     | 220,031     | 221,997     |
| <b>Therms Per Residential Customer</b>           | 3,136       | 3,135       | 3,148       | 3,135       | 3,135       | 3,135       | 3,148       | 3,135       | 3,135       | 3,134       |
| <b>Therms Per Commercial Customer</b>            | 28,808      | 28,804      | 28,914      | 28,795      | 28,791      | 28,790      | 28,900      | 28,783      | 28,780      | 28,774      |
| <b>Therms Per Industrial Customer</b>            | 86,853      | 86,852      | 87,182      | 86,843      | 86,843      | 86,852      | 87,182      | 86,853      | 86,853      | 86,842      |
| <b>Residential Customers</b>                     | 13,884      | 13,923      | 14,162      | 14,401      | 14,640      | 14,879      | 15,118      | 15,357      | 15,596      | 15,835      |
| <b>Commercial Customers</b>                      | 1,916       | 1,920       | 1,925       | 1,929       | 1,933       | 1,938       | 1,942       | 1,947       | 1,951       | 1,956       |
| <b>Industrial Customers</b>                      | 27          | 27          | 27          | 27          | 27          | 27          | 27          | 27          | 27          | 27          |
| <b>Interruptible Customers</b>                   | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           |
| <b>Total Core Customers</b>                      | 15,628      | 15,871      | 16,115      | 16,358      | 16,602      | 16,845      | 17,089      | 17,332      | 17,576      | 17,819      |
| <b>Zone ME-WA</b>                                | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
| <b>Total Therms Pct. Growth</b>                  | 0.91%       | 0.91%       | 1.28%       | 0.50%       | 0.88%       | 0.89%       | 1.25%       | 0.48%       | 0.85%       | 0.83%       |
| <b>Residential Therms</b>                        | 8,289,276   | 8,416,959   | 8,577,936   | 8,671,205   | 8,798,856   | 8,927,664   | 9,090,636   | 9,183,039   | 9,310,726   | 9,437,181   |
| <b>Commercial Therms</b>                         | 6,314,523   | 6,314,479   | 6,337,756   | 6,313,662   | 6,313,619   | 6,314,480   | 6,337,751   | 6,314,568   | 6,314,527   | 6,313,575   |
| <b>Industrial Therms</b>                         | 270,241     | 277,438     | 285,598     | 291,809     | 299,004     | 306,244     | 314,501     | 320,659     | 327,866     | 335,003     |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 14,874,040  | 15,008,876  | 15,201,290  | 15,276,676  | 15,411,478  | 15,548,389  | 15,742,889  | 15,818,266  | 15,953,109  | 16,085,759  |
| <b>Total Core Therms</b>                         | 14,195      | 14,335      | 14,489      | 14,555      | 14,556      | 14,519      | 14,880      | 14,527      | 12,363      | 14,727      |
| <b>Daily BaseLoad Therms</b>                     | 189,931     | 191,775     | 195,478     | 197,539     | 199,400     | 201,261     | 201,003     | 204,989     | 206,050     | 208,711     |
| <b>Peak Day Therms</b>                           | 598         | 598         | 600         | 598         | 598         | 598         | 600         | 598         | 598         | 598         |
| <b>Therms Per Residential Customer</b>           | 4,839       | 4,839       | 4,839       | 4,839       | 4,839       | 4,839       | 4,857       | 4,840       | 4,839       | 4,839       |
| <b>Therms Per Commercial Customer</b>            | 10,592      | 10,592      | 10,627      | 10,590      | 10,590      | 10,592      | 10,627      | 10,592      | 10,592      | 10,590      |
| <b>Residential Customers</b>                     | 13,865      | 14,079      | 14,293      | 14,507      | 14,721      | 14,935      | 15,149      | 15,363      | 15,577      | 15,791      |
| <b>Commercial Customers</b>                      | 1,305       | 1,305       | 1,305       | 1,305       | 1,305       | 1,305       | 1,305       | 1,305       | 1,305       | 1,305       |
| <b>Industrial Customers</b>                      | 26          | 26          | 27          | 28          | 28          | 29          | 30          | 30          | 31          | 32          |
| <b>Interruptible Customers</b>                   | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| <b>Total Core Customers</b>                      | 15,195      | 15,410      | 15,624      | 15,839      | 16,054      | 16,268      | 16,483      | 16,698      | 16,912      | 17,127      |
| <b>Bellingham District</b>                       | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
| <b>Total Therms Pct. Growth</b>                  | 1.25%       | 1.23%       | 1.61%       | 0.80%       | 1.19%       | 1.18%       | 1.55%       | 0.76%       | 1.13%       | 1.11%       |
| <b>Residential Therms</b>                        | 37,439,977  | 37,913,166  | 38,536,060  | 38,855,110  | 39,328,207  | 39,805,869  | 40,436,151  | 40,752,272  | 41,225,471  | 41,693,867  |
| <b>Commercial Therms</b>                         | 18,778,992  | 18,958,601  | 19,212,209  | 19,315,614  | 19,495,299  | 19,677,442  | 19,933,857  | 20,036,865  | 20,214,584  | 20,392,742  |
| <b>Industrial Therms</b>                         | 2,560,480   | 2,630,950   | 2,710,902   | 2,771,741   | 2,842,193   | 2,913,027   | 2,993,957   | 3,054,180   | 3,124,652   | 3,194,704   |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| <b>Total Core Therms</b>                         | 58,779,348  | 59,502,717  | 60,459,170  | 60,942,465  | 61,665,700  | 62,394,338  | 63,363,965  | 63,843,317  | 64,566,707  | 65,282,313  |
| <b>Daily BaseLoad Therms</b>                     | 69,809      | 70,489      | 71,353      | 72,016      | 72,879      | 73,941      | 74,854      | 75,740      | 76,607      | 67,973      |
| <b>Peak Day Therms</b>                           | 517,629     | 523,954     | 537,436     | 543,845     | 550,254     | 556,664     | 555,582     | 569,485     | 575,894     | 582,303     |
| <b>Therms Per Residential Customer</b>           | 2,855       | 2,855       | 2,855       | 2,855       | 2,855       | 2,855       | 2,866       | 2,855       | 2,855       | 2,855       |
| <b>Therms Per Commercial Customer</b>            | 15,466      | 15,463      | 15,522      | 15,450      | 15,447      | 15,451      | 15,510      | 15,445      | 15,443      | 15,433      |
| <b>Therms Per Industrial Customer</b>            | 25,234      | 25,234      | 25,230      | 25,230      | 25,230      | 25,233      | 25,319      | 25,233      | 25,233      | 25,230      |
| <b>Residential Customers</b>                     | 52,208      | 52,869      | 53,530      | 54,190      | 54,851      | 55,512      | 56,172      | 56,833      | 57,494      | 58,155      |
| <b>Commercial Customers</b>                      | 5,963       | 6,026       | 6,089       | 6,152       | 6,215       | 6,278       | 6,341       | 6,404       | 6,467       | 6,530       |
| <b>Industrial Customers</b>                      | 105         | 108         | 111         | 113         | 116         | 119         | 122         | 125         | 128         | 131         |
| <b>Interruptible Customers</b>                   | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| <b>Total Core Customers</b>                      | 58,276      | 59,003      | 59,729      | 60,456      | 61,182      | 61,909      | 62,636      | 63,362      | 64,089      | 64,815      |

Appendix B  
Demand Forecast  
Expected Forecast

|                                       | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Mount Vernon District</b>          |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       | 1.02%      | 1.01%      | 1.39%      | 0.60%      | 0.98%      | 0.98%      | 1.35%      | 0.57%      | 0.95%      | 0.93%      |
| Residential Therms                    | 29,466,805 | 29,767,390 | 30,184,497 | 30,365,626 | 30,666,156 | 30,969,974 | 31,391,752 | 31,571,436 | 31,872,030 | 32,169,202 |
| Commercial Therms                     | 18,510,330 | 18,696,442 | 18,954,139 | 19,066,947 | 19,252,941 | 19,441,171 | 19,701,690 | 19,813,651 | 19,999,782 | 20,183,669 |
| Industrial Therms                     | 2,282,850  | 2,305,853  | 2,338,979  | 2,351,660  | 2,374,653  | 2,397,981  | 2,429,330  | 2,444,115  | 2,461,117  | 2,489,763  |
| Ind., Inst., & Cmcl. Interrup. Therms | 93,961     | 93,961     | 94,193     | 93,951     | 93,951     | 93,961     | 94,192     | 93,961     | 93,961     | 93,951     |
| <b>Total Core Therms</b>              | 50,353,946 | 50,863,646 | 51,569,708 | 51,878,085 | 52,387,701 | 52,903,086 | 53,616,965 | 53,923,162 | 54,432,889 | 54,936,586 |
| Daily BaseLoad Therms                 | 51,275     | 51,655     | 52,324     | 52,674     | 53,183     | 53,869     | 54,195     | 53,400     | 52,345     | 51,805     |
| Peak Day Therms                       | 473,620    | 478,488    | 488,976    | 493,901    | 498,825    | 503,750    | 502,856    | 513,614    | 518,539    | 523,464    |
| Therms Per Residential Customer       | 3,173      | 3,173      | 3,183      | 3,172      | 3,172      | 3,173      | 3,183      | 3,173      | 3,173      | 3,172      |
| Therms Per Commercial Customer        | 16,094     | 16,076     | 16,109     | 16,040     | 16,023     | 16,008     | 16,043     | 15,976     | 15,961     | 15,944     |
| Therms Per Industrial Customer        | 176,588    | 176,583    | 177,133    | 176,577    | 176,573    | 176,582    | 177,133    | 176,590    | 176,586    | 176,588    |
| Residential Customers                 | 44,133     | 44,584     | 45,035     | 45,486     | 45,937     | 46,389     | 46,840     | 47,291     | 47,742     | 48,193     |
| Commercial Customers                  | 5,663      | 5,731      | 5,799      | 5,867      | 5,934      | 6,002      | 6,070      | 6,138      | 6,205      | 6,273      |
| Industrial Customers                  | 139        | 141        | 142        | 144        | 146        | 147        | 149        | 151        | 152        | 154        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 49,936     | 50,457     | 50,978     | 51,498     | 52,019     | 52,539     | 53,060     | 53,581     | 54,101     | 54,621     |
| <b>Bremerston District</b>            |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       | 0.92%      | 0.92%      | 1.28%      | 0.54%      | 0.90%      | 0.90%      | 1.25%      | 0.51%      | 0.87%      | 0.85%      |
| Residential Therms                    | 27,382,712 | 27,787,249 | 28,297,418 | 28,594,376 | 28,998,862 | 29,405,358 | 29,921,821 | 30,214,443 | 30,618,984 | 31,021,395 |
| Commercial Therms                     | 22,605,882 | 22,691,778 | 22,856,306 | 22,881,978 | 22,947,853 | 23,035,325 | 23,201,117 | 23,207,121 | 23,293,015 | 23,377,281 |
| Industrial Therms                     | 444,677    | 444,677    | 446,366    | 444,647    | 444,647    | 444,677    | 446,366    | 444,677    | 444,677    | 444,647    |
| Ind., Inst., & Cmcl. Interrup. Therms | 2,557,739  | 2,557,740  | 2,565,714  | 2,557,551  | 2,557,551  | 2,557,739  | 2,565,714  | 2,557,740  | 2,557,739  | 2,557,551  |
| <b>Total Core Therms</b>              | 52,991,011 | 53,481,444 | 54,166,004 | 54,458,553 | 54,948,912 | 55,443,099 | 56,135,018 | 56,423,980 | 56,914,416 | 57,400,874 |
| Daily BaseLoad Therms                 | 55,642     | 55,945     | 56,640     | 56,760     | 57,179     | 53,937     | 56,782     | 54,682     | 55,198     | 55,081     |
| Peak Day Therms                       | 442,852    | 447,329    | 455,533    | 460,044    | 464,555    | 469,066    | 469,716    | 478,087    | 482,598    | 487,109    |
| Therms Per Residential Customer       | 692        | 692        | 694        | 692        | 692        | 692        | 692        | 694        | 692        | 692        |
| Therms Per Commercial Customer        | 6,760      | 6,738      | 6,739      | 6,693      | 6,671      | 6,650      | 6,652      | 6,608      | 6,588      | 6,567      |
| Therms Per Industrial Customer        | 29,645     | 29,645     | 29,758     | 29,643     | 29,643     | 29,645     | 29,645     | 29,645     | 29,645     | 29,643     |
| Residential Customers                 | 39,581     | 40,166     | 40,751     | 41,336     | 41,921     | 42,506     | 43,091     | 43,676     | 44,261     | 44,846     |
| Commercial Customers                  | 3,344      | 3,368      | 3,392      | 3,416      | 3,440      | 3,464      | 3,488      | 3,512      | 3,536      | 3,560      |
| Industrial Customers                  | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         |
| Interruptible Customers               | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| <b>Total Core Customers</b>           | 42,942     | 43,551     | 44,160     | 44,769     | 45,378     | 45,987     | 46,596     | 47,205     | 47,814     | 48,423     |
| <b>Longview District</b>              |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       | 0.53%      | 0.53%      | 0.94%      | 0.09%      | 0.52%      | 0.55%      | 0.93%      | 0.11%      | 0.51%      | 0.48%      |
| Residential Therms                    | 1,599,925  | 1,633,442  | 1,673,808  | 1,699,988  | 1,733,488  | 1,767,513  | 1,808,433  | 1,834,562  | 1,868,082  | 1,901,033  |
| Commercial Therms                     | 4,368,329  | 4,368,295  | 4,386,162  | 4,366,948  | 4,366,918  | 4,368,299  | 4,386,158  | 4,368,366  | 4,368,335  | 4,366,880  |
| Industrial Therms                     | 229,175    | 229,175    | 230,611    | 229,085    | 229,085    | 229,175    | 230,611    | 229,175    | 229,175    | 229,085    |
| Ind., Inst., & Cmcl. Interrup. Therms | 95,569     | 95,569     | 95,919     | 95,539     | 95,539     | 95,569     | 95,919     | 95,569     | 95,569     | 95,539     |
| <b>Total Core Therms</b>              | 6,292,998  | 6,326,481  | 6,385,950  | 6,391,560  | 6,425,030  | 6,460,556  | 6,520,570  | 6,527,673  | 6,561,161  | 6,592,538  |
| Daily BaseLoad Therms                 | 7,342      | 7,352      | 7,443      | 7,423      | 7,463      | 7,562      | 7,518      | 7,517      | 7,609      | 7,588      |
| Peak Day Therms                       | 53,965     | 54,278     | 56,630     | 56,953     | 57,276     | 57,600     | 55,861     | 58,255     | 58,578     | 58,902     |
| Therms Per Residential Customer       | 1,767      | 1,767      | 1,774      | 1,767      | 1,767      | 1,767      | 1,774      | 1,767      | 1,767      | 1,766      |
| Therms Per Commercial Customer        | 7,766      | 7,762      | 7,787      | 7,753      | 7,749      | 7,746      | 7,772      | 7,739      | 7,736      | 7,731      |
| Therms Per Industrial Customer        | 16,961     | 16,961     | 17,027     | 16,955     | 16,955     | 16,961     | 17,027     | 16,961     | 16,961     | 16,955     |
| Residential Customers                 | 3,984      | 4,074      | 4,164      | 4,254      | 4,344      | 4,434      | 4,524      | 4,614      | 4,704      | 4,794      |
| Commercial Customers                  | 1,254      | 1,258      | 1,262      | 1,266      | 1,269      | 1,273      | 1,277      | 1,281      | 1,285      | 1,289      |
| Industrial Customers                  | 32         | 32         | 32         | 32         | 32         | 32         | 32         | 32         | 32         | 32         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 5,271      | 5,365      | 5,459      | 5,553      | 5,647      | 5,741      | 5,835      | 5,928      | 6,022      | 6,116      |
| <b>Aberdeen District</b>              |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       | 0.35%      | 0.35%      | 0.73%      | -0.07%     | 0.34%      | 0.37%      | 0.72%      | -0.04%     | 0.34%      | 0.30%      |
| Residential Therms                    | 2,809,327  | 2,830,155  | 2,862,335  | 2,870,909  | 2,891,723  | 2,913,449  | 2,945,952  | 2,955,108  | 2,975,938  | 2,995,815  |
| Commercial Therms                     | 2,945,184  | 2,945,184  | 2,955,976  | 2,944,212  | 2,944,212  | 2,945,184  | 2,955,976  | 2,945,184  | 2,945,184  | 2,944,212  |
| Industrial Therms                     | 278,196    | 278,196    | 279,193    | 278,099    | 278,099    | 278,196    | 279,193    | 278,196    | 278,196    | 278,099    |
| Ind., Inst., & Cmcl. Interrup. Therms | 6,032,708  | 6,053,536  | 6,097,504  | 6,093,220  | 6,114,035  | 6,136,830  | 6,181,121  | 6,178,488  | 6,199,319  | 6,218,127  |
| <b>Total Core Therms</b>              | 8,165      | 8,153      | 8,231      | 8,200      | 8,186      | 8,234      | 8,335      | 8,330      | 8,330      | 8,330      |
| Daily BaseLoad Therms                 | 52,947     | 53,153     | 55,324     | 55,536     | 55,748     | 55,960     | 54,180     | 56,384     | 56,596     | 56,808     |
| Peak Day Therms                       | 720        | 720        | 723        | 720        | 720        | 720        | 723        | 720        | 720        | 720        |
| Therms Per Residential Customer       | 4,062      | 4,062      | 4,077      | 4,061      | 4,061      | 4,062      | 4,077      | 4,062      | 4,062      | 4,061      |
| Therms Per Commercial Customer        | 19,871     | 19,871     | 19,942     | 19,864     | 19,864     | 19,871     | 19,942     | 19,871     | 19,871     | 19,864     |
| Therms Per Industrial Customer        | 3,903      | 3,932      | 3,961      | 3,990      | 4,019      | 4,048      | 4,077      | 4,106      | 4,135      | 4,164      |
| Residential Customers                 | 725        | 725        | 725        | 725        | 725        | 725        | 725        | 725        | 725        | 725        |
| Commercial Customers                  | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         |
| Industrial Customers                  | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Interruptible Customers               | 4,642      | 4,671      | 4,700      | 4,729      | 4,758      | 4,787      | 4,816      | 4,845      | 4,874      | 4,903      |
| <b>Kennewick District</b>             |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       | 2.33%      | 2.27%      | 2.62%      | 1.76%      | 2.13%      | 2.10%      | 2.44%      | 1.60%      | 1.96%      | 1.91%      |
| Residential Therms                    | 22,929,372 | 23,553,922 | 24,276,626 | 24,796,959 | 25,423,323 | 26,052,001 | 26,784,918 | 27,301,158 | 27,925,700 | 28,545,518 |
| Commercial Therms                     | 19,751,717 | 20,126,087 | 20,578,978 | 20,871,388 | 21,245,626 | 21,623,440 | 22,002,024 | 22,372,206 | 22,746,586 | 23,117,117 |
| Industrial Therms                     | 1,048,185  | 1,048,186  | 1,051,496  | 1,047,986  | 1,047,987  | 1,048,186  | 1,051,496  | 1,048,185  | 1,048,185  | 1,047,987  |
| Ind., Inst., & Cmcl. Interrup. Therms | 207,687    | 207,687    | 208,383    | 207,652    | 207,652    | 207,687    | 208,383    | 207,687    | 207,687    | 207,652    |
| <b>Total Core Therms</b>              | 43,936,962 | 44,935,882 | 46,115,383 | 46,925,986 | 47,924,588 | 48,931,314 | 50,126,821 | 50,929,216 | 51,928,159 | 52,918,274 |
| Daily BaseLoad Therms                 | 44,161     | 45,318     | 46,405     | 47,121     | 47,824     | 48,219     | 50,115     | 49,019     | 51,854     | 49,001     |
| Peak Day Therms                       | 584,072    | 597,602    | 618,759    | 632,455    | 646,151    | 659,847    | 665,257    | 687,239    | 700,935    | 714,631    |
| Therms Per Residential Customer       | 1,725      | 1,725      | 1,732      | 1,725      | 1,725      | 1,725      | 1,732      | 1,725      | 1,725      | 1,725      |
| Therms Per Commercial Customer        | 65,221     | 65,212     | 65,377     | 65,184     | 65,176     | 65,175     | 65,343     | 65,159     | 65,152     | 65,136     |
| Therms Per Industrial Customer        | 93,167     | 93,167     | 93,462     | 93,150     | 93,150     | 93,167     | 93,462     | 93,167     | 93,167     | 93,150     |
| Residential Customers                 | 39,386     | 40,461     | 41,536     | 42,612     | 43,687     | 44,762     | 45,837     | 46,913     | 47,988     | 49,063     |
| Commercial Customers                  | 4,734      | 4,831      | 4,928      | 5,025      | 5,122      | 5,219      | 5,316      | 5,413      | 5,510      | 5,607      |
| Industrial Customers                  | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 44,143     | 45,316     | 46,488     | 47,660     | 48,833     | 50,005     | 51,177     | 52,350     | 53,522     | 54,694     |

Appendix B  
Demand Forecast  
Expected Forecast

|                                       | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Walla Walla District</b>           |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.91%      | 0.91%      | 1.28%      | 0.50%      | 0.88%      | 0.89%      | 1.25%      | 0.48%      | 0.85%      | 0.83%      |
| Residential Therms                    | 8,289,276  | 8,416,959  | 8,577,936  | 8,671,205  | 8,798,856  | 8,927,664  | 9,090,636  | 9,183,039  | 9,310,726  | 9,437,181  |
| Commercial Therms                     | 6,314,523  | 6,314,479  | 6,337,756  | 6,313,662  | 6,313,619  | 6,314,480  | 6,337,751  | 6,314,568  | 6,314,527  | 6,313,575  |
| Industrial Therms                     | 270,241    | 277,438    | 285,598    | 291,809    | 299,004    | 306,244    | 314,501    | 320,659    | 327,856    | 335,003    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 14,874,040 | 15,008,876 | 15,201,290 | 15,276,676 | 15,411,478 | 15,548,389 | 15,742,889 | 15,818,266 | 15,953,109 | 16,085,759 |
| Daily BaseLoad Therms                 | 14,195     | 14,335     | 14,489     | 14,555     | 14,556     | 14,519     | 14,880     | 14,527     | 12,363     | 14,727     |
| Peak Day Therms                       | 189,931    | 191,775    | 195,478    | 197,539    | 199,400    | 201,261    | 201,003    | 204,989    | 206,850    | 208,711    |
| Therms Per Residential Customer       | 598        | 598        | 600        | 598        | 598        | 598        | 600        | 598        | 598        | 598        |
| Therms Per Commercial Customer        | 4,839      | 4,839      | 4,857      | 4,839      | 4,839      | 4,839      | 4,857      | 4,840      | 4,839      | 4,839      |
| Therms Per Industrial Customer        | 10,592     | 10,592     | 10,627     | 10,590     | 10,590     | 10,592     | 10,627     | 10,592     | 10,592     | 10,590     |
| Residential Customers                 | 13,865     | 14,079     | 14,293     | 14,507     | 14,721     | 14,935     | 15,149     | 15,363     | 15,577     | 15,791     |
| Commercial Customers                  | 1,305      | 1,305      | 1,305      | 1,305      | 1,305      | 1,305      | 1,305      | 1,305      | 1,305      | 1,305      |
| Industrial Customers                  | 26         | 26         | 27         | 28         | 29         | 30         | 30         | 31         | 32         | 32         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 15,195     | 15,410     | 15,624     | 15,839     | 16,054     | 16,268     | 16,483     | 16,698     | 16,912     | 17,127     |
| <b>Wenatchee District</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.20%      | 0.20%      | 0.58%      | -0.20%     | 0.20%      | 0.21%      | 0.57%      | -0.18%     | 0.19%      | 0.18%      |
| Residential Therms                    | 1,542,015  | 1,540,261  | 1,544,747  | 1,536,574  | 1,534,821  | 1,533,275  | 1,537,726  | 1,529,793  | 1,528,042  | 1,526,081  |
| Commercial Therms                     | 8,300,112  | 8,322,977  | 8,377,710  | 8,367,299  | 8,390,153  | 8,414,633  | 8,469,675  | 8,460,563  | 8,483,442  | 8,504,659  |
| Industrial Therms                     | 811,351    | 811,352    | 813,895    | 811,239    | 811,240    | 811,352    | 813,895    | 811,350    | 811,351    | 811,241    |
| Ind., Inst., & Cmcl. Interrup. Therms | 93,364     | 93,364     | 93,681     | 93,365     | 93,365     | 93,364     | 93,681     | 93,364     | 93,364     | 93,365     |
| Total Core Therms                     | 10,746,843 | 10,767,954 | 10,830,034 | 10,808,477 | 10,829,579 | 10,852,624 | 10,914,977 | 10,895,071 | 10,916,199 | 10,935,346 |
| Daily BaseLoad Therms                 | 9,684      | 9,715      | 10,189     | 9,799      | 9,812      | 9,900      | 9,869      | 9,508      | 9,776      | 9,327      |
| Peak Day Therms                       | 95,058     | 95,254     | 97,393     | 97,592     | 97,791     | 97,990     | 96,249     | 96,397     | 96,595     | 98,794     |
| Therms Per Residential Customer       | 1,882      | 1,882      | 1,889      | 1,882      | 1,882      | 1,882      | 1,889      | 1,882      | 1,882      | 1,882      |
| Therms Per Commercial Customer        | 25,003     | 24,968     | 25,024     | 24,898     | 24,866     | 24,838     | 24,897     | 24,778     | 24,749     | 24,718     |
| Therms Per Industrial Customer        | 94,835     | 94,835     | 95,118     | 94,824     | 94,824     | 94,835     | 95,118     | 94,835     | 94,835     | 94,824     |
| Residential Customers                 | 3,176      | 3,172      | 3,168      | 3,164      | 3,160      | 3,156      | 3,152      | 3,148      | 3,144      | 3,140      |
| Commercial Customers                  | 1,505      | 1,511      | 1,517      | 1,523      | 1,529      | 1,535      | 1,541      | 1,547      | 1,553      | 1,559      |
| Industrial Customers                  | 34         | 34         | 34         | 34         | 34         | 34         | 34         | 34         | 34         | 34         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 4,715      | 4,717      | 4,719      | 4,721      | 4,723      | 4,725      | 4,727      | 4,729      | 4,731      | 4,733      |
| <b>Yakima District</b>                |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.96%      | 0.95%      | 1.36%      | 0.48%      | 0.92%      | 0.96%      | 1.33%      | 0.49%      | 0.89%      | 0.84%      |
| Residential Therms                    | 18,524,587 | 18,715,045 | 18,985,245 | 19,089,404 | 19,279,791 | 19,476,988 | 19,750,183 | 19,858,016 | 20,048,533 | 20,231,884 |
| Commercial Therms                     | 20,970,192 | 21,126,966 | 21,373,460 | 21,431,559 | 21,587,222 | 21,753,473 | 22,002,431 | 22,067,603 | 22,223,429 | 22,370,258 |
| Industrial Therms                     | 5,718,341  | 5,802,284  | 5,908,979  | 5,967,463  | 6,051,273  | 6,138,303  | 6,246,231  | 6,306,390  | 6,390,362  | 6,471,077  |
| Ind., Inst., & Cmcl. Interrup. Therms | 58,129     | 58,128     | 58,105     | 58,079     | 57,481     | 57,529     | 57,506     | 57,529     | 56,929     | 56,882     |
| Total Core Therms                     | 45,271,248 | 45,702,423 | 46,325,788 | 46,546,505 | 46,975,767 | 47,426,293 | 48,056,351 | 48,289,538 | 48,719,254 | 49,130,102 |
| Daily BaseLoad Therms                 | 38,407     | 38,779     | 38,166     | 38,030     | 39,581     | 40,482     | 40,610     | 38,954     | 38,513     | 39,537     |
| Peak Day Therms                       | 442,352    | 446,450    | 469,329    | 473,551    | 477,773    | 481,996    | 466,942    | 490,443    | 494,665    | 498,888    |
| Therms Per Residential Customer       | 115,284    | 115,287    | 116,200    | 115,292    | 115,296    | 115,300    | 116,213    | 115,307    | 115,311    | 115,313    |
| Therms Per Commercial Customer        | 36,927     | 36,981     | 37,188     | 37,079     | 37,136     | 37,216     | 37,434     | 37,350     | 37,418     | 37,473     |
| Therms Per Industrial Customer        | 171,303    | 171,225    | 171,763    | 170,962    | 170,900    | 170,911    | 171,444    | 170,750    | 170,672    | 170,508    |
| Residential Customers                 | 28,609     | 28,891     | 29,174     | 29,456     | 29,738     | 30,021     | 30,303     | 30,586     | 30,868     | 31,150     |
| Commercial Customers                  | 5,477      | 5,518      | 5,558      | 5,599      | 5,640      | 5,681      | 5,722      | 5,763      | 5,804      | 5,845      |
| Industrial Customers                  | 173        | 176        | 178        | 180        | 182        | 185        | 187        | 189        | 192        | 194        |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Total Core Customers                  | 34,261     | 34,587     | 34,912     | 35,238     | 35,563     | 35,889     | 36,214     | 36,540     | 36,865     | 37,191     |
| <b>Central Oregon (Bend) District</b> |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 1.87%      | 1.83%      | 2.24%      | 1.31%      | 1.74%      | 1.72%      | 2.12%      | 1.21%      | 1.62%      | 1.58%      |
| Residential Therms                    | 48,277,117 | 49,393,790 | 50,731,877 | 51,621,356 | 52,373,761 | 53,860,568 | 55,218,388 | 56,094,237 | 57,210,928 | 58,320,628 |
| Commercial Therms                     | 23,319,649 | 23,504,771 | 23,791,765 | 23,871,571 | 24,056,627 | 24,245,340 | 24,535,571 | 24,615,705 | 24,800,857 | 24,982,175 |
| Industrial Therms                     | 3,016,541  | 3,086,231  | 3,168,949  | 3,225,146  | 3,294,808  | 3,365,165  | 3,448,962  | 3,504,743  | 3,574,435  | 3,643,381  |
| Ind., Inst., & Cmcl. Interrup. Therms | 281,681    | 281,681    | 282,842    | 281,612    | 281,612    | 281,681    | 282,842    | 281,681    | 281,681    | 281,612    |
| Total Core Therms                     | 74,894,987 | 76,266,473 | 77,975,434 | 78,999,685 | 80,370,809 | 81,752,753 | 83,485,763 | 84,496,366 | 85,867,901 | 87,227,796 |
| Daily BaseLoad Therms                 | 54,449     | 45,257     | 46,651     | 47,170     | 46,108     | 44,684     | 45,105     | 45,127     | 47,434     | 48,145     |
| Peak Day Therms                       | 873,138    | 899,099    | 915,289    | 931,443    | 947,598    | 963,752    | 966,924    | 996,071    | 1,012,226  | 1,028,381  |
| Therms Per Residential Customer       | 8,527      | 8,527      | 8,540      | 8,536      | 8,526      | 8,527      | 8,540      | 8,527      | 8,527      | 8,526      |
| Therms Per Commercial Customer        | 37,980     | 37,964     | 38,097     | 37,932     | 37,918     | 37,908     | 38,043     | 37,883     | 37,883     | 37,858     |
| Therms Per Industrial Customer        | 131,681    | 131,683    | 132,216    | 131,661    | 131,661    | 131,687    | 132,220    | 131,689    | 131,690    | 131,665    |
| Residential Customers                 | 64,009     | 65,503     | 66,997     | 68,490     | 69,984     | 71,478     | 72,971     | 74,465     | 75,959     | 77,452     |
| Commercial Customers                  | 7,566      | 7,632      | 7,698      | 7,764      | 7,830      | 7,896      | 7,962      | 8,028      | 8,094      | 8,160      |
| Industrial Customers                  | 132        | 135        | 138        | 142        | 145        | 148        | 151        | 154        | 157        | 161        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 71,709     | 73,272     | 74,834     | 76,397     | 77,960     | 79,523     | 81,086     | 82,649     | 84,211     | 85,774     |
| <b>Pendleton District</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.88%      | 0.88%      | 1.26%      | 0.46%      | 0.85%      | 0.86%      | 1.23%      | 0.44%      | 0.82%      | 0.80%      |
| Residential Therms                    | 7,414,958  | 7,540,846  | 7,697,872  | 7,791,431  | 7,917,303  | 8,044,485  | 8,203,481  | 8,296,341  | 8,422,255  | 8,546,768  |
| Commercial Therms                     | 7,498,956  | 7,502,169  | 7,545,811  | 7,531,483  | 7,546,699  | 7,563,197  | 7,608,855  | 7,593,849  | 7,609,054  | 7,622,942  |
| Industrial Therms                     | 532,048    | 532,045    | 535,102    | 532,989    | 532,986    | 533,045    | 535,102    | 532,052    | 532,049    | 532,982    |
| Ind., Inst., & Cmcl. Interrup. Therms | 686,333    | 686,333    | 688,430    | 686,236    | 686,236    | 686,333    | 688,430    | 686,333    | 686,333    | 686,236    |
| Total Core Therms                     | 16,121,275 | 16,262,393 | 16,466,956 | 16,542,138 | 16,683,224 | 16,827,040 | 17,033,872 | 17,109,574 | 17,250,690 | 17,388,928 |
| Daily BaseLoad Therms                 | 15,794     | 15,944     | 16,144     | 16,249     | 16,184     | 16,166     | 16,525     | 15,219     | 14,535     | 12,425     |
| Peak Day Therms                       | 201,638    | 203,579    | 208,225    | 210,191    | 212,157    | 214,123    | 213,302    | 218,065    | 220,031    | 221,997    |
| Therms Per Residential Customer       | 3,136      | 3,135      | 3,148      | 3,135      | 3,135      | 3,135      | 3,148      | 3,135      | 3,135      | 3,134      |
| Therms Per Commercial Customer        | 28,808     | 28,804     | 28,914     | 28,795     | 28,791     | 28,790     | 28,900     | 28,783     | 28,780     | 28,774     |
| Therms Per Industrial Customer        | 86,853     | 86,852     | 87,182     | 86,843     | 86,843     | 86,852     | 87,182     | 86,853     | 86,853     | 86,842     |
| Residential Customers                 | 13,684     | 13,923     | 14,162     | 14,401     | 14,640     | 14,879     | 15,118     | 15,357     | 15,596     | 15,835     |
| Commercial Customers                  | 1,919      | 1,923      | 1,928      | 1,932      | 1,936      | 1,941      | 1,945      | 1,950      | 1,954      | 1,959      |
| Industrial Customers                  | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Total Core Customers                  | 15,632     | 15,875     | 16,119     | 16,362     | 16,606     | 16,849     | 17,093     | 17,336     | 17,580     | 17,823     |

**Appendix B  
Demand Forecast  
Expected Forecast**

|  | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Eastern Oregon (Ontario) District</b> |             |             |             |             |             |             |             |             |             |             |
| <b>Total Therms Pct. Growth</b>          | 0.71%       | 0.71%       | 1.10%       | 0.30%       | 0.69%       | 0.69%       | 1.08%       | 0.28%       | 0.67%       | 0.66%       |
| Residential Therms                       | 4,966,974   | 5,019,116   | 5,092,078   | 5,123,298   | 5,175,441   | 5,227,697   | 5,301,508   | 5,331,989   | 5,384,135   | 5,436,157   |
| Commercial Therms                        | 4,458,741   | 4,482,196   | 4,523,848   | 4,528,894   | 4,552,342   | 4,576,025   | 4,618,072   | 4,622,960   | 4,646,411   | 4,669,618   |
| Industrial Therms                        | 332,203     | 332,189     | 332,796     | 332,206     | 332,192     | 332,189     | 332,796     | 332,218     | 332,203     | 332,177     |
| Ind., Inst., & Cmcl. Interrup. Therms    | 943,046     | 943,046     | 946,325     | 943,954     | 943,954     | 943,046     | 946,325     | 943,046     | 943,046     | 943,954     |
| <b>Total Core Therms</b>                 | 10,700,964  | 10,776,547  | 10,895,047  | 10,927,351  | 11,002,928  | 11,078,957  | 11,198,701  | 11,230,213  | 11,305,795  | 11,380,906  |
| Daily BaseLoad Therms                    | 5,712       | 5,733       | 5,859       | 5,827       | 5,886       | 4,986       | 5,938       | 5,042       | 4,861       | 4,830       |
| Peak Day Therms                          | 121,679     | 122,597     | 123,960     | 124,882     | 125,805     | 126,727     | 127,195     | 128,573     | 129,495     | 130,418     |
| Therms Per Residential Customer          | 1,710       | 1,710       | 1,717       | 1,710       | 1,710       | 1,710       | 1,717       | 1,710       | 1,710       | 1,710       |
| Therms Per Commercial Customer           | 7,808       | 7,807       | 7,837       | 7,803       | 7,802       | 7,801       | 7,831       | 7,798       | 7,796       | 7,795       |
| Therms Per Industrial Customer           | 53,034      | 53,033      | 53,154      | 53,036      | 53,036      | 53,033      | 53,154      | 53,035      | 53,034      | 53,035      |
| Residential Customers                    | 8,198       | 8,284       | 8,370       | 8,456       | 8,542       | 8,628       | 8,714       | 8,800       | 8,886       | 8,972       |
| Commercial Customers                     | 1,555       | 1,564       | 1,573       | 1,582       | 1,591       | 1,600       | 1,609       | 1,618       | 1,627       | 1,636       |
| Industrial Customers                     | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          |
| Interruptible Customers                  | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| <b>Total Core Customers</b>              | 9,776       | 9,871       | 9,966       | 10,061      | 10,156      | 10,251      | 10,346      | 10,441      | 10,536      | 10,631      |
| <b>Oregon</b>                            |             |             |             |             |             |             |             |             |             |             |
| <b>Total Therms Pct. Growth</b>          | 1.59%       | 1.56%       | 1.97%       | 1.07%       | 1.49%       | 1.48%       | 1.88%       | 1.00%       | 1.41%       | 1.37%       |
| Residential Therms                       | 60,659,029  | 61,953,753  | 63,521,767  | 64,536,085  | 65,830,505  | 67,132,750  | 68,723,377  | 69,722,568  | 71,017,318  | 72,303,554  |
| Commercial Therms                        | 35,245,346  | 35,489,136  | 35,861,224  | 35,931,948  | 36,155,669  | 36,384,562  | 36,760,501  | 36,832,514  | 37,056,323  | 37,274,735  |
| Industrial Therms                        | 3,881,792   | 3,951,466   | 4,036,847   | 4,090,341   | 4,159,985   | 4,230,399   | 4,316,861   | 4,370,012   | 4,439,687   | 4,508,540   |
| Ind., Inst., & Cmcl. Interrup. Therms    | 1,911,059   | 1,911,059   | 1,917,597   | 1,910,801   | 1,910,801   | 1,911,059   | 1,917,597   | 1,911,059   | 1,917,597   | 1,910,801   |
| <b>Total Core Therms</b>                 | 101,717,227 | 103,305,413 | 105,337,436 | 106,469,175 | 108,056,960 | 109,658,771 | 111,718,336 | 112,836,153 | 114,424,387 | 115,997,630 |
| Daily BaseLoad Therms                    | 85,955      | 86,935      | 87,824      | 88,246      | 88,178      | 85,836      | 87,568      | 86,387      | 86,830      | 85,400      |
| Peak Day Therms                          | 1,196,455   | 1,215,276   | 1,247,473   | 1,266,516   | 1,285,559   | 1,304,602   | 1,309,421   | 1,342,708   | 1,361,752   | 1,380,795   |
| Therms Per Residential Customer          | 13,373      | 13,372      | 13,372      | 13,371      | 13,370      | 13,370      | 13,425      | 13,371      | 13,371      | 13,369      |
| Therms Per Commercial Customer           | 74,596      | 74,575      | 74,848      | 74,530      | 74,511      | 74,498      | 74,774      | 74,465      | 74,448      | 74,427      |
| Therms Per Industrial Customer           | 271,568     | 271,568     | 272,552     | 271,541     | 271,539     | 271,572     | 272,556     | 271,577     | 271,576     | 271,542     |
| Residential Customers                    | 85,891      | 87,709      | 89,528      | 91,347      | 93,165      | 94,984      | 96,803      | 98,621      | 100,440     | 102,259     |
| Commercial Customers                     | 11,040      | 11,119      | 11,199      | 11,278      | 11,358      | 11,437      | 11,516      | 11,596      | 11,675      | 11,755      |
| Industrial Customers                     | 183         | 186         | 189         | 192         | 195         | 198         | 202         | 205         | 208         | 211         |
| Interruptible Customers                  | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           |
| <b>Total Core Customers</b>              | 97,117      | 99,018      | 100,920     | 102,821     | 104,722     | 106,623     | 108,525     | 110,426     | 112,327     | 114,229     |
| <b>Washington</b>                        |             |             |             |             |             |             |             |             |             |             |
| <b>Total Therms Pct. Growth</b>          | 1.18%       | 1.16%       | 1.54%       | 0.73%       | 1.12%       | 1.13%       | 1.49%       | 0.70%       | 1.07%       | 1.05%       |
| Residential Therms                       | 149,983,996 | 152,157,590 | 154,938,873 | 156,482,151 | 158,655,226 | 160,852,091 | 163,667,571 | 165,199,807 | 167,373,506 | 169,521,978 |
| Commercial Therms                        | 122,545,162 | 123,550,809 | 125,032,597 | 125,539,508 | 126,543,843 | 127,573,448 | 129,070,680 | 129,586,127 | 130,590,884 | 131,571,393 |
| Industrial Therms                        | 13,643,497  | 13,828,111  | 14,063,368  | 14,193,730  | 14,378,181  | 14,567,141  | 14,805,030  | 14,936,927  | 15,121,572  | 15,301,608  |
| Ind., Inst., & Cmcl. Interrup. Therms    | 3,106,449   | 3,106,448   | 3,115,995   | 3,106,138   | 3,105,540   | 3,105,849   | 3,115,396   | 3,105,849   | 3,105,249   | 3,104,941   |
| <b>Total Core Therms</b>                 | 289,279,103 | 292,642,959 | 297,150,832 | 299,321,528 | 302,682,790 | 306,098,529 | 310,658,677 | 312,828,710 | 316,191,211 | 319,499,919 |
| Daily BaseLoad Therms                    | 296,681     | 299,739     | 303,061     | 304,579     | 308,664     | 308,666     | 315,057     | 308,702     | 310,597     | 298,940     |
| Peak Day Therms                          | 2,852,427   | 2,888,283   | 2,975,058   | 3,011,417   | 3,047,775   | 3,084,133   | 3,067,645   | 3,156,892   | 3,193,251   | 3,229,609   |
| Therms Per Residential Customer          | 128,696     | 128,699     | 129,662     | 128,702     | 128,705     | 128,712     | 129,675     | 128,719     | 128,722     | 128,722     |
| Therms Per Commercial Customer           | 182,140     | 182,101     | 182,682     | 181,997     | 181,968     | 181,967     | 182,586     | 181,959     | 181,948     | 181,902     |
| Therms Per Industrial Customer           | 638,197     | 638,114     | 640,150     | 637,816     | 637,730     | 637,798     | 639,831     | 637,645     | 637,565     | 637,531     |
| Residential Customers                    | 228,843     | 232,226     | 235,610     | 238,994     | 242,377     | 245,761     | 249,145     | 252,528     | 255,912     | 259,295     |
| Commercial Customers                     | 29,949      | 30,272      | 30,574      | 30,877      | 31,179      | 31,482      | 31,784      | 32,087      | 32,389      | 32,692      |
| Industrial Customers                     | 561         | 568         | 576         | 583         | 591         | 598         | 606         | 613         | 621         | 628         |
| Interruptible Customers                  | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           |
| <b>Total Core Customers</b>              | 259,382     | 263,075     | 266,769     | 270,463     | 274,156     | 277,850     | 281,544     | 285,237     | 288,931     | 292,624     |
| <b>System</b>                            |             |             |             |             |             |             |             |             |             |             |
| <b>Total Therms Pct. Growth</b>          | 1.28%       | 1.27%       | 1.65%       | 0.82%       | 1.22%       | 1.22%       | 1.59%       | 0.78%       | 1.16%       | 1.13%       |
| Residential Therms                       | 210,643,025 | 214,111,343 | 218,460,640 | 221,018,237 | 224,485,731 | 227,984,841 | 232,390,949 | 234,922,375 | 238,390,823 | 241,825,531 |
| Commercial Therms                        | 157,810,508 | 159,039,945 | 160,893,821 | 161,471,456 | 162,699,512 | 163,958,009 | 165,831,181 | 166,418,641 | 167,647,207 | 168,846,128 |
| Industrial Therms                        | 17,525,289  | 17,779,577  | 18,100,216  | 18,284,071  | 18,538,166  | 18,797,541  | 19,121,891  | 19,306,939  | 19,561,259  | 19,810,148  |
| Ind., Inst., & Cmcl. Interrup. Therms    | 5,017,508   | 5,017,507   | 5,033,592   | 5,016,940   | 5,016,341   | 5,016,341   | 5,032,992   | 5,016,908   | 5,016,309   | 5,015,742   |
| <b>Total Core Therms</b>                 | 390,996,330 | 395,948,372 | 402,488,268 | 405,790,703 | 410,739,750 | 415,757,299 | 422,377,015 | 425,664,863 | 430,615,596 | 435,497,549 |
| Daily BaseLoad Therms                    | 332,636     | 336,674     | 339,885     | 339,825     | 346,042     | 344,503     | 402,625     | 395,089     | 397,427     | 394,340     |
| Peak Day Therms                          | 4,048,981   | 4,103,559   | 4,222,531   | 4,277,932   | 4,333,334   | 4,380,735   | 4,377,067   | 4,499,601   | 4,555,003   | 4,610,404   |
| Therms Per Residential Customer          | 142,049     | 142,073     | 143,088     | 142,073     | 142,076     | 142,083     | 143,100     | 142,090     | 142,093     | 142,091     |
| Therms Per Commercial Customer           | 256,736     | 256,675     | 257,530     | 256,527     | 256,480     | 256,485     | 257,360     | 256,424     | 256,396     | 256,329     |
| Therms Per Industrial Customer           | 909,765     | 909,682     | 912,702     | 909,357     | 909,249     | 909,370     | 912,387     | 909,221     | 909,139     | 908,873     |
| Residential Customers                    | 314,733     | 319,936     | 325,138     | 330,340     | 335,543     | 340,745     | 345,947     | 351,150     | 356,352     | 361,554     |
| Commercial Customers                     | 41,009      | 41,391      | 41,773      | 42,155      | 42,537      | 42,919      | 43,301      | 43,683      | 44,065      | 44,446      |
| Industrial Customers                     | 744         | 754         | 765         | 776         | 786         | 797         | 807         | 818         | 829         | 839         |
| Interruptible Customers                  | 13          | 13          | 13          | 13          | 13          | 13          | 13          | 13          | 13          | 13          |
| <b>Total Core Customers</b>              | 356,499     | 362,094     | 367,689     | 373,284     | 378,879     | 384,473     | 390,069     | 395,663     | 401,258     | 406,853     |

**Appendix B  
Demand Forecast  
Low Scenario**

| Athena                                | 2020             | 2021             | 2022             | 2023             | 2024             | 2025             | 2026             | 2027             | 2028             | 2029             |
|---------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| <b>Total Therms Pct. Growth</b>       |                  | -0.12%           | 0.36%            | 0.37%            | 0.79%            | -0.06%           | 0.35%            | 0.35%            | 0.77%            | -0.07%           |
| Residential Therms                    | 298,610          | 299,007          | 300,973          | 302,933          | 306,165          | 306,824          | 308,747          | 310,660          | 313,851          | 314,448          |
| Commercial Therms                     | 133,705          | 132,803          | 132,467          | 132,130          | 132,366          | 131,470          | 131,138          | 130,801          | 131,020          | 130,137          |
| Industrial Therms                     | 6,409            | 6,381            | 6,328            | 6,316            | 6,345            | 6,317            | 6,265            | 6,253            | 6,278            | 6,253            |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>438,724</b>   | <b>438,191</b>   | <b>439,768</b>   | <b>441,379</b>   | <b>444,876</b>   | <b>444,611</b>   | <b>446,150</b>   | <b>447,714</b>   | <b>451,149</b>   | <b>450,838</b>   |
| Daily BaseLoad Therms                 | 281              | 282              | 274              | 290              | 293              | 296              | 299              | 299              | 305              | 307              |
| Peak Day Therms                       | 4,907            | 4,925            | 4,941            | 4,958            | 4,962            | 4,978            | 5,008            | 5,024            | 5,041            | 5,057            |
| Therms Per Residential Customer       | 572              | 569              | 569              | 569              | 572              | 569              | 569              | 569              | 571              | 569              |
| Therms Per Commercial Customer        | 2,059            | 2,051            | 2,051            | 2,051            | 2,059            | 2,051            | 2,051            | 2,051            | 2,059            | 2,051            |
| Therms Per Industrial Customer        | 6,409            | 6,381            | 6,386            | 6,380            | 6,409            | 6,381            | 6,387            | 6,381            | 6,406            | 6,381            |
| Residential Customers                 | 522              | 525              | 529              | 532              | 536              | 539              | 542              | 546              | 549              | 552              |
| Commercial Customers                  | 65               | 65               | 65               | 64               | 64               | 64               | 64               | 64               | 64               | 63               |
| Industrial Customers                  | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>588</b>       | <b>591</b>       | <b>594</b>       | <b>598</b>       | <b>601</b>       | <b>604</b>       | <b>607</b>       | <b>611</b>       | <b>614</b>       | <b>617</b>       |
| <b>Baker</b>                          | <b>2020</b>      | <b>2021</b>      | <b>2022</b>      | <b>2023</b>      | <b>2024</b>      | <b>2025</b>      | <b>2026</b>      | <b>2027</b>      | <b>2028</b>      | <b>2029</b>      |
| <b>Total Therms Pct. Growth</b>       |                  | -0.46%           | 0.24%            | 0.23%            | 0.86%            | -0.40%           | 0.22%            | 0.22%            | 0.86%            | -0.42%           |
| Residential Therms                    | 2,242,512        | 2,238,548        | 2,251,942        | 2,265,186        | 2,293,096        | 2,291,202        | 2,304,279        | 2,317,201        | 2,345,556        | 2,343,831        |
| Commercial Therms                     | 1,546,061        | 1,532,531        | 1,528,754        | 1,524,910        | 1,530,585        | 1,517,148        | 1,513,304        | 1,509,462        | 1,515,249        | 1,501,769        |
| Industrial Therms                     | 127,398          | 126,766          | 126,385          | 126,090          | 126,122          | 125,494          | 125,106          | 124,811          | 124,861          | 124,222          |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>3,915,971</b> | <b>3,897,845</b> | <b>3,907,101</b> | <b>3,916,186</b> | <b>3,949,804</b> | <b>3,933,924</b> | <b>3,942,690</b> | <b>3,951,474</b> | <b>3,985,617</b> | <b>3,968,822</b> |
| Daily BaseLoad Therms                 | 2,304            | 2,317            | 2,322            | 2,333            | 2,349            | 2,360            | 2,370            | 2,383            | 2,388            | 2,399            |
| Peak Day Therms                       | 42,784           | 42,898           | 43,009           | 43,120           | 43,423           | 43,534           | 43,447           | 43,554           | 43,660           | 43,767           |
| Therms Per Residential Customer       | 663              | 659              | 659              | 659              | 663              | 659              | 659              | 659              | 663              | 659              |
| Therms Per Commercial Customer        | 3,019            | 3,000            | 3,001            | 3,001            | 3,020            | 3,001            | 3,001            | 3,001            | 3,021            | 3,002            |
| Therms Per Industrial Customer        | 42,501           | 42,397           | 42,399           | 42,395           | 42,501           | 42,397           | 42,397           | 42,393           | 42,506           | 42,397           |
| Residential Customers                 | 3,380            | 3,399            | 3,419            | 3,439            | 3,459            | 3,479            | 3,499            | 3,518            | 3,538            | 3,557            |
| Commercial Customers                  | 512              | 511              | 509              | 508              | 507              | 506              | 504              | 503              | 502              | 500              |
| Industrial Customers                  | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>3,895</b>     | <b>3,913</b>     | <b>3,931</b>     | <b>3,950</b>     | <b>3,969</b>     | <b>3,988</b>     | <b>4,006</b>     | <b>4,024</b>     | <b>4,043</b>     | <b>4,061</b>     |
| <b>Umatilla</b>                       | <b>2020</b>      | <b>2021</b>      | <b>2022</b>      | <b>2023</b>      | <b>2024</b>      | <b>2025</b>      | <b>2026</b>      | <b>2027</b>      | <b>2028</b>      | <b>2029</b>      |
| <b>Total Therms Pct. Growth</b>       |                  | -0.09%           | 0.19%            | 0.50%            | 0.98%            | 0.08%            | 0.13%            | 0.44%            | 0.94%            | 0.02%            |
| Residential Therms                    | 402,515          | 408,677          | 419,558          | 430,149          | 442,971          | 450,566          | 460,443          | 470,113          | 482,354          | 488,879          |
| Commercial Therms                     | 1,265,653        | 1,258,725        | 1,251,716        | 1,250,688        | 1,255,801        | 1,250,661        | 1,243,616        | 1,242,587        | 1,247,781        | 1,242,608        |
| Industrial Therms                     | 159,084          | 158,127          | 157,798          | 157,335          | 157,491          | 156,539          | 156,208          | 155,745          | 155,904          | 154,952          |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>1,827,252</b> | <b>1,825,528</b> | <b>1,829,072</b> | <b>1,838,172</b> | <b>1,856,264</b> | <b>1,857,767</b> | <b>1,860,267</b> | <b>1,868,445</b> | <b>1,886,038</b> | <b>1,886,438</b> |
| Daily BaseLoad Therms                 | 2,729            | 2,749            | 2,768            | 2,788            | 2,808            | 2,828            | 2,848            | 2,868            | 2,888            | 2,908            |
| Peak Day Therms                       | 13,996           | 14,107           | 14,179           | 14,284           | 14,442           | 14,542           | 14,551           | 14,647           | 14,743           | 14,835           |
| Therms Per Residential Customer       | 465              | 461              | 461              | 461              | 463              | 461              | 461              | 461              | 463              | 461              |
| Therms Per Commercial Customer        | 8,886            | 8,851            | 8,803            | 8,795            | 8,831            | 8,795            | 8,746            | 8,739            | 8,739            | 8,739            |
| Therms Per Industrial Customer        | 26,540           | 26,450           | 26,458           | 26,450           | 26,540           | 26,450           | 26,457           | 26,450           | 26,541           | 26,450           |
| Residential Customers                 | 865              | 887              | 911              | 934              | 956              | 978              | 999              | 1,020            | 1,041            | 1,061            |
| Commercial Customers                  | 142              | 142              | 142              | 142              | 142              | 142              | 142              | 142              | 142              | 142              |
| Industrial Customers                  | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>1,013</b>     | <b>1,035</b>     | <b>1,059</b>     | <b>1,082</b>     | <b>1,104</b>     | <b>1,126</b>     | <b>1,147</b>     | <b>1,168</b>     | <b>1,189</b>     | <b>1,209</b>     |
| <b>Chemult</b>                        | <b>2020</b>      | <b>2021</b>      | <b>2022</b>      | <b>2023</b>      | <b>2024</b>      | <b>2025</b>      | <b>2026</b>      | <b>2027</b>      | <b>2028</b>      | <b>2029</b>      |
| <b>Total Therms Pct. Growth</b>       |                  | -0.69%           | -0.25%           | -0.25%           | 0.20%            | -0.70%           | -0.25%           | -0.25%           | 0.18%            | -0.69%           |
| Residential Therms                    | 13,751           | 13,655           | 13,620           | 13,587           | 13,613           | 13,519           | 13,484           | 13,449           | 13,475           | 13,382           |
| Commercial Therms                     | 40,326           | 40,046           | 39,944           | 39,844           | 39,922           | 39,644           | 39,544           | 39,444           | 39,516           | 39,243           |
| Industrial Therms                     | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>54,077</b>    | <b>53,702</b>    | <b>53,565</b>    | <b>53,431</b>    | <b>53,535</b>    | <b>53,163</b>    | <b>53,028</b>    | <b>52,893</b>    | <b>52,990</b>    | <b>52,624</b>    |
| Daily BaseLoad Therms                 | 56               | 56               | 56               | 56               | 56               | 56               | 56               | 56               | 56               | 56               |
| Peak Day Therms                       | 451              | 449              | 448              | 447              | 444              | 443              | 444              | 443              | 442              | 440              |
| Therms Per Residential Customer       | 540              | 538              | 538              | 538              | 541              | 539              | 539              | 539              | 542              | 539              |
| Therms Per Commercial Customer        | 2,019            | 2,010            | 2,010            | 2,010            | 2,019            | 2,010            | 2,010            | 2,010            | 2,018            | 2,010            |
| Therms Per Industrial Customer        | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Residential Customers                 | 25               | 25               | 25               | 25               | 25               | 25               | 25               | 25               | 25               | 25               |
| Commercial Customers                  | 20               | 20               | 20               | 20               | 20               | 20               | 20               | 20               | 20               | 20               |
| Industrial Customers                  | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>45</b>        | <b>45</b>        | <b>45</b>        | <b>45</b>        | <b>45</b>        | <b>45</b>        | <b>45</b>        | <b>45</b>        | <b>44</b>        | <b>44</b>        |
| <b>Gilchrist</b>                      | <b>2020</b>      | <b>2021</b>      | <b>2022</b>      | <b>2023</b>      | <b>2024</b>      | <b>2025</b>      | <b>2026</b>      | <b>2027</b>      | <b>2028</b>      | <b>2029</b>      |
| <b>Total Therms Pct. Growth</b>       |                  | -0.73%           | -0.25%           | -0.25%           | 0.23%            | -0.73%           | -0.25%           | -0.26%           | 0.23%            | -0.73%           |
| Residential Therms                    | 114,484          | 113,663          | 113,376          | 113,092          | 113,338          | 112,522          | 112,236          | 111,952          | 112,171          | 111,380          |
| Commercial Therms                     | 138,117          | 137,098          | 136,762          | 136,415          | 136,734          | 135,729          | 135,384          | 135,035          | 135,353          | 134,352          |
| Industrial Therms                     | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>252,602</b>   | <b>250,761</b>   | <b>250,138</b>   | <b>249,507</b>   | <b>250,072</b>   | <b>248,250</b>   | <b>247,620</b>   | <b>246,986</b>   | <b>247,544</b>   | <b>245,733</b>   |
| Daily BaseLoad Therms                 | 168              | 168              | 168              | 168              | 168              | 168              | 168              | 168              | 168              | 168              |
| Peak Day Therms                       | 2,315            | 2,309            | 2,303            | 2,297            | 2,292            | 2,286            | 2,280            | 2,274            | 2,268            | 2,263            |
| Therms Per Residential Customer       | 588              | 585              | 585              | 586              | 589              | 586              | 586              | 587              | 590              | 587              |
| Therms Per Commercial Customer        | 3,559            | 3,542            | 3,543            | 3,543            | 3,561            | 3,544            | 3,544            | 3,545            | 3,562            | 3,546            |
| Therms Per Industrial Customer        | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Residential Customers                 | 195              | 194              | 194              | 193              | 193              | 192              | 191              | 191              | 190              | 190              |
| Commercial Customers                  | 39               | 39               | 39               | 39               | 38               | 38               | 38               | 38               | 38               | 38               |
| Industrial Customers                  | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>234</b>       | <b>233</b>       | <b>232</b>       | <b>232</b>       | <b>231</b>       | <b>230</b>       | <b>230</b>       | <b>229</b>       | <b>228</b>       | <b>228</b>       |



Appendix B  
Demand Forecast  
Low Scenario

| Hermiston                             | 2020      | 2021      | 2022      | 2023      | 2024      | 2025      | 2026      | 2027      | 2028      | 2029      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Total Therms Pct. Growth              |           | -0.01%    | 0.64%     | 0.65%     | 1.21%     | 0.10%     | 0.62%     | 0.61%     | 1.08%     | 0.12%     |
| Residential Therms                    | 2,296,048 | 2,306,317 | 2,335,305 | 2,364,564 | 2,408,391 | 2,422,712 | 2,450,951 | 2,478,867 | 2,519,993 | 2,533,764 |
| Commercial Therms                     | 2,934,297 | 2,925,278 | 2,931,243 | 2,938,074 | 2,959,873 | 2,952,643 | 2,959,409 | 2,966,164 | 2,985,290 | 2,979,659 |
| Industrial Therms                     | 180,842   | 179,302   | 178,812   | 178,363   | 179,032   | 177,503   | 177,053   | 176,603   | 177,142   | 175,704   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 5,411,187 | 5,410,897 | 5,445,360 | 5,481,001 | 5,547,296 | 5,552,858 | 5,587,413 | 5,621,635 | 5,682,426 | 5,689,126 |
| Daily BaseLoad Therms                 | 5,123     | 4,507     | 4,425     | 5,315     | 5,410     | 5,490     | 5,534     | 4,896     | 5,653     | 5,658     |
| Peak Day Therms                       | 56,723    | 57,130    | 57,533    | 57,931    | 56,723    | 57,103    | 59,103    | 59,484    | 59,865    | 60,238    |
| Therms Per Residential Customer       | 539       | 535       | 535       | 535       | 538       | 535       | 535       | 535       | 538       | 535       |
| Therms Per Commercial Customer        | 3,867     | 3,846     | 3,843     | 3,840     | 3,858     | 3,837     | 3,835     | 3,833     | 3,847     | 3,829     |
| Therms Per Industrial Customer        | 22,629    | 22,492    | 22,487    | 22,487    | 22,629    | 22,492    | 22,492    | 22,492    | 22,619    | 22,492    |
| Residential Customers                 | 4,259     | 4,310     | 4,366     | 4,421     | 4,475     | 4,528     | 4,581     | 4,634     | 4,685     | 4,736     |
| Commercial Customers                  | 759       | 761       | 763       | 765       | 767       | 769       | 772       | 774       | 776       | 778       |
| Industrial Customers                  | 8         | 8         | 8         | 8         | 8         | 8         | 8         | 8         | 8         | 8         |
| Interruptible Customers               | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         |
| Total Core Customers                  | 5,026     | 5,080     | 5,138     | 5,195     | 5,251     | 5,307     | 5,362     | 5,416     | 5,470     | 5,523     |
| Huntington                            | 2020      | 2021      | 2022      | 2023      | 2024      | 2025      | 2026      | 2027      | 2028      | 2029      |
| Total Therms Pct. Growth              |           | -0.84%    | -0.08%    | -0.08%    | 0.58%     | -0.73%    | -0.08%    | -0.08%    | 0.57%     | -0.72%    |
| Residential Therms                    | 63,475    | 62,977    | 62,975    | 62,976    | 63,380    | 62,984    | 62,985    | 62,987    | 63,378    | 62,991    |
| Commercial Therms                     | 29,441    | 29,157    | 29,085    | 29,014    | 29,146    | 28,864    | 28,793    | 28,722    | 28,849    | 28,576    |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 92,916    | 92,134    | 92,061    | 91,990    | 92,526    | 91,848    | 91,779    | 91,709    | 92,227    | 91,567    |
| Daily BaseLoad Therms                 | 15        | 15        | 15        | 15        | 15        | 15        | 15        | 15        | 15        | 15        |
| Peak Day Therms                       | 1,300     | 1,299     | 1,298     | 1,297     | 1,291     | 1,290     | 1,294     | 1,294     | 1,293     | 1,292     |
| Therms Per Residential Customer       | 483       | 480       | 479       | 479       | 483       | 480       | 480       | 480       | 482       | 480       |
| Therms Per Commercial Customer        | 1,969     | 1,954     | 1,954     | 1,954     | 1,967     | 1,953     | 1,953     | 1,953     | 1,966     | 1,952     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 131       | 131       | 131       | 131       | 131       | 131       | 131       | 131       | 131       | 131       |
| Commercial Customers                  | 15        | 15        | 15        | 15        | 15        | 15        | 15        | 15        | 15        | 15        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 146       | 146       | 146       | 146       | 146       | 146       | 146       | 146       | 146       | 146       |
| La Pine                               | 2020      | 2021      | 2022      | 2023      | 2024      | 2025      | 2026      | 2027      | 2028      | 2029      |
| Total Therms Pct. Growth              |           | -0.16%    | 0.40%     | 0.42%     | 0.92%     | -0.08%    | 0.38%     | 0.37%     | 0.77%     | -0.05%    |
| Residential Therms                    | 162,298   | 164,118   | 167,315   | 170,510   | 174,531   | 176,797   | 179,824   | 182,802   | 186,481   | 188,624   |
| Commercial Therms                     | 375,476   | 372,775   | 371,710   | 370,775   | 371,720   | 369,033   | 368,098   | 367,164   | 367,707   | 365,292   |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 537,775   | 536,892   | 539,025   | 541,285   | 546,251   | 545,830   | 547,922   | 549,966   | 554,188   | 553,917   |
| Daily BaseLoad Therms                 | 455       | 465       | 466       | 471       | 483       | 483       | 488       | 500       | 500       | 512       |
| Peak Day Therms                       | 4,842     | 4,863     | 4,884     | 4,904     | 4,735     | 4,753     | 4,963     | 4,981     | 4,999     | 5,017     |
| Therms Per Residential Customer       | 650       | 645       | 645       | 645       | 648       | 645       | 645       | 645       | 648       | 645       |
| Therms Per Commercial Customer        | 2,819     | 2,806     | 2,806     | 2,806     | 2,821     | 2,808     | 2,808     | 2,809     | 2,821     | 2,810     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 250       | 254       | 259       | 264       | 269       | 274       | 279       | 283       | 288       | 292       |
| Commercial Customers                  | 133       | 133       | 132       | 132       | 132       | 131       | 131       | 131       | 130       | 130       |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 383       | 387       | 392       | 396       | 401       | 405       | 410       | 414       | 418       | 422       |
| Madras                                | 2020      | 2021      | 2022      | 2023      | 2024      | 2025      | 2026      | 2027      | 2028      | 2029      |
| Total Therms Pct. Growth              |           | -0.29%    | 0.12%     | 0.20%     | 0.74%     | -0.29%    | 0.13%     | 0.18%     | 0.65%     | -0.26%    |
| Residential Therms                    | 708,792   | 712,598   | 721,370   | 730,203   | 742,926   | 747,739   | 756,270   | 764,706   | 776,672   | 781,301   |
| Commercial Therms                     | 1,175,648 | 1,171,051 | 1,170,793 | 1,170,815 | 1,176,911 | 1,171,181 | 1,171,206 | 1,171,237 | 1,176,466 | 1,171,318 |
| Industrial Therms                     | 914,885   | 907,859   | 905,379   | 903,091   | 905,727   | 898,748   | 896,482   | 894,193   | 896,147   | 889,638   |
| Ind., Inst., & Cmcl. Interrup. Therms | 280,483   | 279,229   | 276,851   | 276,369   | 277,678   | 276,437   | 274,127   | 273,644   | 274,738   | 273,644   |
| Total Core Therms                     | 3,079,809 | 3,070,738 | 3,074,393 | 3,080,477 | 3,103,243 | 3,094,105 | 3,098,086 | 3,103,780 | 3,124,023 | 3,115,902 |
| Daily BaseLoad Therms                 | 2,498     | 2,229     | 1,649     | 2,539     | 2,573     | 2,542     | 2,575     | 2,612     | 2,603     | 2,641     |
| Peak Day Therms                       | 29,647    | 29,713    | 29,762    | 29,826    | 29,149    | 29,209    | 30,002    | 30,061    | 30,127    | 30,184    |
| Therms Per Residential Customer       | 565       | 561       | 561       | 561       | 564       | 561       | 561       | 561       | 564       | 561       |
| Therms Per Commercial Customer        | 3,100     | 3,086     | 3,085     | 3,085     | 3,101     | 3,086     | 3,086     | 3,086     | 3,100     | 3,086     |
| Therms Per Industrial Customer        | 50,884    | 50,619    | 50,608    | 50,607    | 50,884    | 50,619    | 50,620    | 50,619    | 50,840    | 50,620    |
| Residential Customers                 | 1,255     | 1,270     | 1,286     | 1,301     | 1,317     | 1,332     | 1,348     | 1,363     | 1,378     | 1,392     |
| Commercial Customers                  | 379       | 379       | 379       | 379       | 379       | 380       | 380       | 380       | 380       | 380       |
| Industrial Customers                  | 18        | 18        | 18        | 18        | 18        | 18        | 18        | 18        | 18        | 18        |
| Interruptible Customers               | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         |
| Total Core Customers                  | 1,653     | 1,668     | 1,684     | 1,700     | 1,715     | 1,731     | 1,746     | 1,761     | 1,776     | 1,790     |
| Milton-Freewater                      | 2020      | 2021      | 2022      | 2023      | 2024      | 2025      | 2026      | 2027      | 2028      | 2029      |
| Total Therms Pct. Growth              |           | -0.81%    | -0.22%    | -0.19%    | 0.48%     | -0.81%    | -0.19%    | -0.19%    | 0.37%     | -0.74%    |
| Residential Therms                    | 107,228   | 106,515   | 106,487   | 106,491   | 107,281   | 106,544   | 106,549   | 106,556   | 107,241   | 106,573   |
| Commercial Therms                     | 294,280   | 291,824   | 290,989   | 290,261   | 291,334   | 288,895   | 288,165   | 287,437   | 288,101   | 285,967   |
| Industrial Therms                     | 31,098    | 30,783    | 30,711    | 30,612    | 30,796    | 30,475    | 30,401    | 30,330    | 30,450    | 30,180    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 432,606   | 429,122   | 428,186   | 427,364   | 429,410   | 425,914   | 425,115   | 424,323   | 425,872   | 422,720   |
| Daily BaseLoad Therms                 | 413       | 416       | 414       | 405       | 411       | 414       | 414       | 416       | 405       | 394       |
| Peak Day Therms                       | 4,505     | 4,497     | 4,489     | 4,481     | 4,326     | 4,318     | 4,458     | 4,450     | 4,442     | 4,434     |
| Therms Per Residential Customer       | 453       | 450       | 450       | 450       | 453       | 450       | 450       | 450       | 453       | 450       |
| Therms Per Commercial Customer        | 2,860     | 2,844     | 2,843     | 2,844     | 2,862     | 2,845     | 2,846     | 2,846     | 2,861     | 2,847     |
| Therms Per Industrial Customer        | 5,486     | 5,450     | 5,457     | 5,458     | 5,511     | 5,473     | 5,479     | 5,485     | 5,526     | 5,497     |
| Residential Customers                 | 237       | 237       | 237       | 237       | 237       | 237       | 237       | 237       | 237       | 237       |
| Commercial Customers                  | 103       | 103       | 102       | 102       | 102       | 102       | 101       | 101       | 101       | 100       |
| Industrial Customers                  | 6         | 6         | 6         | 6         | 6         | 6         | 6         | 6         | 6         | 5         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 345       | 345       | 345       | 344       | 344       | 344       | 344       | 343       | 343       | 343       |

**Appendix B  
Demand Forecast  
Low Scenario**

| Mission Tap                           | 2020             | 2021             | 2022             | 2023             | 2024             | 2025             | 2026             | 2027             | 2028             | 2029             |
|---------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| <b>Total Therms Pct. Growth</b>       |                  | -0.37%           | 0.00%            | 0.00%            | 0.37%            | -0.37%           | 0.00%            | 0.00%            | 0.38%            | -0.38%           |
| Residential Therms                    | 121,002          | 120,527          | 120,529          | 120,527          | 121,002          | 120,527          | 120,525          | 120,522          | 121,011          | 120,527          |
| Commercial Therms                     | 371,060          | 369,724          | 369,736          | 369,733          | 371,061          | 369,725          | 369,721          | 369,718          | 371,090          | 369,724          |
| Industrial Therms                     | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>492,062</b>   | <b>490,251</b>   | <b>490,265</b>   | <b>490,260</b>   | <b>492,062</b>   | <b>490,252</b>   | <b>490,246</b>   | <b>490,240</b>   | <b>492,101</b>   | <b>490,252</b>   |
| Daily BaseLoad Therms                 | 546              | 546              | 546              | 546              | 546              | 546              | 546              | 546              | 546              | 546              |
| Peak Day Therms                       | 4,459            | 4,459            | 4,459            | 4,460            | 4,480            | 4,460            | 4,460            | 4,461            | 4,461            | 4,461            |
| Therms Per Residential Customer       | 561              | 559              | 559              | 559              | 562              | 560              | 560              | 560              | 562              | 560              |
| Therms Per Commercial Customer        | 8,294            | 8,266            | 8,267            | 8,269            | 8,300            | 8,272            | 8,273            | 8,275            | 8,307            | 8,278            |
| Therms Per Industrial Customer        | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Residential Customers                 | 216              | 216              | 215              | 215              | 215              | 215              | 215              | 215              | 215              | 215              |
| Commercial Customers                  | 45               | 45               | 45               | 45               | 45               | 45               | 45               | 45               | 45               | 45               |
| Industrial Customers                  | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>260</b>       | <b>260</b>       | <b>260</b>       | <b>260</b>       | <b>260</b>       | <b>260</b>       | <b>260</b>       | <b>260</b>       | <b>260</b>       | <b>260</b>       |
| <b>Nyssa-Ontario</b>                  | <b>2020</b>      | <b>2021</b>      | <b>2022</b>      | <b>2023</b>      | <b>2024</b>      | <b>2025</b>      | <b>2026</b>      | <b>2027</b>      | <b>2028</b>      | <b>2029</b>      |
| <b>Total Therms Pct. Growth</b>       |                  | -0.27%           | 0.27%            | 0.36%            | 1.00%            | -0.20%           | 0.26%            | 0.24%            | 0.95%            | -0.20%           |
| Residential Therms                    | 2,072,328        | 2,068,508        | 2,080,439        | 2,092,509        | 2,118,593        | 2,116,656        | 2,128,524        | 2,140,327        | 2,165,814        | 2,163,735        |
| Commercial Therms                     | 2,628,157        | 2,620,951        | 2,632,249        | 2,642,853        | 2,670,441        | 2,665,074        | 2,676,434        | 2,686,812        | 2,713,661        | 2,708,344        |
| Industrial Therms                     | 215,830          | 215,703          | 215,704          | 215,741          | 215,842          | 215,829          | 215,868          | 215,890          | 215,933          | 215,967          |
| Ind., Inst., & Cmcl. Interrup. Therms | 942,310          | 937,558          | 929,897          | 928,091          | 932,887          | 928,182          | 920,613          | 918,807          | 923,283          | 918,807          |
| <b>Total Core Therms</b>              | <b>5,858,625</b> | <b>5,842,720</b> | <b>5,858,288</b> | <b>5,879,194</b> | <b>5,937,764</b> | <b>5,925,741</b> | <b>5,941,440</b> | <b>5,961,835</b> | <b>6,018,691</b> | <b>6,008,853</b> |
| Daily BaseLoad Therms                 | 2,984            | 3,074            | 3,039            | 3,087            | 3,101            | 3,113            | 3,164            | 3,255            | 3,237            | 3,286            |
| Peak Day Therms                       | 66,490           | 66,790           | 66,994           | 67,292           | 66,992           | 67,285           | 68,078           | 68,369           | 68,658           | 68,946           |
| Therms Per Residential Customer       | 545              | 541              | 541              | 541              | 545              | 541              | 541              | 541              | 545              | 541              |
| Therms Per Commercial Customer        | 2,806            | 2,786            | 2,785            | 2,783            | 2,799            | 2,780            | 2,779            | 2,777            | 2,792            | 2,775            |
| Therms Per Industrial Customer        | 10,843           | 10,842           | 10,841           | 10,841           | 10,844           | 10,842           | 10,842           | 10,842           | 10,842           | 10,843           |
| Residential Customers                 | 3,800            | 3,821            | 3,843            | 3,866            | 3,888            | 3,910            | 3,932            | 3,954            | 3,976            | 3,997            |
| Commercial Customers                  | 937              | 941              | 945              | 950              | 954              | 959              | 963              | 967              | 972              | 976              |
| Industrial Customers                  | 20               | 20               | 20               | 20               | 20               | 20               | 20               | 20               | 20               | 20               |
| Interruptible Customers               | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                |
| <b>Total Core Customers</b>           | <b>4,757</b>     | <b>4,782</b>     | <b>4,809</b>     | <b>4,836</b>     | <b>4,863</b>     | <b>4,890</b>     | <b>4,916</b>     | <b>4,942</b>     | <b>4,969</b>     | <b>4,995</b>     |
| <b>Pendleton</b>                      | <b>2020</b>      | <b>2021</b>      | <b>2022</b>      | <b>2023</b>      | <b>2024</b>      | <b>2025</b>      | <b>2026</b>      | <b>2027</b>      | <b>2028</b>      | <b>2029</b>      |
| <b>Total Therms Pct. Growth</b>       |                  | -0.33%           | 0.18%            | 0.28%            | 0.88%            | -0.27%           | 0.19%            | 0.27%            | 0.83%            | -0.26%           |
| Residential Therms                    | 2,938,983        | 2,936,314        | 2,954,785        | 2,973,465        | 3,010,402        | 3,010,805        | 3,029,142        | 3,047,371        | 3,083,299        | 3,083,499        |
| Commercial Therms                     | 2,384,902        | 2,371,565        | 2,370,932        | 2,370,839        | 2,384,655        | 2,371,303        | 2,370,948        | 2,370,855        | 2,383,830        | 2,371,037        |
| Industrial Therms                     | 163,201          | 161,526          | 161,170          | 160,702          | 161,568          | 159,955          | 159,595          | 159,095          | 159,907          | 158,284          |
| Ind., Inst., & Cmcl. Interrup. Therms | 692,517          | 689,957          | 683,858          | 682,962          | 685,592          | 683,058          | 677,056          | 676,158          | 678,476          | 676,158          |
| <b>Total Core Therms</b>              | <b>6,179,602</b> | <b>6,159,363</b> | <b>6,170,745</b> | <b>6,187,967</b> | <b>6,242,217</b> | <b>6,225,071</b> | <b>6,236,709</b> | <b>6,253,479</b> | <b>6,305,512</b> | <b>6,288,979</b> |
| Daily BaseLoad Therms                 | 5,551            | 5,577            | 5,597            | 5,575            | 5,631            | 5,674            | 5,700            | 5,726            | 5,698            | 5,672            |
| Peak Day Therms                       | 64,523           | 64,733           | 64,896           | 65,105           | 64,594           | 64,798           | 65,678           | 65,881           | 66,086           | 66,287           |
| Therms Per Residential Customer       | 579              | 575              | 575              | 575              | 578              | 575              | 575              | 575              | 578              | 575              |
| Therms Per Commercial Customer        | 3,160            | 3,143            | 3,142            | 3,141            | 3,160            | 3,142            | 3,141            | 3,141            | 3,158            | 3,141            |
| Therms Per Industrial Customer        | 27,227           | 27,019           | 27,023           | 27,016           | 27,227           | 27,019           | 27,025           | 27,019           | 27,222           | 27,019           |
| Residential Customers                 | 5,078            | 5,108            | 5,141            | 5,174            | 5,206            | 5,208            | 5,210            | 5,210            | 5,302            | 5,334            |
| Commercial Customers                  | 755              | 755              | 755              | 755              | 755              | 755              | 755              | 755              | 755              | 755              |
| Industrial Customers                  | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                |
| Interruptible Customers               | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                |
| <b>Total Core Customers</b>           | <b>5,839</b>     | <b>5,870</b>     | <b>5,903</b>     | <b>5,935</b>     | <b>5,968</b>     | <b>6,000</b>     | <b>6,032</b>     | <b>6,064</b>     | <b>6,096</b>     | <b>6,127</b>     |
| <b>Prineville</b>                     | <b>2020</b>      | <b>2021</b>      | <b>2022</b>      | <b>2023</b>      | <b>2024</b>      | <b>2025</b>      | <b>2026</b>      | <b>2027</b>      | <b>2028</b>      | <b>2029</b>      |
| <b>Total Therms Pct. Growth</b>       |                  | 0.21%            | 0.84%            | 0.82%            | 1.34%            | 0.30%            | 0.79%            | 0.76%            | 1.21%            | 0.28%            |
| Residential Therms                    | 1,538,996        | 1,553,403        | 1,579,627        | 1,605,762        | 1,640,075        | 1,657,174        | 1,682,120        | 1,706,701        | 1,738,882        | 1,754,819        |
| Commercial Therms                     | 1,822,946        | 1,817,397        | 1,821,584        | 1,825,594        | 1,839,496        | 1,834,583        | 1,839,133        | 1,843,085        | 1,855,737        | 1,851,540        |
| Industrial Therms                     | 195,483          | 194,138          | 193,606          | 193,117          | 193,526          | 192,189          | 191,700          | 191,211          | 191,485          | 190,241          |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>3,557,426</b> | <b>3,564,937</b> | <b>3,594,817</b> | <b>3,624,472</b> | <b>3,673,096</b> | <b>3,683,945</b> | <b>3,712,953</b> | <b>3,740,997</b> | <b>3,786,104</b> | <b>3,796,600</b> |
| Daily BaseLoad Therms                 | 2,656            | 2,431            | 2,579            | 2,797            | 2,852            | 2,867            | 2,909            | 2,980            | 3,008            | 3,079            |
| Peak Day Therms                       | 35,319           | 35,627           | 35,939           | 36,237           | 35,702           | 35,986           | 37,124           | 37,406           | 37,693           | 37,968           |
| Therms Per Residential Customer       | 587              | 583              | 583              | 583              | 586              | 582              | 582              | 582              | 586              | 582              |
| Therms Per Commercial Customer        | 3,476            | 3,456            | 3,454            | 3,452            | 3,468            | 3,449            | 3,448            | 3,445            | 3,459            | 3,442            |
| Therms Per Industrial Customer        | 6,749            | 6,719            | 6,717            | 6,717            | 6,749            | 6,719            | 6,719            | 6,719            | 6,746            | 6,719            |
| Residential Customers                 | 2,622            | 2,664            | 2,710            | 2,755            | 2,799            | 2,842            | 2,885            | 2,927            | 2,969            | 3,010            |
| Commercial Customers                  | 524              | 526              | 527              | 529              | 530              | 532              | 533              | 535              | 536              | 538              |
| Industrial Customers                  | 29               | 29               | 29               | 29               | 29               | 29               | 29               | 28               | 28               | 28               |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>3,175</b>     | <b>3,219</b>     | <b>3,266</b>     | <b>3,312</b>     | <b>3,358</b>     | <b>3,403</b>     | <b>3,447</b>     | <b>3,491</b>     | <b>3,534</b>     | <b>3,576</b>     |
| <b>Redmond</b>                        | <b>2020</b>      | <b>2021</b>      | <b>2022</b>      | <b>2023</b>      | <b>2024</b>      | <b>2025</b>      | <b>2026</b>      | <b>2027</b>      | <b>2028</b>      | <b>2029</b>      |
| <b>Total Therms Pct. Growth</b>       |                  | 0.87%            | 1.56%            | 1.54%            | 2.04%            | 0.94%            | 1.41%            | 1.36%            | 1.77%            | 0.85%            |
| Residential Therms                    | 4,177,006        | 4,224,641        | 4,305,183        | 4,385,729        | 4,489,122        | 4,544,244        | 4,620,702        | 4,695,915        | 4,790,628        | 4,842,798        |
| Commercial Therms                     | 3,820,774        | 3,833,189        | 3,870,337        | 3,900,034        | 3,946,935        | 3,983,897        | 4,020,828        | 4,057,123        | 4,111,678        | 4,128,945        |
| Industrial Therms                     | 764,938          | 781,158          | 801,486          | 821,459          | 844,830          | 860,434          | 879,164          | 897,387          | 918,746          | 932,934          |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>8,762,719</b> | <b>8,838,989</b> | <b>8,977,007</b> | <b>9,115,222</b> | <b>9,300,887</b> | <b>9,388,576</b> | <b>9,520,694</b> | <b>9,650,424</b> | <b>9,820,852</b> | <b>9,904,697</b> |
| Daily BaseLoad Therms                 | 7,113            | 7,442            | 6,298            | 7,832            | 8,205            | 8,340            | 8,585            | 8,933            | 9,059            | 9,430            |
| Peak Day Therms                       | 86,556           | 87,929           | 89,281           | 90,610           | 88,786           | 90,029           | 94,479           | 95,727           | 96,962           | 98,178           |
| Therms Per Residential Customer       | 752              | 747              | 747              | 747              | 751              | 747              | 747              | 747              | 750              | 747              |
| Therms Per Commercial Customer        | 3,246            | 3,226            | 3,224            | 3,223            | 3,240            | 3,223            | 3,223            | 3,222            | 3,236            | 3,221            |
| Therms Per Industrial Customer        | 39,001           | 38,811           | 38,802           | 38,803           | 38,977           | 38,814           | 38,815           | 38,816           | 38,962           | 38,817           |
| Residential Customers                 | 5,552            | 5,654            | 5,764            | 5,872            | 5,978            | 6,082            | 6,185            | 6,285            | 6,384            | 6,482            |
| Commercial Customers                  | 1,177            | 1,188            | 1,200            | 1,212            | 1,224            | 1,236            | 1,248            | 1,259            | 1,271            | 1,282            |
| Industrial Customers                  | 20               | 20               | 21               | 21               | 22               | 22               | 23               | 23               | 24               | 24               |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>6,749</b>     | <b>6,863</b>     | <b>6,985</b>     | <b>7,106</b>     | <b>7,224</b>     | <b>7,340</b>     | <b>7,455</b>     | <b>7,568</b>     | <b>7,679</b>     | <b>7,788</b>     |

Appendix B  
Demand Forecast  
Low Scenario

|                                       | 2020      | 2021      | 2022      | 2023      | 2024      | 2025      | 2026      | 2027      | 2028      | 2029      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Stanfield</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              |           | -0.08%    | 0.59%     | 0.59%     | 1.08%     | 0.08%     | 0.56%     | 0.55%     | 1.02%     | 0.07%     |
| Residential Therms                    | 198,137   | 198,479   | 200,326   | 202,173   | 205,043   | 205,848   | 207,648   | 209,431   | 212,217   | 212,965   |
| Commercial Therms                     | 80,289    | 79,712    | 79,509    | 79,305    | 79,485    | 78,912    | 78,716    | 78,512    | 78,668    | 78,112    |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 278,426   | 278,190   | 279,835   | 281,478   | 284,528   | 284,760   | 286,363   | 287,943   | 290,885   | 291,076   |
| Daily BaseLoad Therms                 | 200       | 203       | 205       | 206       | 209       | 212       | 215       | 218       | 218       | 219       |
| Peak Day Therms                       | 3,111     | 3,130     | 3,150     | 3,169     | 3,164     | 3,182     | 3,226     | 3,244     | 3,263     | 3,280     |
| Therms Per Residential Customer       | 578       | 574       | 574       | 574       | 577       | 574       | 574       | 574       | 577       | 574       |
| Therms Per Commercial Customer        | 2,172     | 2,162     | 2,162     | 2,172     | 2,172     | 2,162     | 2,162     | 2,162     | 2,172     | 2,162     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 343       | 346       | 349       | 352       | 355       | 358       | 362       | 365       | 368       | 371       |
| Commercial Customers                  | 37        | 37        | 37        | 37        | 37        | 36        | 36        | 36        | 36        | 36        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 380       | 382       | 386       | 389       | 392       | 395       | 398       | 401       | 404       | 407       |
| <b>Stearns (Surviver)</b>             |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              |           | -0.13%    | 0.38%     | 0.38%     | 0.82%     | -0.08%    | 0.36%     | 0.36%     | 0.62%     | -0.10%    |
| Residential Therms                    | 3,713,976 | 3,714,760 | 3,736,022 | 3,757,041 | 3,795,809 | 3,798,670 | 3,819,342 | 3,839,905 | 3,878,995 | 3,880,765 |
| Commercial Therms                     | 1,076,064 | 1,069,364 | 1,066,730 | 1,064,046 | 1,065,291 | 1,058,630 | 1,055,947 | 1,053,264 | 1,054,615 | 1,047,897 |
| Industrial Therms                     | 44,962    | 44,701    | 44,568    | 44,469    | 44,512    | 44,253    | 44,119    | 44,019    | 44,063    | 43,804    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 4,835,002 | 4,828,825 | 4,847,320 | 4,865,556 | 4,905,612 | 4,901,554 | 4,919,408 | 4,937,188 | 4,977,674 | 4,972,466 |
| Daily BaseLoad Therms                 | 5,017     | 4,976     | 5,009     | 5,136     | 5,165     | 5,201     | 5,238     | 5,280     | 5,321     | 5,354     |
| Peak Day Therms                       | 40,666    | 40,785    | 40,963    | 41,139    | 41,490    | 41,665    | 41,663    | 41,835    | 42,007    | 42,178    |
| Therms Per Residential Customer       | 1,002     | 997       | 997       | 997       | 1,001     | 997       | 997       | 997       | 1,001     | 997       |
| Therms Per Commercial Customer        | 4,809     | 4,791     | 4,792     | 4,792     | 4,809     | 4,791     | 4,791     | 4,791     | 4,810     | 4,791     |
| Therms Per Industrial Customer        | 15,000    | 14,950    | 14,952    | 14,952    | 15,000    | 14,950    | 14,951    | 14,951    | 15,000    | 14,950    |
| Residential Customers                 | 3,708     | 3,728     | 3,749     | 3,770     | 3,791     | 3,812     | 3,833     | 3,853     | 3,874     | 3,894     |
| Commercial Customers                  | 224       | 223       | 223       | 222       | 221       | 220       | 220       | 220       | 219       | 219       |
| Industrial Customers                  | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 3,935     | 3,954     | 3,975     | 3,995     | 4,016     | 4,036     | 4,056     | 4,076     | 4,096     | 4,116     |
| <b>Pronghorn</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              |           | 1.02%     | 1.68%     | 1.58%     | 1.91%     | 1.03%     | 1.38%     | 1.33%     | 1.73%     | 0.79%     |
| Residential Therms                    | 386,712   | 395,866   | 408,715   | 421,122   | 435,146   | 444,864   | 456,281   | 467,423   | 480,685   | 488,975   |
| Commercial Therms                     | 326,902   | 324,993   | 324,224   | 323,409   | 323,629   | 321,731   | 320,916   | 320,102   | 320,447   | 318,469   |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 713,614   | 720,859   | 732,939   | 744,531   | 758,775   | 766,595   | 777,197   | 787,525   | 801,132   | 807,444   |
| Daily BaseLoad Therms                 | 974       | 1,006     | 1,032     | 1,061     | 1,088     | 1,117     | 1,145     | 1,178     | 1,204     | 1,233     |
| Peak Day Therms                       | 5,376     | 5,489     | 5,598     | 5,705     | 5,916     | 6,018     | 6,006     | 6,102     | 6,195     | 6,286     |
| Therms Per Residential Customer       | 1,052     | 1,044     | 1,044     | 1,044     | 1,049     | 1,044     | 1,044     | 1,044     | 1,049     | 1,044     |
| Therms Per Commercial Customer        | 9,351     | 9,319     | 9,321     | 9,321     | 9,351     | 9,319     | 9,319     | 9,320     | 9,353     | 9,319     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 368       | 379       | 391       | 403       | 415       | 426       | 437       | 448       | 458       | 468       |
| Commercial Customers                  | 35        | 35        | 35        | 35        | 35        | 35        | 34        | 34        | 34        | 34        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 403       | 414       | 426       | 438       | 449       | 461       | 471       | 482       | 492       | 502       |
| <b>North Bend</b>                     |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              |           | -0.50%    | -0.65%    | 0.02%     | 0.20%     | -0.40%    | -0.64%    | -0.33%    | 0.37%     | -0.29%    |
| Residential Therms                    | 5,916     | 5,879     | 5,863     | 5,858     | 5,860     | 5,830     | 5,815     | 5,790     | 5,795     | 5,773     |
| Commercial Therms                     | 47,087    | 46,908    | 46,496    | 46,512    | 46,655    | 46,521    | 46,116    | 46,015    | 46,174    | 46,089    |
| Industrial Therms                     | 14,463    | 14,342    | 14,331    | 14,335    | 14,324    | 14,224    | 14,218    | 14,126    | 14,210    | 14,127    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 67,467    | 67,130    | 66,691    | 66,705    | 66,838    | 66,574    | 66,149    | 65,931    | 66,178    | 65,989    |
| Daily BaseLoad Therms                 | 11        | 8         | (10)      | 11        | 11        | 11        | 11        | 8         | 11        | 11        |
| Peak Day Therms                       | 337       | 337       | 335       | 334       | 332       | 331       | 331       | 331       | 330       | 330       |
| Therms Per Residential Customer       | 1,481     | 1,475     | 1,475     | 1,477     | 1,481     | 1,477     | 1,477     | 1,475     | 1,480     | 1,478     |
| Therms Per Commercial Customer        | 613       | 597       | 578       | 566       | 556       | 543       | 528       | 517       | 509       | 499       |
| Therms Per Industrial Customer        | 7,232     | 7,204     | 7,202     | 7,237     | 7,234     | 7,217     | 7,217     | 7,204     | 7,250     | 7,241     |
| Residential Customers                 | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         |
| Commercial Customers                  | 77        | 79        | 80        | 82        | 84        | 86        | 87        | 89        | 91        | 92        |
| Industrial Customers                  | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 83        | 85        | 86        | 88        | 90        | 92        | 93        | 95        | 97        | 98        |

**Appendix B  
Demand Forecast  
Low Scenario**

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| Bend Loop  | 2020              | 2021              | 2022              | 2023              | 2024              | 2025              | 2026              | 2027              | 2028              | 2029              |
|--|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| <b>Total Therms Pct. Growth</b>                  |                   | 0.48%             | 1.11%             | 1.10%             | 1.56%             | 0.57%             | 1.02%             | 1.00%             | 1.44%             | 0.50%             |
| Residential Therms                               | 25,170,744        | 25,361,639        | 25,729,928        | 26,095,109        | 26,584,647        | 26,812,881        | 27,163,594        | 27,509,836        | 27,980,885        | 28,189,510        |
| Commercial Therms                                | 12,336,293        | 12,317,542        | 12,361,719        | 12,406,988        | 12,511,353        | 12,498,345        | 12,542,893        | 12,587,451        | 12,688,594        | 12,676,284        |
| Industrial Therms                                | 336,045           | 345,818           | 357,277           | 368,448           | 380,830           | 389,851           | 400,118           | 410,107           | 421,462           | 429,429           |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| <b>Total Core Therms</b>                         | <b>37,843,082</b> | <b>38,024,999</b> | <b>38,448,924</b> | <b>38,870,545</b> | <b>39,474,831</b> | <b>39,701,077</b> | <b>40,106,605</b> | <b>40,507,394</b> | <b>41,090,941</b> | <b>41,295,223</b> |
| Daily BaseLoad Therms                            | 33,686            | 34,056            | 34,486            | 35,921            | 36,824            | 37,464            | 38,220            | 39,039            | 39,699            | 40,583            |
| Peak Day Therms                                  | 346,833           | 350,794           | 354,694           | 358,550           | 358,945           | 362,669           | 369,823           | 373,493           | 377,122           | 380,708           |
| Therms Per Residential Customer                  | 745               | 741               | 741               | 741               | 745               | 741               | 741               | 741               | 744               | 741               |
| Therms Per Commercial Customer                   | 2,918             | 2,903             | 2,902             | 2,901             | 2,914             | 2,900             | 2,899             | 2,898             | 2,910             | 2,897             |
| Therms Per Industrial Customer                   | 12,401            | 12,345            | 12,344            | 12,344            | 12,394            | 12,346            | 12,346            | 12,346            | 12,392            | 12,346            |
| Residential Customers                            | 33,765            | 34,229            | 34,729            | 35,221            | 35,708            | 36,187            | 36,660            | 37,128            | 37,589            | 38,045            |
| Commercial Customers                             | 4,228             | 4,243             | 4,260             | 4,277             | 4,294             | 4,310             | 4,327             | 4,343             | 4,360             | 4,376             |
| Industrial Customers                             | 27                | 28                | 29                | 30                | 31                | 32                | 32                | 33                | 34                | 35                |
| Interruptible Customers                          | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Customers</b>                      | <b>38,020</b>     | <b>38,500</b>     | <b>39,018</b>     | <b>39,528</b>     | <b>40,032</b>     | <b>40,529</b>     | <b>41,020</b>     | <b>41,504</b>     | <b>41,983</b>     | <b>42,456</b>     |
| <b>McCleary (Aberdeen/Hoquiam)</b>               | <b>2020</b>       | <b>2021</b>       | <b>2022</b>       | <b>2023</b>       | <b>2024</b>       | <b>2025</b>       | <b>2026</b>       | <b>2027</b>       | <b>2028</b>       | <b>2029</b>       |
| <b>Total Therms Pct. Growth</b>                  |                   | -0.46%            | 0.03%             | 0.02%             | 0.58%             | -0.47%            | 0.06%             | 0.01%             | 0.48%             | -0.41%            |
| Residential Therms                               | 2,589,251         | 2,586,158         | 2,595,651         | 2,605,921         | 2,630,639         | 2,627,168         | 2,637,325         | 2,647,442         | 2,649,720         | 2,667,551         |
| Commercial Therms                                | 2,955,270         | 2,933,166         | 2,926,158         | 2,917,483         | 2,925,692         | 2,903,726         | 2,897,681         | 2,899,000         | 2,894,210         | 2,874,283         |
| Industrial Therms                                | 278,733           | 276,857           | 276,058           | 275,372           | 275,943           | 274,079           | 273,376           | 272,489           | 272,962           | 271,300           |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| <b>Total Core Therms</b>                         | <b>5,823,253</b>  | <b>5,796,181</b>  | <b>5,797,867</b>  | <b>5,798,776</b>  | <b>5,832,274</b>  | <b>5,804,972</b>  | <b>5,808,381</b>  | <b>5,809,132</b>  | <b>5,836,892</b>  | <b>5,813,134</b>  |
| Daily BaseLoad Therms                            | 5,980             | 6,050             | 6,020             | 6,007             | 6,066             | 6,055             | 6,078             | 6,149             | 6,088             | 6,138             |
| Peak Day Therms                                  | 49,440            | 49,469            | 49,515            | 49,543            | 47,706            | 47,733            | 49,659            | 49,685            | 49,729            | 49,755            |
| Therms Per Residential Customer                  | 719               | 715               | 715               | 715               | 719               | 715               | 715               | 715               | 718               | 715               |
| Therms Per Commercial Customer                   | 4,081             | 4,061             | 4,061             | 4,059             | 4,081             | 4,061             | 4,062             | 4,061             | 4,078             | 4,061             |
| Therms Per Industrial Customer                   | 19,932            | 19,848            | 19,840            | 19,841            | 19,932            | 19,848            | 19,847            | 19,848            | 19,918            | 19,848            |
| Residential Customers                            | 3,602             | 3,617             | 3,631             | 3,646             | 3,660             | 3,674             | 3,689             | 3,703             | 3,717             | 3,731             |
| Commercial Customers                             | 724               | 722               | 721               | 719               | 717               | 713               | 713               | 711               | 710               | 708               |
| Industrial Customers                             | 14                | 14                | 14                | 14                | 14                | 14                | 14                | 14                | 14                | 14                |
| Interruptible Customers                          | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Customers</b>                      | <b>4,341</b>      | <b>4,353</b>      | <b>4,366</b>      | <b>4,378</b>      | <b>4,391</b>      | <b>4,403</b>      | <b>4,416</b>      | <b>4,428</b>      | <b>4,440</b>      | <b>4,453</b>      |
| <b>Acme</b>                                      | <b>2020</b>       | <b>2021</b>       | <b>2022</b>       | <b>2023</b>       | <b>2024</b>       | <b>2025</b>       | <b>2026</b>       | <b>2027</b>       | <b>2028</b>       | <b>2029</b>       |
| <b>Total Therms Pct. Growth</b>                  |                   | -0.73%            | -0.26%            | -0.25%            | 0.24%             | -0.73%            | -0.26%            | -0.26%            | 0.22%             | -0.72%            |
| Residential Therms                               | 55,550            | 55,143            | 55,000            | 54,862            | 54,994            | 54,590            | 54,451            | 54,313            | 54,429            | 54,036            |
| Commercial Therms                                | 31,839            | 31,608            | 31,525            | 31,443            | 31,521            | 31,291            | 31,210            | 31,128            | 31,197            | 30,974            |
| Industrial Therms                                | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| <b>Total Core Therms</b>                         | <b>87,389</b>     | <b>86,751</b>     | <b>86,525</b>     | <b>86,305</b>     | <b>86,514</b>     | <b>85,881</b>     | <b>85,661</b>     | <b>85,441</b>     | <b>85,626</b>     | <b>85,010</b>     |
| Daily BaseLoad Therms                            | 64                | 64                | 64                | 64                | 64                | 64                | 64                | 64                | 64                | 64                |
| Peak Day Therms                                  | 728               | 726               | 724               | 722               | 714               | 712               | 717               | 715               | 713               | 712               |
| Therms Per Residential Customer                  | 818               | 814               | 814               | 814               | 818               | 814               | 814               | 814               | 818               | 814               |
| Therms Per Commercial Customer                   | 3,542             | 3,525             | 3,524             | 3,524             | 3,542             | 3,525             | 3,525             | 3,524             | 3,541             | 3,525             |
| Therms Per Industrial Customer                   | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| Residential Customers                            | 68                | 68                | 68                | 67                | 67                | 67                | 67                | 67                | 67                | 66                |
| Commercial Customers                             | 9                 | 9                 | 9                 | 9                 | 9                 | 9                 | 9                 | 9                 | 9                 | 9                 |
| Industrial Customers                             | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| Interruptible Customers                          | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Customers</b>                      | <b>77</b>         | <b>77</b>         | <b>77</b>         | <b>76</b>         | <b>76</b>         | <b>76</b>         | <b>76</b>         | <b>76</b>         | <b>75</b>         | <b>75</b>         |
| <b>Arlington</b>                                 | <b>2020</b>       | <b>2021</b>       | <b>2022</b>       | <b>2023</b>       | <b>2024</b>       | <b>2025</b>       | <b>2026</b>       | <b>2027</b>       | <b>2028</b>       | <b>2029</b>       |
| <b>Total Therms Pct. Growth</b>                  |                   | 0.08%             | 0.61%             | 0.62%             | 1.11%             | 0.13%             | 0.59%             | 0.58%             | 1.00%             | 0.13%             |
| Residential Therms                               | 3,320,492         | 3,312,332         | 3,320,500         | 3,329,347         | 3,355,030         | 3,347,723         | 3,356,504         | 3,365,262         | 3,388,879         | 3,382,742         |
| Commercial Therms                                | 1,958,514         | 1,963,174         | 1,978,977         | 1,995,070         | 2,020,797         | 2,027,411         | 2,043,138         | 2,058,745         | 2,082,912         | 2,089,664         |
| Industrial Therms                                | 432,557           | 440,611           | 451,415           | 462,057           | 474,682           | 482,835           | 492,809           | 502,580           | 514,221           | 521,629           |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| <b>Total Core Therms</b>                         | <b>5,711,563</b>  | <b>5,716,117</b>  | <b>5,750,892</b>  | <b>5,786,473</b>  | <b>5,850,510</b>  | <b>5,857,969</b>  | <b>5,892,451</b>  | <b>5,926,588</b>  | <b>5,986,013</b>  | <b>5,994,034</b>  |
| Daily BaseLoad Therms                            | 5,522             | 5,641             | 5,684             | 5,763             | 5,879             | 5,916             | 5,995             | 6,116             | 6,156             | 6,200             |
| Peak Day Therms                                  | 44,106            | 44,378            | 44,642            | 44,905            | 43,908            | 44,158            | 45,662            | 45,936            | 46,189            | 46,437            |
| Therms Per Residential Customer                  | 695               | 691               | 691               | 691               | 695               | 691               | 691               | 691               | 694               | 691               |
| Therms Per Commercial Customer                   | 3,167             | 3,151             | 3,150             | 3,150             | 3,165             | 3,150             | 3,150             | 3,150             | 3,163             | 3,150             |
| Therms Per Industrial Customer                   | 13,992            | 13,912            | 13,908            | 13,908            | 13,972            | 13,911            | 13,911            | 13,911            | 13,966            | 13,911            |
| Residential Customers                            | 4,780             | 4,792             | 4,805             | 4,817             | 4,830             | 4,843             | 4,856             | 4,868             | 4,881             | 4,894             |
| Commercial Customers                             | 618               | 623               | 628               | 633               | 638               | 644               | 649               | 653               | 658               | 663               |
| Industrial Customers                             | 31                | 32                | 32                | 33                | 34                | 35                | 35                | 36                | 37                | 37                |
| Interruptible Customers                          | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Customers</b>                      | <b>5,429</b>      | <b>5,447</b>      | <b>5,465</b>      | <b>5,484</b>      | <b>5,503</b>      | <b>5,521</b>      | <b>5,540</b>      | <b>5,558</b>      | <b>5,576</b>      | <b>5,595</b>      |
| <b>Bremerton (Shelton)</b>                       | <b>2020</b>       | <b>2021</b>       | <b>2022</b>       | <b>2023</b>       | <b>2024</b>       | <b>2025</b>       | <b>2026</b>       | <b>2027</b>       | <b>2028</b>       | <b>2029</b>       |
| <b>Total Therms Pct. Growth</b>                  |                   | -0.11%            | 0.42%             | 0.42%             | 0.90%             | -0.05%            | 0.41%             | 0.40%             | 0.86%             | -0.05%            |
| Residential Therms                               | 23,179,188        | 23,228,944        | 23,424,529        | 23,620,047        | 23,932,931        | 24,007,962        | 24,198,802        | 24,388,153        | 24,693,789        | 24,762,484        |
| Commercial Therms                                | 21,766,395        | 21,682,429        | 21,697,750        | 21,712,806        | 21,823,727        | 21,745,542        | 21,761,731        | 21,778,161        | 21,882,299        | 21,806,138        |
| Industrial Therms                                | 445,921           | 442,606           | 441,498           | 440,372           | 441,467           | 438,165           | 437,086           | 435,960           | 436,944           | 433,723           |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| <b>Total Core Therms</b>                         | <b>47,953,722</b> | <b>47,899,148</b> | <b>48,100,251</b> | <b>48,301,190</b> | <b>48,734,712</b> | <b>48,711,312</b> | <b>48,908,754</b> | <b>49,102,899</b> | <b>49,523,028</b> | <b>49,496,462</b> |
| Daily BaseLoad Therms                            | 51,332            | 51,835            | 52,147            | 52,566            | 53,120            | 53,429            | 53,848            | 54,358            | 54,663            | 55,199            |
| Peak Day Therms                                  | 373,787           | 375,614           | 377,489           | 379,285           | 377,834           | 379,586           | 384,763           | 386,500           | 388,340           | 390,049           |
| Therms Per Residential Customer                  | 695               | 691               | 691               | 691               | 694               | 691               | 691               | 691               | 694               | 691               |
| Therms Per Commercial Customer                   | 7,029             | 6,978             | 6,956             | 6,934             | 6,944             | 6,893             | 6,872             | 6,852             | 6,860             | 6,811             |
| Therms Per Industrial Customer                   | 29,762            | 29,616            | 29,614            | 29,613            | 29,762            | 29,616            | 29,616            | 29,615            | 29,758            | 29,616            |
| Residential Customers                            | 33,373            | 33,637            | 33,923            | 34,206            | 34,487            | 34,765            | 35,042            | 35,316            | 35,588            | 35,859            |
| Commercial Customers                             | 3,096             | 3,107             | 3,119             | 3,131             | 3,143             | 3,155             | 3,167             | 3,178             | 3,190             | 3,202             |
| Industrial Customers                             | 15                | 15                | 15                | 15                | 15                | 15                | 15                | 15                | 15                | 15                |
| Interruptible Customers                          | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 |
| <b>Total Core Customers</b>                      | <b>36,488</b>     | <b>36,762</b>     | <b>37,060</b>     | <b>37,355</b>     | <b>37,648</b>     | <b>37,938</b>     | <b>38,226</b>     | <b>38,512</b>     | <b>38,796</b>     | <b>39,078</b>     |











| 7th Day School                        | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>       |            | -0.34%     | -0.33%     | -0.24%     | 0.20%      | -0.28%     | -0.37%     | 0.08%      | 0.06%      | -0.31%     |
| Residential Therms                    | 8,778      | 8,733      | 8,711      | 8,689      | 8,690      | 8,645      | 8,623      | 8,602      | 8,602      | 8,558      |
| Commercial Therms                     | 11,409     | 11,320     | 11,334     | 11,336     | 11,380     | 11,356     | 11,356     | 11,366     | 11,415     | 11,415     |
| Industrial Therms                     | 9,634      | 9,666      | 9,676      | 9,525      | 9,537      | 9,525      | 9,435      | 9,473      | 9,442      | 9,428      |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 29,821     | 29,719     | 29,621     | 29,550     | 29,608     | 29,526     | 29,417     | 29,440     | 29,459     | 29,368     |
| Daily BaseLoad Therms                 | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         |
| Peak Day Therms                       | 127        | 127        | 127        | 127        | 127        | 127        | 126        | 126        | 126        | 126        |
| Therms Per Residential Customer       | 1,098      | 1,096      | 1,096      | 1,096      | 1,098      | 1,096      | 1,096      | 1,096      | 1,098      | 1,096      |
| Therms Per Commercial Customer        | 2,234      | 2,223      | 2,223      | 2,223      | 2,230      | 2,223      | 2,223      | 2,223      | 2,230      | 2,223      |
| Therms Per Industrial Customer        | 9,634      | 9,666      | 9,665      | 9,621      | 9,634      | 9,621      | 9,620      | 9,666      | 9,634      | 9,620      |
| Residential Customers                 | 8          | 8          | 8          | 8          | 8          | 8          | 8          | 8          | 8          | 8          |
| Commercial Customers                  | 5          | 5          | 5          | 5          | 5          | 5          | 5          | 5          | 5          | 5          |
| Industrial Customers                  | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         |
| <b>Yakima Training Center</b>         | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| <b>Total Therms Pct. Growth</b>       |            | -0.09%     | 0.48%      | 0.47%      | 0.97%      | -0.04%     | 0.46%      | 0.45%      | 0.96%      | -0.07%     |
| Residential Therms                    | 18,407     | 18,552     | 18,881     | 19,205     | 19,611     | 19,834     | 20,141     | 20,444     | 20,841     | 21,038     |
| Commercial Therms                     | 361,747    | 361,263    | 362,763    | 364,242    | 367,549    | 367,177    | 368,645    | 370,099    | 373,455    | 373,001    |
| Industrial Therms                     | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 380,155    | 379,816    | 381,644    | 383,448    | 387,160    | 387,011    | 388,786    | 390,543    | 394,296    | 394,039    |
| Daily BaseLoad Therms                 | 230        | 232        | 234        | 237        | 239        | 241        | 244        | 246        | 248        | 251        |
| Peak Day Therms                       | 4,329      | 4,349      | 4,370      | 4,390      | 4,423      | 4,443      | 4,450      | 4,470      | 4,490      | 4,509      |
| Therms Per Residential Customer       | 802        | 796        | 796        | 796        | 800        | 796        | 796        | 796        | 800        | 796        |
| Therms Per Commercial Customer        | 3,334      | 3,317      | 3,317      | 3,317      | 3,333      | 3,317      | 3,317      | 3,317      | 3,334      | 3,317      |
| Therms Per Industrial Customer        | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Residential Customers                 | 23         | 23         | 24         | 24         | 25         | 25         | 25         | 26         | 26         | 26         |
| Commercial Customers                  | 108        | 109        | 109        | 110        | 110        | 111        | 111        | 112        | 112        | 112        |
| Industrial Customers                  | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 131        | 132        | 133        | 134        | 135        | 136        | 136        | 137        | 138        | 139        |
| <b>Burbank Heights Loop</b>           | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| <b>Total Therms Pct. Growth</b>       |            | 0.61%      | 1.58%      | 1.55%      | 2.20%      | 0.78%      | 1.41%      | 1.37%      | 1.97%      | 0.66%      |
| Residential Therms                    | 6,254,587  | 6,308,296  | 6,428,351  | 6,547,491  | 6,711,661  | 6,780,949  | 6,894,047  | 7,005,320  | 7,160,639  | 7,222,679  |
| Commercial Therms                     | 4,654,954  | 4,671,146  | 4,729,412  | 4,787,695  | 4,878,863  | 4,903,278  | 4,959,557  | 5,014,962  | 5,101,549  | 5,123,963  |
| Industrial Therms                     | 272,313    | 270,573    | 269,832    | 269,153    | 269,586    | 267,857    | 267,178    | 266,499    | 266,736    | 266,141    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 11,181,855 | 11,250,015 | 11,427,595 | 11,604,339 | 11,860,110 | 11,952,085 | 12,120,783 | 12,286,782 | 12,528,923 | 12,611,782 |
| Daily BaseLoad Therms                 | 10,434     | 10,822     | 11,089     | 11,347     | 11,739     | 12,167     | 12,514     | 12,917     | 13,058     | 13,180     |
| Peak Day Therms                       | 130,289    | 132,420    | 134,520    | 136,578    | 136,053    | 138,010    | 142,573    | 144,507    | 146,420    | 148,300    |
| Therms Per Residential Customer       | 553        | 548        | 548        | 548        | 552        | 548        | 548        | 548        | 552        | 548        |
| Therms Per Commercial Customer        | 4,051      | 4,014      | 4,009      | 4,005      | 4,029      | 3,999      | 3,995      | 3,992      | 4,014      | 3,985      |
| Therms Per Industrial Customer        | 22,721     | 22,633     | 22,627     | 22,627     | 22,721     | 22,633     | 22,633     | 22,633     | 22,711     | 22,633     |
| Residential Customers                 | 11,325     | 11,511     | 11,733     | 11,951     | 12,164     | 12,374     | 12,581     | 12,784     | 12,984     | 13,180     |
| Commercial Customers                  | 1,149      | 1,164      | 1,180      | 1,195      | 1,211      | 1,226      | 1,241      | 1,256      | 1,271      | 1,286      |
| Industrial Customers                  | 12         | 12         | 12         | 12         | 12         | 12         | 12         | 12         | 12         | 12         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 12,466     | 12,687     | 12,925     | 13,158     | 13,387     | 13,612     | 13,834     | 14,052     | 14,266     | 14,478     |
| <b>East Stanwood Loop</b>             | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| <b>Total Therms Pct. Growth</b>       |            | -0.13%     | 0.36%      | 0.38%      | 0.84%      | -0.10%     | 0.35%      | 0.36%      | 0.80%      | -0.10%     |
| Residential Therms                    | 5,524,432  | 5,521,828  | 5,550,706  | 5,579,840  | 5,636,769  | 5,638,178  | 5,666,869  | 5,695,415  | 5,751,057  | 5,752,177  |
| Commercial Therms                     | 4,843,469  | 4,834,490  | 4,846,174  | 4,859,405  | 4,893,796  | 4,884,501  | 4,909,228  | 4,909,133  | 4,942,288  | 4,933,195  |
| Industrial Therms                     | 448,347    | 445,599    | 444,586    | 443,540    | 443,848    | 441,238    | 440,255    | 439,189    | 439,294    | 436,753    |
| Ind., Inst., & Cmcl. Interrup. Therms | 95,526     | 95,276     | 94,427     | 94,314     | 94,571     | 94,323     | 93,484     | 93,370     | 93,597     | 93,370     |
| <b>Total Core Therms</b>              | 10,911,774 | 10,897,193 | 10,935,894 | 10,977,099 | 11,068,984 | 11,058,240 | 11,096,836 | 11,137,108 | 11,226,237 | 11,215,495 |
| Daily BaseLoad Therms                 | 11,394     | 11,502     | 11,564     | 11,551     | 11,730     | 11,829     | 11,916     | 12,006     | 12,086     | 12,202     |
| Peak Day Therms                       | 80,463     | 80,758     | 81,075     | 81,397     | 80,990     | 81,234     | 82,384     | 82,699     | 83,021     | 83,362     |
| Therms Per Residential Customer       | 660        | 656        | 656        | 656        | 659        | 656        | 656        | 656        | 659        | 656        |
| Therms Per Commercial Customer        | 4,968      | 4,934      | 4,920      | 4,909      | 4,919      | 4,885      | 4,873      | 4,862      | 4,871      | 4,839      |
| Therms Per Industrial Customer        | 150,158    | 149,949    | 150,410    | 150,693    | 151,657    | 151,455    | 151,987    | 152,320    | 153,198    | 153,023    |
| Residential Customers                 | 8,376      | 8,417      | 8,461      | 8,506      | 8,550      | 8,594      | 8,638      | 8,681      | 8,725      | 8,768      |
| Commercial Customers                  | 975        | 980        | 985        | 990        | 995        | 1,000      | 1,005      | 1,010      | 1,015      | 1,020      |
| Industrial Customers                  | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 9,354      | 9,401      | 9,450      | 9,500      | 9,549      | 9,598      | 9,646      | 9,695      | 9,743      | 9,791      |
| <b>Kennewick Loop</b>                 | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| <b>Total Therms Pct. Growth</b>       |            | 0.46%      | 1.29%      | 1.28%      | 1.87%      | 0.60%      | 1.17%      | 1.15%      | 1.71%      | 0.52%      |
| Residential Therms                    | 10,064,860 | 10,136,249 | 10,308,021 | 10,478,265 | 10,716,724 | 10,812,160 | 10,974,622 | 11,138,712 | 11,363,267 | 11,448,122 |
| Commercial Therms                     | 10,854,441 | 10,888,886 | 11,005,227 | 11,121,691 | 11,302,523 | 11,352,105 | 11,464,720 | 11,576,008 | 11,749,470 | 11,796,984 |
| Industrial Therms                     | 776,693    | 771,598    | 769,535    | 767,591    | 768,918    | 763,855    | 761,926    | 759,982    | 760,577    | 756,111    |
| Ind., Inst., & Cmcl. Interrup. Therms | 208,356    | 207,373    | 205,565    | 205,266    | 206,273    | 205,300    | 203,525    | 203,226    | 204,122    | 203,226    |
| <b>Total Core Therms</b>              | 21,904,350 | 22,004,106 | 22,288,347 | 22,572,814 | 22,994,438 | 23,133,499 | 23,404,793 | 23,673,927 | 24,077,736 | 24,202,443 |
| Daily BaseLoad Therms                 | 24,068     | 24,731     | 25,245     | 25,751     | 26,402     | 27,114     | 27,738     | 28,418     | 28,787     | 29,129     |
| Peak Day Therms                       | 232,059    | 235,314    | 238,503    | 241,660    | 241,570    | 244,604    | 250,855    | 253,843    | 256,793    | 259,709    |
| Therms Per Residential Customer       | 606        | 600        | 600        | 600        | 604        | 604        | 600        | 600        | 604        | 600        |
| Therms Per Commercial Customer        | 4,268      | 4,234      | 4,228      | 4,223      | 4,243      | 4,214      | 4,210      | 4,205      | 4,224      | 4,197      |
| Therms Per Industrial Customer        | 70,689     | 70,401     | 70,390     | 70,389     | 70,689     | 70,401     | 70,402     | 70,401     | 70,664     | 70,401     |
| Residential Customers                 | 16,615     | 16,883     | 17,172     | 17,455     | 17,735     | 18,010     | 18,280     | 18,547     | 18,810     | 18,969     |
| Commercial Customers                  | 2,543      | 2,572      | 2,603      | 2,634      | 2,664      | 2,694      | 2,723      | 2,753      | 2,782      | 2,810      |
| Industrial Customers                  | 11         | 11         | 11         | 11         | 11         | 11         | 11         | 11         | 11         | 11         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 19,170     | 19,467     | 19,787     | 20,101     | 20,410     | 20,715     | 21,016     | 21,312     | 21,604     | 21,892     |

**Appendix B  
Demand Forecast  
Low Scenario**

|                                       | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Longview South Loop</b>            |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | -0.34%     | 0.19%      | 0.23%      | 0.79%      | -0.29%     | 0.20%      | 0.22%      | 0.68%      | -0.24%     |
| Residential Therms                    | 1,064,094  | 1,070,774  | 1,084,953  | 1,099,303  | 1,119,796  | 1,127,846  | 1,141,670  | 1,155,329  | 1,174,271  | 1,182,166  |
| Commercial Therms                     | 4,146,647  | 4,123,196  | 4,120,505  | 4,119,443  | 4,114,544  | 4,119,017  | 4,117,729  | 4,116,647  | 4,114,572  | 4,114,852  |
| Industrial Therms                     | 191,951    | 190,537    | 190,020    | 189,522    | 190,029    | 188,625    | 188,167    | 187,669    | 187,992    | 186,712    |
| Ind., Inst., & Cmcl. Interrup. Therms | 95,555     | 95,085     | 94,270     | 94,105     | 94,599     | 94,134     | 93,349     | 93,183     | 93,586     | 93,183     |
| Total Core Therms                     | 5,498,247  | 5,479,591  | 5,489,749  | 5,502,373  | 5,545,969  | 5,529,621  | 5,540,915  | 5,552,828  | 5,590,421  | 5,576,914  |
| Daily BaseLoad Therms                 | 4,455      | 4,545      | 4,527      | 4,558      | 4,601      | 4,609      | 4,640      | 4,731      | 4,711      | 4,804      |
| Peak Day Therms                       | 46,372     | 46,498     | 46,606     | 46,727     | 47,996     | 45,111     | 47,071     | 47,186     | 47,304     | 47,417     |
| Therms Per Residential Customer       | 525        | 521        | 521        | 521        | 524        | 521        | 521        | 521        | 524        | 521        |
| Therms Per Commercial Customer        | 4,578      | 4,553      | 4,550      | 4,549      | 4,573      | 4,548      | 4,547      | 4,546      | 4,566      | 4,544      |
| Therms Per Industrial Customer        | 14,783     | 14,710     | 14,706     | 14,706     | 14,783     | 14,710     | 14,711     | 14,710     | 14,773     | 14,710     |
| Residential Customers                 | 2,028      | 2,054      | 2,082      | 2,110      | 2,137      | 2,164      | 2,190      | 2,217      | 2,242      | 2,268      |
| Commercial Customers                  | 906        | 906        | 906        | 906        | 906        | 906        | 906        | 906        | 906        | 906        |
| Industrial Customers                  | 13         | 13         | 13         | 13         | 13         | 13         | 13         | 13         | 13         | 13         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 2,948      | 2,974      | 3,002      | 3,029      | 3,056      | 3,083      | 3,110      | 3,136      | 3,162      | 3,187      |
| <b>Sedro-Woolley Loop</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | -0.04%     | 0.56%      | 0.56%      | 1.08%      | 0.04%      | 0.54%      | 0.53%      | 1.02%      | 0.03%      |
| Residential Therms                    | 17,954,404 | 17,954,581 | 18,064,667 | 18,175,759 | 18,282,304 | 18,397,663 | 18,506,758 | 18,615,209 | 18,816,098 | 18,830,199 |
| Commercial Therms                     | 10,041,486 | 10,037,836 | 10,093,556 | 10,149,670 | 10,258,227 | 10,261,898 | 10,317,039 | 10,371,619 | 10,476,718 | 10,479,853 |
| Industrial Therms                     | 1,181,557  | 1,173,570  | 1,170,486  | 1,167,535  | 1,169,738  | 1,161,801  | 1,158,850  | 1,155,898  | 1,157,421  | 1,150,015  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 29,177,447 | 29,165,987 | 29,328,708 | 29,492,965 | 29,810,268 | 29,821,361 | 29,982,647 | 30,142,726 | 30,450,436 | 30,460,068 |
| Daily BaseLoad Therms                 | 29,147     | 29,565     | 29,831     | 30,174     | 30,600     | 30,855     | 31,202     | 31,627     | 31,886     | 32,321     |
| Peak Day Therms                       | 238,810    | 240,200    | 241,591    | 242,962    | 241,451    | 242,789    | 247,045    | 248,382    | 249,721    | 251,042    |
| Therms Per Residential Customer       | 685        | 681        | 681        | 681        | 685        | 681        | 681        | 681        | 685        | 681        |
| Therms Per Commercial Customer        | 2,992      | 2,972      | 2,968      | 2,965      | 2,976      | 2,958      | 2,955      | 2,951      | 2,963      | 2,945      |
| Therms Per Industrial Customer        | 13,563     | 13,504     | 13,502     | 13,502     | 13,561     | 13,503     | 13,503     | 13,502     | 13,557     | 13,501     |
| Residential Customers                 | 26,195     | 26,347     | 26,511     | 26,675     | 26,837     | 26,998     | 27,159     | 27,318     | 27,477     | 27,634     |
| Commercial Customers                  | 3,356      | 3,378      | 3,401      | 3,424      | 3,446      | 3,469      | 3,492      | 3,514      | 3,536      | 3,558      |
| Industrial Customers                  | 87         | 87         | 87         | 86         | 86         | 86         | 86         | 86         | 85         | 85         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 29,639     | 29,811     | 29,999     | 30,185     | 30,370     | 30,553     | 30,736     | 30,918     | 31,098     | 31,278     |
| <b>Sumas SPE Loop</b>                 |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 0.09%      | 0.67%      | 0.67%      | 1.17%      | 0.16%      | 0.65%      | 0.64%      | 1.10%      | 0.15%      |
| Residential Therms                    | 32,853,715 | 32,884,793 | 33,115,605 | 33,348,446 | 33,753,568 | 33,813,101 | 34,041,187 | 34,267,741 | 34,659,727 | 34,716,333 |
| Commercial Therms                     | 16,975,366 | 16,965,383 | 17,048,660 | 17,133,476 | 17,302,890 | 17,303,661 | 17,386,981 | 17,469,800 | 17,632,637 | 17,634,018 |
| Industrial Therms                     | 1,833,146  | 1,856,597  | 1,890,093  | 1,923,183  | 1,963,970  | 1,988,097  | 2,019,694  | 2,050,674  | 2,089,173  | 2,111,496  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 51,662,226 | 51,706,773 | 52,054,358 | 52,405,105 | 53,020,428 | 53,104,859 | 53,447,861 | 53,788,215 | 54,381,536 | 54,461,847 |
| Daily BaseLoad Therms                 | 60,717     | 61,540     | 62,233     | 63,096     | 64,379     | 65,074     | 65,957     | 66,794     | 67,462     | 68,508     |
| Peak Day Therms                       | 387,829    | 390,526    | 393,198    | 395,851    | 392,349    | 394,928    | 403,701    | 406,279    | 408,841    | 411,390    |
| Therms Per Residential Customer       | 729        | 725        | 725        | 725        | 729        | 725        | 725        | 725        | 729        | 725        |
| Therms Per Commercial Customer        | 3,222      | 3,203      | 3,200      | 3,197      | 3,210      | 3,192      | 3,190      | 3,187      | 3,199      | 3,182      |
| Therms Per Industrial Customer        | 24,871     | 24,756     | 24,753     | 24,753     | 24,855     | 24,756     | 24,756     | 24,756     | 24,849     | 24,755     |
| Residential Customers                 | 45,044     | 45,342     | 45,646     | 45,988     | 46,307     | 46,624     | 46,939     | 47,251     | 47,562     | 47,871     |
| Commercial Customers                  | 5,269      | 5,297      | 5,329      | 5,359      | 5,390      | 5,421      | 5,451      | 5,482      | 5,512      | 5,542      |
| Industrial Customers                  | 74         | 75         | 76         | 78         | 79         | 80         | 82         | 83         | 84         | 85         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 50,386     | 50,715     | 51,071     | 51,425     | 51,776     | 52,125     | 52,471     | 52,816     | 53,158     | 53,497     |
| <b>Yakima Loop</b>                    |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 0.04%      | 0.67%      | 0.70%      | 1.28%      | 0.12%      | 0.67%      | 0.66%      | 1.13%      | 0.16%      |
| Residential Therms                    | 12,643,225 | 12,644,668 | 12,729,883 | 12,818,642 | 12,984,043 | 12,998,612 | 13,085,612 | 13,172,042 | 13,324,125 | 13,343,140 |
| Commercial Therms                     | 12,705,634 | 12,692,485 | 12,758,421 | 12,828,702 | 12,975,438 | 12,973,185 | 13,042,271 | 13,110,938 | 13,242,706 | 13,247,199 |
| Industrial Therms                     | 3,135,632  | 3,157,826  | 3,197,485  | 3,238,006  | 3,296,014  | 3,319,138  | 3,358,314  | 3,396,999  | 3,449,270  | 3,473,048  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 28,484,491 | 28,494,979 | 28,685,789 | 28,885,350 | 29,255,495 | 29,290,925 | 29,486,198 | 29,679,979 | 30,016,101 | 30,063,387 |
| Daily BaseLoad Therms                 | 24,267     | 24,964     | 25,058     | 25,431     | 25,726     | 26,127     | 26,499     | 27,226     | 27,291     | 27,967     |
| Peak Day Therms                       | 309,014    | 311,166    | 313,296    | 315,417    | 306,676    | 308,894    | 321,680    | 323,742    | 325,786    | 327,821    |
| Therms Per Residential Customer       | 651        | 647        | 647        | 647        | 651        | 647        | 647        | 647        | 650        | 647        |
| Therms Per Commercial Customer        | 3,600      | 3,576      | 3,573      | 3,571      | 3,590      | 3,568      | 3,566      | 3,564      | 3,580      | 3,561      |
| Therms Per Industrial Customer        | 37,673     | 37,465     | 37,448     | 37,448     | 37,653     | 37,466     | 37,466     | 37,467     | 37,620     | 37,466     |
| Residential Customers                 | 19,413     | 19,541     | 19,680     | 19,818     | 19,955     | 20,091     | 20,227     | 20,361     | 20,494     | 20,627     |
| Commercial Customers                  | 3,529      | 3,549      | 3,571      | 3,593      | 3,614      | 3,636      | 3,657      | 3,678      | 3,699      | 3,720      |
| Industrial Customers                  | 83         | 84         | 85         | 86         | 88         | 89         | 90         | 91         | 92         | 93         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 23,026     | 23,176     | 23,338     | 23,499     | 23,658     | 23,817     | 23,974     | 24,131     | 24,286     | 24,441     |
| <b>Zone 10</b>                        |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | -0.84%     | -0.50%     | -0.36%     | 0.21%      | -0.44%     | -0.36%     | -0.44%     | 0.01%      | -0.72%     |
| Residential Therms                    | 3,164,258  | 3,134,994  | 3,121,019  | 3,108,660  | 3,114,558  | 3,085,518  | 3,073,157  | 3,060,786  | 3,061,724  | 3,036,056  |
| Commercial Therms                     | 5,684,286  | 5,633,824  | 5,599,435  | 5,576,868  | 5,586,864  | 5,537,359  | 5,506,984  | 5,484,329  | 5,482,835  | 5,441,097  |
| Industrial Therms                     | 1,609,231  | 1,600,967  | 1,597,602  | 1,595,328  | 1,600,548  | 1,592,275  | 1,589,951  | 1,587,774  | 1,589,775  | 1,582,620  |
| Ind., Inst., & Cmcl. Interrup. Therms | 59,128     | 59,048     | 58,998     | 58,998     | 59,128     | 59,048     | 59,048     | 59,048     | 59,028     | 59,048     |
| Total Core Therms                     | 10,516,903 | 10,428,832 | 10,377,053 | 10,339,833 | 10,361,098 | 10,274,400 | 10,229,140 | 10,191,937 | 10,193,162 | 10,119,820 |
| Daily BaseLoad Therms                 | 8,804      | 7,756      | 7,562      | 8,694      | 9,020      | 8,969      | 8,698      | 7,638      | 8,607      | 8,801      |
| Peak Day Therms                       | 98,519     | 98,376     | 98,186     | 98,038     | 91,308     | 91,177     | 97,566     | 97,418     | 97,265     | 97,118     |
| Therms Per Residential Customer       | 114,047    | 113,645    | 113,693    | 114,200    | 115,165    | 114,763    | 114,813    | 115,330    | 115,300    | 115,904    |
| Therms Per Commercial Customer        | 21,523     | 21,439     | 21,402     | 21,422     | 21,568     | 21,489     | 21,467     | 21,490     | 21,597     | 21,548     |
| Therms Per Industrial Customer        | 127,395    | 127,010    | 127,008    | 127,040    | 127,713    | 127,287    | 127,356    | 127,475    | 127,902    | 127,614    |
| Residential Customers                 | 5,280      | 5,246      | 5,213      | 5,179      | 5,146      | 5,112      | 5,079      | 5,045      | 5,012      | 4,978      |
| Commercial Customers                  | 1,360      | 1,353      | 1,346      | 1,338      | 1,331      | 1,324      | 1,316      | 1,309      | 1,302      | 1,294      |
| Industrial Customers                  | 54         | 54         | 54         | 54         | 54         | 54         | 53         | 53         | 53         | 53         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 6,695      | 6,654      | 6,613      | 6,572      | 6,531      | 6,490      | 6,449      | 6,409      | 6,368      | 6,327      |

**Appendix B  
Demand Forecast  
Low Scenario**

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| Zone 11  | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>                  |            | -0.07%     | 0.54%      | 0.57%      | 1.15%      | 0.01%      | 0.54%      | 0.54%      | 1.02%      | 0.05%      |
| <b>Residential Therms</b>                        | 13,878,953 | 13,876,816 | 13,966,572 | 14,060,100 | 14,237,639 | 14,249,727 | 14,341,310 | 14,432,262 | 14,595,471 | 14,612,261 |
| <b>Commercial Therms</b>                         | 17,723,455 | 17,683,094 | 17,744,141 | 17,812,890 | 17,985,042 | 17,956,250 | 18,021,609 | 18,088,715 | 18,242,324 | 18,222,624 |
| <b>Industrial Therms</b>                         | 3,666,742  | 3,685,424  | 3,723,852  | 3,763,124  | 3,822,352  | 3,841,997  | 3,880,051  | 3,917,485  | 3,970,621  | 3,991,147  |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> |            |            |            |            |            |            |            |            |            |            |
| <b>Total Core Therms</b>                         | 35,269,150 | 35,245,334 | 35,434,565 | 35,636,115 | 36,045,033 | 36,047,974 | 36,242,971 | 36,438,462 | 36,808,416 | 36,826,032 |
| <b>Daily BaseLoad Therms</b>                     | 32,365     | 33,077     | 33,143     | 33,545     | 33,879     | 34,287     | 34,659     | 35,401     | 35,456     | 36,188     |
| <b>Peak Day Therms</b>                           | 367,838    | 370,035    | 372,197    | 374,356    | 364,280    | 366,340    | 380,739    | 382,834    | 384,925    | 386,998    |
| <b>Therms Per Residential Customer</b>           | 2,909      | 2,891      | 2,891      | 2,892      | 2,909      | 2,894      | 2,895      | 2,896      | 2,912      | 2,898      |
| <b>Therms Per Commercial Customer</b>            | 28,837     | 28,705     | 28,675     | 28,677     | 28,827     | 28,698     | 28,674     | 28,675     | 28,812     | 28,692     |
| <b>Therms Per Industrial Customer</b>            | 95,457     | 95,018     | 95,003     | 95,006     | 95,467     | 95,048     | 95,063     | 95,062     | 95,441     | 95,076     |
| <b>Residential Customers</b>                     | 21,867     | 21,999     | 22,142     | 22,285     | 22,426     | 22,566     | 22,705     | 22,844     | 23,981     | 23,117     |
| <b>Commercial Customers</b>                      | 4,458      | 4,478      | 4,500      | 4,521      | 4,543      | 4,564      | 4,586      | 4,607      | 4,628      | 4,649      |
| <b>Industrial Customers</b>                      | 113        | 114        | 115        | 116        | 117        | 118        | 119        | 120        | 121        | 122        |
| <b>Interruptible Customers</b>                   | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>                      | 26,439     | 26,592     | 26,758     | 26,923     | 27,087     | 27,250     | 27,412     | 27,572     | 27,731     | 27,889     |
| <b>Zone 20</b>                                   |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>                  |            | 0.39%      | 1.21%      | 1.20%      | 1.79%      | 0.53%      | 1.10%      | 1.09%      | 1.64%      | 0.46%      |
| <b>Residential Therms</b>                        | 17,271,555 | 17,391,697 | 17,682,719 | 17,971,344 | 18,377,428 | 18,533,241 | 18,812,037 | 19,082,441 | 19,469,832 | 19,611,914 |
| <b>Commercial Therms</b>                         | 19,400,209 | 19,439,934 | 19,622,260 | 19,805,059 | 20,103,192 | 20,167,523 | 20,344,165 | 20,518,587 | 20,803,252 | 20,861,889 |
| <b>Industrial Therms</b>                         | 1,380,935  | 1,372,169  | 1,368,496  | 1,365,008  | 1,367,098  | 1,358,397  | 1,354,933  | 1,351,443  | 1,352,869  | 1,344,614  |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 302,069    | 300,649    | 298,034    | 297,609    | 299,048    | 297,643    | 295,061    | 294,636    | 294,636    | 294,636    |
| <b>Total Core Therms</b>                         | 38,354,767 | 38,504,450 | 38,971,509 | 39,439,019 | 40,146,766 | 40,360,803 | 40,806,197 | 41,247,307 | 41,921,914 | 42,113,504 |
| <b>Daily BaseLoad Therms</b>                     | 37,250     | 38,731     | 39,160     | 39,937     | 41,011     | 42,189     | 43,193     | 44,706     | 44,847     | 45,358     |
| <b>Peak Day Therms</b>                           | 411,179    | 416,634    | 421,978    | 427,257    | 426,206    | 431,261    | 442,627    | 447,610    | 452,533    | 457,390    |
| <b>Therms Per Residential Customer</b>           | 2,733      | 2,714      | 2,714      | 2,715      | 2,731      | 2,716      | 2,717      | 2,717      | 2,733      | 2,718      |
| <b>Therms Per Commercial Customer</b>            | 23,894     | 23,707     | 23,666     | 23,627     | 23,726     | 23,558     | 23,523     | 23,488     | 23,581     | 23,421     |
| <b>Therms Per Industrial Customer</b>            | 134,493    | 133,980    | 133,959    | 133,954    | 134,491    | 133,980    | 133,979    | 133,973    | 134,453    | 133,978    |
| <b>Residential Customers</b>                     | 29,753     | 30,225     | 30,733     | 31,231     | 31,721     | 32,203     | 32,678     | 33,145     | 33,605     | 34,059     |
| <b>Commercial Customers</b>                      | 4,391      | 4,438      | 4,488      | 4,537      | 4,585      | 4,634      | 4,681      | 4,728      | 4,775      | 4,821      |
| <b>Industrial Customers</b>                      | 39         | 39         | 39         | 39         | 39         | 38         | 38         | 38         | 38         | 38         |
| <b>Interruptible Customers</b>                   | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| <b>Total Core Customers</b>                      | 34,186     | 34,704     | 35,261     | 35,809     | 36,347     | 36,877     | 37,399     | 37,913     | 38,420     | 38,919     |
| <b>Zone 24</b>                                   |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>                  |            | -0.35%     | 0.25%      | 0.30%      | 0.94%      | -0.29%     | 0.25%      | 0.29%      | 0.91%      | -0.29%     |
| <b>Residential Therms</b>                        | 4,378,315  | 4,370,034  | 4,395,376  | 4,400,670  | 4,475,069  | 4,470,922  | 4,495,789  | 4,520,514  | 4,574,698  | 4,569,557  |
| <b>Commercial Therms</b>                         | 4,203,659  | 4,182,638  | 4,190,088  | 4,196,777  | 4,230,172  | 4,211,085  | 4,218,532  | 4,224,996  | 4,257,759  | 4,238,688  |
| <b>Industrial Therms</b>                         | 343,228    | 342,468    | 342,089    | 341,831    | 341,965    | 341,323    | 340,974    | 340,701    | 340,794    | 340,189    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 942,310    | 937,558    | 929,897    | 928,091    | 932,887    | 928,182    | 920,613    | 918,807    | 923,283    | 918,807    |
| <b>Total Core Therms</b>                         | 9,867,512  | 9,832,699  | 9,857,449  | 9,887,370  | 9,980,093  | 9,951,513  | 9,975,908  | 10,005,018 | 10,096,935 | 10,062,241 |
| <b>Daily BaseLoad Therms</b>                     | 5,303      | 5,406      | 5,376      | 5,435      | 5,465      | 5,488      | 5,549      | 5,653      | 5,640      | 5,700      |
| <b>Peak Day Therms</b>                           | 110,574    | 110,988    | 111,302    | 111,709    | 111,707    | 112,109    | 112,820    | 113,217    | 113,611    | 114,005    |
| <b>Therms Per Residential Customer</b>           | 1,692      | 1,680      | 1,679      | 1,679      | 1,690      | 1,679      | 1,679      | 1,679      | 1,690      | 1,679      |
| <b>Therms Per Commercial Customer</b>            | 7,794      | 7,740      | 7,739      | 7,737      | 7,786      | 7,734      | 7,733      | 7,731      | 7,779      | 7,728      |
| <b>Therms Per Industrial Customer</b>            | 53,344     | 53,239     | 53,240     | 53,236     | 53,345     | 53,239     | 53,239     | 53,234     | 53,348     | 53,239     |
| <b>Residential Customers</b>                     | 7,311      | 7,351      | 7,394      | 7,436      | 7,478      | 7,520      | 7,562      | 7,604      | 7,646      | 7,688      |
| <b>Commercial Customers</b>                      | 1,464      | 1,466      | 1,470      | 1,473      | 1,476      | 1,479      | 1,482      | 1,485      | 1,488      | 1,491      |
| <b>Industrial Customers</b>                      | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         |
| <b>Interruptible Customers</b>                   | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>                      | 8,799      | 8,841      | 8,887      | 8,933      | 8,978      | 9,023      | 9,068      | 9,113      | 9,157      | 9,201      |
| <b>Zone 26</b>                                   |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>                  |            | -0.33%     | 0.14%      | 0.22%      | 0.77%      | -0.28%     | 0.16%      | 0.21%      | 0.66%      | -0.23%     |
| <b>Residential Therms</b>                        | 1,241,639  | 1,248,430  | 1,264,063  | 1,279,851  | 1,302,754  | 1,311,237  | 1,326,460  | 1,341,502  | 1,362,830  | 1,371,073  |
| <b>Commercial Therms</b>                         | 4,615,616  | 4,590,574  | 4,584,896  | 4,583,420  | 4,607,100  | 4,583,003  | 4,578,788  | 4,577,448  | 4,596,602  | 4,575,584  |
| <b>Industrial Therms</b>                         | 228,953    | 227,416    | 226,868    | 226,371    | 227,032    | 225,504    | 225,046    | 224,548    | 224,932    | 223,592    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 95,555     | 95,085     | 94,270     | 94,105     | 94,599     | 94,134     | 93,349     | 93,183     | 93,586     | 93,183     |
| <b>Total Core Therms</b>                         | 6,181,764  | 6,161,505  | 6,170,997  | 6,183,746  | 6,231,485  | 6,213,878  | 6,223,643  | 6,236,681  | 6,277,950  | 6,263,431  |
| <b>Daily BaseLoad Therms</b>                     | 7,215      | 7,275      | 7,251      | 7,325      | 7,370      | 7,390      | 7,413      | 7,475      | 7,490      | 7,588      |
| <b>Peak Day Therms</b>                           | 50,686     | 50,823     | 50,926     | 51,058     | 49,245     | 49,370     | 51,418     | 51,542     | 51,671     | 51,795     |
| <b>Therms Per Residential Customer</b>           | 1,779      | 1,768      | 1,767      | 1,767      | 1,777      | 1,767      | 1,767      | 1,767      | 1,776      | 1,767      |
| <b>Therms Per Commercial Customer</b>            | 59,258     | 59,200     | 58,920     | 58,966     | 59,252     | 59,167     | 58,963     | 58,971     | 59,204     | 59,165     |
| <b>Therms Per Industrial Customer</b>            | 16,962     | 16,888     | 16,887     | 16,892     | 16,984     | 16,910     | 16,916     | 16,921     | 16,993     | 16,932     |
| <b>Residential Customers</b>                     | 3,031      | 3,071      | 3,114      | 3,157      | 3,199      | 3,241      | 3,281      | 3,322      | 3,362      | 3,401      |
| <b>Commercial Customers</b>                      | 1,218      | 1,220      | 1,222      | 1,223      | 1,225      | 1,227      | 1,229      | 1,230      | 1,232      | 1,234      |
| <b>Industrial Customers</b>                      | 32         | 32         | 32         | 32         | 32         | 32         | 31         | 31         | 31         | 31         |
| <b>Interruptible Customers</b>                   | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>                      | 4,282      | 4,324      | 4,369      | 4,413      | 4,457      | 4,500      | 4,543      | 4,584      | 4,626      | 4,667      |
| <b>Zone 30-S</b>                                 |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>                  |            | -0.15%     | 0.38%      | 0.37%      | 0.86%      | -0.09%     | 0.37%      | 0.36%      | 0.82%      | -0.09%     |
| <b>Residential Therms</b>                        | 25,768,438 | 25,815,102 | 26,020,180 | 26,225,968 | 26,563,571 | 26,635,129 | 26,836,128 | 27,035,595 | 27,363,509 | 27,430,035 |
| <b>Commercial Therms</b>                         | 24,721,664 | 24,615,595 | 24,623,908 | 24,630,290 | 24,749,620 | 24,649,268 | 24,659,412 | 24,665,161 | 24,716,510 | 24,680,421 |
| <b>Industrial Therms</b>                         | 724,664    | 719,463    | 717,556    | 715,743    | 717,410    | 712,243    | 710,462    | 708,649    | 709,007    | 705,023    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 2,562,208  | 2,545,169  | 2,536,473  | 2,527,966  | 2,536,586  | 2,519,444  | 2,511,135  | 2,502,625  | 2,510,595  | 2,494,118  |
| <b>Total Core Therms</b>                         | 53,776,975 | 53,695,329 | 53,898,117 | 54,099,947 | 54,566,986 | 54,516,284 | 54,717,135 | 54,912,031 | 55,340,521 | 55,309,596 |
| <b>Daily BaseLoad Therms</b>                     | 57,312     | 57,885     | 58,167     | 58,573     | 59,186     | 59,484     | 59,926     | 60,507     | 60,752     | 61,336     |
| <b>Peak Day Therms</b>                           | 423,227    | 425,083    | 427,005    | 428,827    | 425,540    | 427,319    | 434,423    | 436,185    | 438,049    | 439,804    |
| <b>Therms Per Residential Customer</b>           | 1,413      | 1,406      | 1,405      | 1,405      | 1,413      | 1,406      | 1,406      | 1,406      | 1,412      | 1,406      |
| <b>Therms Per Commercial Customer</b>            | 11,110     | 11,038     | 11,017     | 10,994     | 11,024     | 10,953     | 10,935     | 10,912     | 10,938     | 10,872     |
| <b>Therms Per Industrial Customer</b>            | 49,694     | 49,463     | 49,454     | 49,454     | 49,694     | 49,463     | 49,463     | 49,463     | 49,676     | 49,463     |
| <b>Residential Customers</b>                     | 36,976     | 37,254     | 37,554     | 37,852     | 38,147     | 38,440     | 38,731     | 39,019     | 39,305     | 39,590     |
| <b>Commercial Customers</b>                      | 3,821      | 3,830      | 3,840      | 3,850      | 3,860      | 3,870      | 3,880      | 3,890      | 3,900      | 3,909      |
| <b>Industrial Customers</b>                      | 29         | 29         | 29         | 29         | 29         | 29         | 29         | 28         | 28         | 28         |
| <b>Interruptible Customers</b>                   | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| <b>Total Core Customers</b>                      | 40,828     | 41,115     | 41,426     | 41,733     | 42,039     | 42,341     | 42,642     | 42,940     | 43,236     | 43,530     |

Appendix B  
Demand Forecast  
Low Scenario

| Zone 30-W  | 2020       | 2021       | 2022       | 2023       | 2024        | 2025        | 2026        | 2027        | 2028        | 2029        |
|--|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Total Therms Pct. Growth</b>                  |            | 0.02%      | 0.60%      | 0.60%      | 1.10%       | 0.09%       | 0.58%       | 0.57%       | 1.04%       | 0.08%       |
| <b>Residential Therms</b>                        | 59,778,860 | 59,798,448 | 60,176,067 | 60,557,657 | 61,252,229  | 61,320,315  | 61,694,655  | 62,066,660  | 62,739,036  | 62,803,847  |
| <b>Commercial Therms</b>                         | 33,979,672 | 33,960,659 | 34,126,250 | 34,296,141 | 34,634,942  | 34,635,649  | 34,800,745  | 34,966,289  | 35,292,022  | 35,293,304  |
| <b>Industrial Therms</b>                         | 3,896,200  | 3,916,970  | 3,957,166  | 3,996,901  | 4,052,826   | 4,074,557   | 4,112,189   | 4,148,923   | 4,200,891   | 4,220,474   |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 95,526     | 95,276     | 94,427     | 94,214     | 94,571      | 94,322      | 93,484      | 92,370      | 92,697      | 92,370      |
| <b>Total Core Therms</b>                         | 97,750,258 | 97,771,352 | 98,353,910 | 98,945,013 | 100,034,568 | 100,124,845 | 100,701,073 | 101,275,242 | 102,325,547 | 102,410,995 |
| <b>Daily BaseLoad Therms</b>                     | 106,962    | 108,433    | 109,494    | 110,865    | 112,773     | 113,856     | 115,252     | 116,748     | 117,772     | 119,496     |
| <b>Peak Day Therms</b>                           | 753,565    | 758,272    | 762,908    | 767,513    | 770,900     | 765,406     | 781,190     | 785,668     | 790,141     | 794,556     |
| <b>Therms Per Residential Customer</b>           | 6,127      | 6,101      | 6,100      | 6,098      | 6,125       | 6,098       | 6,098       | 6,101       | 6,123       | 6,098       |
| <b>Therms Per Commercial Customer</b>            | 32,359     | 32,205     | 32,157     | 32,143     | 32,283      | 32,137      | 32,092      | 32,077      | 32,206      | 32,071      |
| <b>Therms Per Industrial Customer</b>            | 203,178    | 202,714    | 203,166    | 203,448    | 204,639     | 204,217     | 204,749     | 205,082     | 206,163     | 205,783     |
| <b>Residential Customers</b>                     | 84,557     | 85,060     | 85,605     | 86,147     | 86,685      | 87,220      | 87,751      | 88,279      | 88,804      | 89,325      |
| <b>Commercial Customers</b>                      | 10,259     | 10,319     | 10,383     | 10,447     | 10,511      | 10,574      | 10,637      | 10,699      | 10,761      | 10,823      |
| <b>Industrial Customers</b>                      | 196        | 198        | 199        | 201        | 203         | 205         | 207         | 208         | 210         | 212         |
| <b>Interruptible Customers</b>                   | 1          | 1          | 1          | 1          | 1           | 1           | 1           | 1           | 1           | 1           |
| <b>Total Core Customers</b>                      | 95,013     | 95,578     | 96,189     | 96,797     | 97,400      | 98,000      | 98,596      | 99,188      | 99,776      | 100,361     |

| Zone GTN   | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>                  |            | 0.42%      | 1.04%      | 1.03%      | 1.51%      | 0.50%      | 0.96%      | 0.94%      | 1.38%      | 0.45%      |
| <b>Residential Therms</b>                        | 36,190,813 | 36,458,701 | 36,981,347 | 37,500,184 | 38,200,111 | 38,520,088 | 39,017,312 | 39,507,910 | 40,176,907 | 40,470,293 |
| <b>Commercial Therms</b>                         | 21,239,924 | 21,210,075 | 21,289,808 | 21,371,737 | 21,558,130 | 21,538,206 | 21,618,782 | 21,698,430 | 21,874,754 | 21,857,501 |
| <b>Industrial Therms</b>                         | 2,270,777  | 2,288,016  | 2,316,647  | 2,344,919  | 2,383,750  | 2,399,700  | 2,425,800  | 2,451,043  | 2,486,112  | 2,500,172  |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 280,483    | 279,229    | 276,851    | 276,369    | 277,678    | 276,437    | 274,127    | 273,644    | 274,348    | 274,684    |
| <b>Total Core Therms</b>                         | 59,981,998 | 60,236,022 | 60,864,654 | 61,493,209 | 62,419,669 | 62,734,430 | 63,336,025 | 63,931,027 | 64,812,512 | 65,107,620 |
| <b>Daily BaseLoad Therms</b>                     | 52,834     | 53,040     | 53,040     | 53,040     | 53,040     | 53,040     | 53,040     | 53,040     | 53,040     | 53,040     |
| <b>Peak Day Therms</b>                           | 555,392    | 561,425    | 567,357    | 573,219    | 579,944    | 576,562    | 590,340    | 595,897    | 601,407    | 606,833    |
| <b>Therms Per Residential Customer</b>           | 8,540      | 8,491      | 8,490      | 8,493      | 8,532      | 8,495      | 8,495      | 8,493      | 8,531      | 8,497      |
| <b>Therms Per Commercial Customer</b>            | 38,082     | 37,900     | 37,876     | 37,861     | 38,012     | 37,835     | 37,818     | 37,804     | 37,951     | 37,782     |
| <b>Therms Per Industrial Customer</b>            | 131,266    | 130,649    | 130,625    | 130,660    | 131,237    | 130,665    | 130,665    | 130,655    | 131,209    | 130,693    |
| <b>Residential Customers</b>                     | 48,086     | 48,747     | 49,460     | 50,162     | 50,854     | 51,535     | 52,208     | 52,872     | 53,527     | 54,173     |
| <b>Commercial Customers</b>                      | 6,873      | 6,902      | 6,933      | 6,964      | 6,995      | 7,025      | 7,055      | 7,085      | 7,115      | 7,145      |
| <b>Industrial Customers</b>                      | 99         | 100        | 101        | 103        | 104        | 105        | 106        | 107        | 108        | 110        |
| <b>Interruptible Customers</b>                   | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>                      | 55,058     | 55,750     | 56,495     | 57,229     | 57,953     | 58,666     | 59,370     | 60,065     | 60,751     | 61,429     |

| Zone ME-OR                                       | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>                  |            | -0.19%     | 0.34%      | 0.42%      | 0.98%      | -0.10%     | 0.33%      | 0.40%      | 0.91%      | -0.10%     |
| <b>Residential Therms</b>                        | 6,164,385  | 6,177,357  | 6,237,637  | 6,298,129  | 6,396,212  | 6,417,978  | 6,476,357  | 6,534,088  | 6,627,749  | 6,647,689  |
| <b>Commercial Therms</b>                         | 7,383,897  | 7,349,919  | 7,347,082  | 7,351,725  | 7,395,089  | 7,364,697  | 7,362,998  | 7,367,562  | 7,407,192  | 7,379,132  |
| <b>Industrial Therms</b>                         | 540,634    | 536,120    | 534,819    | 533,327    | 535,231    | 530,739    | 529,491    | 528,027    | 529,681    | 528,373    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 692,517    | 689,957    | 683,858    | 682,962    | 685,592    | 683,058    | 677,056    | 676,158    | 678,476    | 676,158    |
| <b>Total Core Therms</b>                         | 14,781,434 | 14,753,353 | 14,803,397 | 14,866,143 | 15,012,125 | 14,996,472 | 15,045,900 | 15,105,836 | 15,243,098 | 15,228,353 |
| <b>Daily BaseLoad Therms</b>                     | 14,643     | 14,076     | 14,024     | 14,919     | 15,098     | 15,247     | 15,340     | 14,751     | 15,494     | 15,485     |
| <b>Peak Day Therms</b>                           | 149,113    | 149,851    | 150,498    | 151,219    | 149,527    | 150,219    | 153,258    | 153,947    | 154,638    | 155,313    |
| <b>Therms Per Residential Customer</b>           | 3,120      | 3,149      | 3,149      | 3,149      | 3,166      | 3,149      | 3,149      | 3,149      | 3,166      | 3,149      |
| <b>Therms Per Commercial Customer</b>            | 29,128     | 29,000     | 28,948     | 28,940     | 29,070     | 28,942     | 28,892     | 28,884     | 29,008     | 28,884     |
| <b>Therms Per Industrial Customer</b>            | 88,290     | 87,792     | 87,811     | 87,792     | 88,315     | 87,815     | 87,841     | 87,826     | 88,314     | 87,839     |
| <b>Residential Customers</b>                     | 11,176     | 11,283     | 11,398     | 11,512     | 11,625     | 11,738     | 11,846     | 11,954     | 12,061     | 12,168     |
| <b>Commercial Customers</b>                      | 1,868      | 1,870      | 1,871      | 1,873      | 1,875      | 1,877      | 1,878      | 1,880      | 1,882      | 1,884      |
| <b>Industrial Customers</b>                      | 27         | 27         | 26         | 26         | 26         | 26         | 26         | 26         | 26         | 26         |
| <b>Interruptible Customers</b>                   | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| <b>Total Core Customers</b>                      | 13,073     | 13,181     | 13,298     | 13,414     | 13,528     | 13,641     | 13,752     | 13,863     | 13,972     | 14,079     |

| Zone ME-WA                                       | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>                  |            | -0.26%     | 0.46%      | 0.42%      | 1.08%      | -0.19%     | 0.45%      | 0.40%      | 1.02%      | -0.19%     |
| <b>Residential Therms</b>                        | 6,953,290  | 6,958,278  | 7,019,397  | 7,080,870  | 7,188,580  | 7,203,187  | 7,263,128  | 7,322,578  | 7,427,007  | 7,440,035  |
| <b>Commercial Therms</b>                         | 6,336,630  | 6,294,138  | 6,291,854  | 6,284,078  | 6,319,140  | 6,275,910  | 6,274,529  | 6,266,751  | 6,299,014  | 6,257,685  |
| <b>Industrial Therms</b>                         | 194,635    | 196,859    | 200,265    | 203,613    | 207,990    | 210,227    | 213,421    | 216,593    | 220,723    | 222,794    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 13,484,555 | 13,449,275 | 13,511,516 | 13,568,561 | 13,715,709 | 13,689,323 | 13,751,079 | 13,805,922 | 13,946,745 | 13,920,514 |
| <b>Total Core Therms</b>                         | 13,137     | 13,284     | 13,357     | 13,368     | 13,543     | 13,681     | 13,791     | 13,941     | 14,071     | 13,870     |
| <b>Daily BaseLoad Therms</b>                     | 141,662    | 142,345    | 143,088    | 143,759    | 144,430    | 143,281    | 145,864    | 146,510    | 147,217    | 147,852    |
| <b>Peak Day Therms</b>                           | 599        | 595        | 594        | 594        | 598        | 595        | 595        | 594        | 598        | 594        |
| <b>Therms Per Residential Customer</b>           | 4,843      | 4,811      | 4,809      | 4,803      | 4,830      | 4,796      | 4,795      | 4,789      | 4,814      | 4,782      |
| <b>Therms Per Commercial Customer</b>            | 10,596     | 10,537     | 10,536     | 10,535     | 10,588     | 10,537     | 10,537     | 10,537     | 10,585     | 10,536     |
| <b>Therms Per Industrial Customer</b>            | 11,607     | 11,703     | 11,808     | 11,911     | 12,014     | 12,116     | 12,217     | 12,317     | 12,515     | 12,516     |
| <b>Residential Customers</b>                     | 1,308      | 1,308      | 1,308      | 1,308      | 1,308      | 1,308      | 1,308      | 1,308      | 1,308      | 1,308      |
| <b>Commercial Customers</b>                      | 18         | 19         | 19         | 19         | 20         | 20         | 20         | 21         | 21         | 21         |
| <b>Industrial Customers</b>                      | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Interruptible Customers</b>                   | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>                      | 12,933     | 13,030     | 13,135     | 13,239     | 13,342     | 13,445     | 13,546     | 13,646     | 13,746     | 13,845     |

| Bellingham District                              | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>                  |            | 0.08%      | 0.67%      | 0.67%      | 1.17%      | 0.15%      | 0.64%      | 0.63%      | 1.10%      | 0.14%      |
| <b>Residential Therms</b>                        | 32,974,847 | 33,005,022 | 33,235,520 | 33,468,070 | 33,873,488 | 33,922,134 | 34,159,918 | 34,386,169 | 34,778,411 | 34,834,158 |
| <b>Commercial Therms</b>                         | 17,130,777 | 17,119,743 | 17,200,173 | 17,286,628 | 17,456,761 | 17,456,477 | 17,456,477 | 17,427,483 | 17,784,763 | 17,785,283 |
| <b>Industrial Therms</b>                         | 1,832,740  | 1,857,190  | 1,890,680  | 1,923,770  | 1,964,558  | 1,988,684  | 2,020,275  | 2,051,255  | 2,089,755  | 2,112,077  |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>                         | 51,939,364 | 51,981,965 | 52,328,383 | 52,678,468 | 53,294,798 | 53,377,294 | 53,719,221 | 54,058,908 | 54,652,948 | 54,731,518 |
| <b>Daily BaseLoad Therms</b>                     | 60,894     | 61,720     | 62,410     | 63,273     | 64,559     | 65,251     | 66,134     | 66,974     | 67,639     | 68,689     |
| <b>Peak Day Therms</b>                           | 390,223    | 392,915    | 395,576    | 398,224    | 394,627    | 397,202    | 406,055    | 408,629    | 411,186    | 413,731    |
| <b>Therms Per Residential Customer</b>           | 2,915      | 2,900      | 2,899      | 2,899      | 2,914      | 2,899      | 2,899      | 2,899      | 2,913      | 2,899      |
| <b>Therms Per Commercial Customer</b>            | 15,807     | 15,733     | 15,699     | 15,698     | 15,798     | 15,727     | 15,699     | 15,698     | 15,779     | 15,720     |
| <b>Therms Per Industrial Customer</b>            | 25,465     | 25,349     | 25,346     | 25,345     | 25,449     | 25,348     | 25,348     | 25,348     | 25,443     | 25,348     |
| <b>Residential Customers</b>                     | 45,203     | 45,501     | 45,824     | 46,145     | 46,464     | 46,781     | 47,095     | 47,407     | 47,718     | 48,026     |
| <b>Commercial Customers</b>                      | 5,309      | 5,337      | 5,368      | 5,399      | 5,430      | 5,460      | 5,491      | 5,521      | 5,551      | 5,581      |
| <b>Industrial Customers</b>                      | 75         | 76         | 77         | 79         | 80         | 81         | 83         | 84         | 85         | 86         |
| <b>Interruptible Customers</b>                   | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>                      | 50,586     | 50,914     | 51,270     | 51,623     | 51,974     | 52,322     | 52,668     | 53,012     | 53,353     | 53,693     |

**Appendix B  
Demand Forecast  
Low Scenario**

|  | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Mount Vernon District</b>                     |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>                  |            | -0.05%     | 0.52%      | 0.52%      | 1.02%      | 0.02%      | 0.50%      | 0.50%      | 0.97%      | 0.01%      |
| <b>Residential Therms</b>                        | 26,804,012 | 26,793,416 | 26,940,537 | 27,089,587 | 27,378,741 | 27,388,182 | 27,534,737 | 27,680,491 | 27,960,625 | 27,969,689 |
| <b>Commercial Therms</b>                         | 16,848,895 | 16,840,916 | 16,924,077 | 17,009,513 | 17,179,190 | 17,179,172 | 17,261,716 | 17,344,304 | 17,507,240 | 17,508,020 |
| <b>Industrial Therms</b>                         | 2,062,440  | 2,059,780  | 2,064,486  | 2,073,132  | 2,088,268  | 2,085,874  | 2,091,914  | 2,097,668  | 2,111,336  | 2,108,397  |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 95,526     | 95,276     | 94,427     | 94,214     | 94,571     | 94,322     | 93,484     | 92,370     | 92,957     | 93,270     |
| <b>Total Core Therms</b>                         | 45,810,893 | 45,789,388 | 46,025,527 | 46,264,545 | 46,739,770 | 46,747,551 | 46,981,851 | 47,216,334 | 47,672,998 | 47,679,476 |
| <b>Daily BaseLoad Therms</b>                     | 46,068     | 46,713     | 47,083     | 47,592     | 48,214     | 48,605     | 49,118     | 49,774     | 50,133     | 50,807     |
| <b>Peak Day Therms</b>                           | 363,343    | 365,357    | 367,332    | 369,289    | 366,273    | 368,204    | 375,135    | 377,040    | 378,954    | 380,864    |
| <b>Therms Per Residential Customer</b>           | 3,212      | 3,202      | 3,201      | 3,199      | 3,211      | 3,199      | 3,199      | 3,202      | 3,211      | 3,199      |
| <b>Therms Per Commercial Customer</b>            | 16,552     | 16,472     | 16,458     | 16,445     | 16,485     | 16,410     | 16,393     | 16,379     | 16,379     | 16,351     |
| <b>Therms Per Industrial Customer</b>            | 177,713    | 177,365    | 177,820    | 178,103    | 179,190    | 178,869    | 179,401    | 179,733    | 180,720    | 180,435    |
| <b>Residential Customers</b>                     | 39,355     | 39,559     | 39,781     | 40,002     | 40,221     | 40,439     | 40,656     | 40,872     | 41,086     | 41,300     |
| <b>Commercial Customers</b>                      | 4,950      | 4,982      | 5,015      | 5,048      | 5,081      | 5,114      | 5,146      | 5,178      | 5,210      | 5,242      |
| <b>Industrial Customers</b>                      | 121        | 122        | 122        | 123        | 123        | 124        | 124        | 125        | 125        | 126        |
| <b>Interruptible Customers</b>                   | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>                      | 44,427     | 44,664     | 44,919     | 45,173     | 45,426     | 45,678     | 45,927     | 46,176     | 46,423     | 46,668     |
| <b>Bremerton District</b>                        |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>                  |            | -0.11%     | 0.42%      | 0.42%      | 0.90%      | -0.05%     | 0.41%      | 0.40%      | 0.86%      | -0.05%     |
| <b>Residential Therms</b>                        | 23,179,188 | 23,228,944 | 23,424,529 | 23,620,047 | 23,932,931 | 24,007,962 | 24,198,802 | 24,388,153 | 24,693,789 | 24,762,484 |
| <b>Commercial Therms</b>                         | 21,746,395 | 21,682,429 | 21,697,750 | 21,712,806 | 21,823,227 | 21,745,542 | 21,761,731 | 21,776,161 | 21,882,299 | 21,806,138 |
| <b>Industrial Therms</b>                         | 445,931    | 442,606    | 441,498    | 440,372    | 441,467    | 438,165    | 437,086    | 435,960    | 436,944    | 433,723    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 2,562,208  | 2,545,169  | 2,536,473  | 2,527,966  | 2,526,586  | 2,519,644  | 2,511,135  | 2,502,625  | 2,510,595  | 2,494,118  |
| <b>Total Core Therms</b>                         | 47,953,722 | 47,899,148 | 48,100,251 | 48,301,190 | 48,734,712 | 48,711,312 | 48,908,754 | 49,102,899 | 49,523,628 | 49,496,462 |
| <b>Daily BaseLoad Therms</b>                     | 51,332     | 51,835     | 52,147     | 52,566     | 53,120     | 53,429     | 53,848     | 54,358     | 54,663     | 55,199     |
| <b>Peak Day Therms</b>                           | 373,787    | 375,614    | 377,489    | 379,285    | 377,834    | 379,586    | 384,763    | 386,500    | 388,340    | 390,049    |
| <b>Therms Per Residential Customer</b>           | 695        | 691        | 691        | 691        | 694        | 691        | 691        | 691        | 694        | 691        |
| <b>Therms Per Commercial Customer</b>            | 7,029      | 6,978      | 6,956      | 6,934      | 6,944      | 6,893      | 6,872      | 6,852      | 6,860      | 6,811      |
| <b>Therms Per Industrial Customer</b>            | 29,762     | 29,616     | 29,614     | 29,613     | 29,762     | 29,616     | 29,616     | 29,615     | 29,616     | 29,616     |
| <b>Residential Customers</b>                     | 33,373     | 33,637     | 33,923     | 34,206     | 34,487     | 34,765     | 35,042     | 35,316     | 35,588     | 35,859     |
| <b>Commercial Customers</b>                      | 3,096      | 3,107      | 3,119      | 3,131      | 3,143      | 3,155      | 3,167      | 3,178      | 3,190      | 3,202      |
| <b>Industrial Customers</b>                      | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         |
| <b>Interruptible Customers</b>                   | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| <b>Total Core Customers</b>                      | 36,488     | 36,762     | 37,060     | 37,355     | 37,648     | 37,938     | 38,226     | 38,512     | 38,796     | 39,078     |
| <b>Longview District</b>                         |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>                  |            | -0.33%     | 0.19%      | 0.24%      | 0.79%      | -0.28%     | 0.20%      | 0.22%      | 0.68%      | -0.23%     |
| <b>Residential Therms</b>                        | 1,241,639  | 1,248,430  | 1,264,063  | 1,279,851  | 1,302,754  | 1,311,237  | 1,326,440  | 1,341,502  | 1,362,830  | 1,371,073  |
| <b>Commercial Therms</b>                         | 4,358,646  | 4,334,200  | 4,330,856  | 4,329,684  | 4,352,632  | 4,329,269  | 4,327,353  | 4,326,166  | 4,344,839  | 4,324,346  |
| <b>Industrial Therms</b>                         | 228,953    | 227,416    | 226,868    | 226,371    | 227,032    | 225,504    | 225,046    | 224,548    | 224,932    | 223,592    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 95,555     | 95,085     | 94,270     | 94,105     | 94,599     | 94,134     | 93,349     | 93,183     | 93,586     | 93,183     |
| <b>Total Core Therms</b>                         | 5,924,794  | 5,905,131  | 5,916,057  | 5,930,010  | 5,977,017  | 5,960,144  | 5,972,208  | 5,985,399  | 6,026,187  | 6,012,193  |
| <b>Daily BaseLoad Therms</b>                     | 6,988      | 7,075      | 7,058      | 7,098      | 7,143      | 7,153      | 7,186      | 7,276      | 7,263      | 7,361      |
| <b>Peak Day Therms</b>                           | 49,394     | 49,532     | 49,647     | 49,779     | 48,001     | 48,126     | 50,152     | 50,277     | 50,406     | 50,530     |
| <b>Therms Per Residential Customer</b>           | 1,779      | 1,768      | 1,767      | 1,767      | 1,777      | 1,767      | 1,767      | 1,767      | 1,776      | 1,767      |
| <b>Therms Per Commercial Customer</b>            | 7,821      | 7,779      | 7,771      | 7,766      | 7,801      | 7,761      | 7,754      | 7,750      | 7,780      | 7,743      |
| <b>Therms Per Industrial Customer</b>            | 16,962     | 16,888     | 16,887     | 16,892     | 16,984     | 16,910     | 16,916     | 16,921     | 16,993     | 16,932     |
| <b>Residential Customers</b>                     | 3,031      | 3,071      | 3,114      | 3,157      | 3,199      | 3,241      | 3,281      | 3,322      | 3,361      | 3,401      |
| <b>Commercial Customers</b>                      | 1,213      | 1,215      | 1,217      | 1,219      | 1,220      | 1,222      | 1,224      | 1,225      | 1,227      | 1,229      |
| <b>Industrial Customers</b>                      | 32         | 32         | 32         | 32         | 32         | 32         | 31         | 31         | 31         | 31         |
| <b>Interruptible Customers</b>                   | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>                      | 4,277      | 4,319      | 4,364      | 4,408      | 4,452      | 4,495      | 4,538      | 4,580      | 4,621      | 4,662      |
| <b>Aberdeen District</b>                         |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>                  |            | -0.46%     | 0.03%      | 0.02%      | 0.58%      | -0.47%     | 0.06%      | 0.01%      | 0.48%      | -0.41%     |
| <b>Residential Therms</b>                        | 2,589,251  | 2,586,158  | 2,595,651  | 2,605,921  | 2,630,639  | 2,627,168  | 2,637,325  | 2,647,442  | 2,669,720  | 2,667,551  |
| <b>Commercial Therms</b>                         | 2,955,270  | 2,933,166  | 2,926,158  | 2,917,483  | 2,925,692  | 2,903,726  | 2,897,681  | 2,889,000  | 2,894,210  | 2,874,283  |
| <b>Industrial Therms</b>                         | 278,733    | 276,857    | 276,058    | 275,372    | 275,943    | 274,079    | 273,376    | 272,689    | 272,962    | 271,300    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 5,822,253  | 5,796,181  | 5,797,847  | 5,798,776  | 5,832,274  | 5,804,972  | 5,808,381  | 5,809,132  | 5,836,892  | 5,813,134  |
| <b>Total Core Therms</b>                         | 5,980      | 6,050      | 6,020      | 6,007      | 6,066      | 6,055      | 6,078      | 6,149      | 6,088      | 6,138      |
| <b>Daily BaseLoad Therms</b>                     | 49,440     | 49,469     | 49,515     | 49,543     | 47,704     | 47,733     | 49,659     | 49,685     | 49,729     | 49,755     |
| <b>Peak Day Therms</b>                           | 719        | 715        | 715        | 715        | 719        | 715        | 715        | 715        | 718        | 715        |
| <b>Therms Per Residential Customer</b>           | 4,061      | 4,061      | 4,061      | 4,059      | 4,061      | 4,061      | 4,062      | 4,061      | 4,078      | 4,061      |
| <b>Therms Per Commercial Customer</b>            | 19,932     | 19,848     | 19,840     | 19,841     | 19,932     | 19,848     | 19,847     | 19,848     | 19,918     | 19,848     |
| <b>Therms Per Industrial Customer</b>            | 3,602      | 3,617      | 3,631      | 3,646      | 3,660      | 3,674      | 3,689      | 3,703      | 3,717      | 3,731      |
| <b>Residential Customers</b>                     | 724        | 722        | 721        | 719        | 717        | 715        | 713        | 711        | 710        | 708        |
| <b>Commercial Customers</b>                      | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         |
| <b>Industrial Customers</b>                      | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Interruptible Customers</b>                   | 4,341      | 4,353      | 4,366      | 4,378      | 4,391      | 4,403      | 4,416      | 4,428      | 4,440      | 4,453      |
| <b>Kennewick District</b>                        |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>                  |            | 0.50%      | 1.37%      | 1.35%      | 1.97%      | 0.65%      | 1.24%      | 1.21%      | 1.78%      | 0.56%      |
| <b>Residential Therms</b>                        | 16,335,410 | 16,460,377 | 16,752,205 | 17,041,589 | 17,444,323 | 17,608,943 | 17,894,504 | 18,155,868 | 18,539,848 | 18,666,640 |
| <b>Commercial Therms</b>                         | 15,826,745 | 15,874,187 | 16,048,318 | 16,222,600 | 16,495,630 | 16,566,379 | 16,734,754 | 16,901,101 | 17,161,950 | 17,228,767 |
| <b>Industrial Therms</b>                         | 1,049,006  | 1,042,172  | 1,039,266  | 1,036,744  | 1,038,504  | 1,031,712  | 1,029,104  | 1,026,481  | 1,027,613  | 1,021,252  |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 208,356    | 207,373    | 205,565    | 205,266    | 206,273    | 205,300    | 203,525    | 203,226    | 204,122    | 203,226    |
| <b>Total Core Therms</b>                         | 33,419,518 | 33,586,109 | 34,045,454 | 34,506,200 | 35,184,730 | 35,414,333 | 35,851,887 | 36,286,706 | 36,933,533 | 37,139,884 |
| <b>Daily BaseLoad Therms</b>                     | 34,783     | 35,807     | 36,581     | 37,379     | 38,422     | 39,562     | 40,533     | 41,588     | 42,127     | 42,590     |
| <b>Peak Day Therms</b>                           | 364,652    | 370,036    | 375,311    | 380,524    | 379,872    | 384,861    | 395,696    | 400,615    | 405,475    | 410,269    |
| <b>Therms Per Residential Customer</b>           | 1,727      | 1,712      | 1,712      | 1,712      | 1,723      | 1,712      | 1,712      | 1,712      | 1,723      | 1,712      |
| <b>Therms Per Commercial Customer</b>            | 64,406     | 64,284     | 64,002     | 64,043     | 64,373     | 64,235     | 63,960     | 64,033     | 64,311     | 64,219     |
| <b>Therms Per Industrial Customer</b>            | 93,410     | 93,034     | 93,017     | 93,016     | 93,410     | 93,034     | 93,035     | 93,034     | 93,034     | 93,034     |
| <b>Residential Customers</b>                     | 27,950     | 28,424     | 28,935     | 29,436     | 29,929     | 30,414     | 30,891     | 31,361     | 31,824     | 32,280     |
| <b>Commercial Customers</b>                      | 3,713      | 3,757      | 3,803      | 3,850      | 3,896      | 3,941      | 3,985      | 4,030      | 4,073      | 4,117      |
| <b>Industrial Customers</b>                      | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 22         |
| <b>Interruptible Customers</b>                   | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>                      | 31,687     | 32,205     | 32,762     | 33,310     | 33,848     | 34,378     | 34,900     | 35,414     | 35,921     | 36,420     |

Appendix B  
Demand Forecast  
Low Scenario

|                                       | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Walla Walla District</b>           |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | -0.26%     | 0.46%      | 0.42%      | 1.08%      | -0.19%     | 0.45%      | 0.40%      | 1.02%      | -0.19%     |
| Residential Therms                    | 6,953,290  | 6,958,278  | 7,019,397  | 7,080,870  | 7,188,580  | 7,203,187  | 7,263,128  | 7,322,578  | 7,427,007  | 7,440,035  |
| Commercial Therms                     | 6,336,630  | 6,294,138  | 6,291,854  | 6,284,078  | 6,319,140  | 6,275,910  | 6,271,529  | 6,266,751  | 6,299,014  | 6,257,685  |
| Industrial Therms                     | 194,635    | 196,859    | 200,265    | 203,613    | 207,990    | 210,227    | 213,421    | 216,593    | 220,723    | 222,794    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 13,484,555 | 13,449,275 | 13,511,516 | 13,568,561 | 13,715,709 | 13,689,323 | 13,751,079 | 13,805,922 | 13,946,745 | 13,920,514 |
| Daily BaseLoad Therms                 | 13,137     | 13,284     | 13,357     | 13,368     | 13,543     | 13,681     | 13,791     | 13,941     | 13,908     | 13,878     |
| Peak Day Therms                       | 141,662    | 142,345    | 143,088    | 143,759    | 142,630    | 143,281    | 145,864    | 146,510    | 147,217    | 147,852    |
| Therms Per Residential Customer       | 599        | 595        | 594        | 594        | 598        | 595        | 595        | 594        | 598        | 594        |
| Therms Per Commercial Customer        | 4,843      | 4,811      | 4,809      | 4,803      | 4,830      | 4,796      | 4,795      | 4,789      | 4,814      | 4,782      |
| Therms Per Industrial Customer        | 10,596     | 10,537     | 10,536     | 10,535     | 10,588     | 10,537     | 10,537     | 10,537     | 10,585     | 10,536     |
| Residential Customers                 | 11,607     | 11,703     | 11,808     | 11,911     | 12,014     | 12,116     | 12,217     | 12,317     | 12,417     | 12,515     |
| Commercial Customers                  | 1,308      | 1,308      | 1,308      | 1,308      | 1,308      | 1,308      | 1,308      | 1,308      | 1,308      | 1,308      |
| Industrial Customers                  | 18         | 19         | 19         | 19         | 20         | 20         | 20         | 21         | 21         | 21         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 12,933     | 13,030     | 13,135     | 13,239     | 13,342     | 13,445     | 13,546     | 13,646     | 13,746     | 13,845     |
| <b>Wenatchee District</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | -0.47%     | -0.03%     | 0.02%      | 0.52%      | -0.45%     | -0.01%     | 0.02%      | 0.46%      | -0.42%     |
| Residential Therms                    | 1,558,415  | 1,548,457  | 1,545,933  | 1,543,624  | 1,549,146  | 1,539,242  | 1,536,929  | 1,536,620  | 1,539,459  | 1,530,026  |
| Commercial Therms                     | 8,028,096  | 7,994,423  | 7,996,934  | 8,003,455  | 8,050,259  | 8,018,293  | 8,022,031  | 8,028,225  | 8,070,129  | 8,040,880  |
| Industrial Therms                     | 807,640    | 802,224    | 800,137    | 798,023    | 799,543    | 794,171    | 792,194    | 790,079    | 791,251    | 786,108    |
| Ind., Inst., & Cmcl. Interrup. Therms | 93,712     | 93,276     | 92,469     | 92,343     | 92,775     | 92,343     | 91,536     | 91,536     | 91,839     | 91,410     |
| Total Core Therms                     | 10,487,863 | 10,438,380 | 10,435,473 | 10,437,445 | 10,491,723 | 10,444,049 | 10,442,690 | 10,444,334 | 10,492,678 | 10,448,424 |
| Daily BaseLoad Therms                 | 9,375      | 9,848      | 9,459      | 9,471      | 9,498      | 9,529      | 9,561      | 10,034     | 9,626      | 9,714      |
| Peak Day Therms                       | 92,460     | 92,496     | 92,500     | 92,526     | 90,665     | 90,697     | 92,588     | 92,611     | 92,636     | 92,666     |
| Therms Per Residential Customer       | 1,872      | 1,864      | 1,865      | 1,867      | 1,877      | 1,870      | 1,871      | 1,873      | 1,883      | 1,876      |
| Therms Per Commercial Customer        | 25,324     | 25,187     | 25,128     | 25,104     | 25,200     | 25,070     | 25,016     | 24,994     | 25,082     | 24,961     |
| Therms Per Industrial Customer        | 94,302     | 93,927     | 93,917     | 93,906     | 94,296     | 93,920     | 93,923     | 93,909     | 94,267     | 93,911     |
| Residential Customers                 | 3,226      | 3,216      | 3,207      | 3,198      | 3,189      | 3,180      | 3,171      | 3,162      | 3,153      | 3,144      |
| Commercial Customers                  | 1,442      | 1,444      | 1,447      | 1,450      | 1,453      | 1,455      | 1,458      | 1,461      | 1,463      | 1,466      |
| Industrial Customers                  | 34         | 34         | 34         | 34         | 34         | 34         | 33         | 33         | 33         | 33         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 4,702      | 4,696      | 4,689      | 4,683      | 4,677      | 4,670      | 4,664      | 4,657      | 4,651      | 4,644      |
| <b>Yakima District</b>                |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | -0.20%     | 0.36%      | 0.42%      | 1.00%      | -0.13%     | 0.38%      | 0.39%      | 0.85%      | -0.07%     |
| Residential Therms                    | 16,420,941 | 16,394,672 | 16,472,173 | 16,554,890 | 16,736,156 | 16,724,301 | 16,805,071 | 16,885,201 | 17,047,720 | 17,043,566 |
| Commercial Therms                     | 19,210,078 | 19,142,615 | 19,174,623 | 19,222,498 | 19,383,676 | 19,328,394 | 19,367,409 | 19,413,556 | 19,547,894 | 19,507,201 |
| Industrial Therms                     | 4,800,263  | 4,814,165  | 4,850,447  | 4,888,703  | 4,951,951  | 4,966,786  | 5,003,638  | 5,040,143  | 5,094,403  | 5,112,021  |
| Ind., Inst., & Cmcl. Interrup. Therms | 59,128     | 59,048     | 58,998     | 58,998     | 59,128     | 59,048     | 59,048     | 59,048     | 59,028     | 59,048     |
| Total Core Therms                     | 40,490,410 | 40,410,500 | 40,556,240 | 40,725,088 | 41,130,912 | 41,078,529 | 41,235,166 | 41,397,948 | 41,749,045 | 41,721,836 |
| Daily BaseLoad Therms                 | 34,488     | 34,109     | 34,017     | 35,553     | 36,217     | 36,581     | 36,684     | 36,322     | 37,384     | 38,269     |
| Peak Day Therms                       | 421,715    | 423,803    | 425,828    | 427,880    | 412,502    | 414,463    | 433,915    | 435,903    | 437,876    | 439,837    |
| Therms Per Residential Customer       | 116,090    | 115,674    | 115,722    | 116,228    | 117,205    | 116,791    | 116,842    | 117,359    | 118,338    | 117,932    |
| Therms Per Commercial Customer        | 35,961     | 35,800     | 35,762     | 35,780     | 36,000     | 35,847     | 35,827     | 35,847     | 36,020     | 35,903     |
| Therms Per Industrial Customer        | 169,633    | 169,047    | 169,036    | 169,077    | 169,966    | 169,360    | 169,440    | 169,567    | 170,155    | 169,723    |
| Residential Customers                 | 25,725     | 25,829     | 25,946     | 26,061     | 26,175     | 26,288     | 26,400     | 26,511     | 26,621     | 26,730     |
| Commercial Customers                  | 5,059      | 5,073      | 5,087      | 5,102      | 5,116      | 5,130      | 5,145      | 5,159      | 5,173      | 5,187      |
| Industrial Customers                  | 150        | 150        | 151        | 152        | 153        | 154        | 155        | 156        | 157        | 158        |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Total Core Customers                  | 30,936     | 31,054     | 31,186     | 31,317     | 31,446     | 31,575     | 31,702     | 31,828     | 31,953     | 32,076     |
| <b>Central Oregon (Bend) District</b> |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 0.42%      | 1.04%      | 1.03%      | 1.51%      | 0.50%      | 0.96%      | 0.94%      | 1.38%      | 0.45%      |
| Residential Therms                    | 36,190,813 | 36,458,701 | 36,981,347 | 37,500,184 | 38,200,111 | 38,520,088 | 39,017,316 | 39,507,910 | 40,176,907 | 40,470,293 |
| Commercial Therms                     | 21,239,924 | 21,210,075 | 21,289,808 | 21,371,737 | 21,558,130 | 21,538,206 | 21,618,782 | 21,698,430 | 21,874,754 | 21,857,561 |
| Industrial Therms                     | 2,270,777  | 2,288,016  | 2,316,647  | 2,344,919  | 2,383,750  | 2,399,700  | 2,425,800  | 2,451,043  | 2,486,112  | 2,500,172  |
| Ind., Inst., & Cmcl. Interrup. Therms | 280,483    | 279,229    | 276,851    | 276,369    | 276,678    | 276,437    | 274,727    | 273,644    | 274,738    | 273,644    |
| Total Core Therms                     | 59,981,998 | 60,236,022 | 60,864,654 | 61,493,209 | 62,419,669 | 62,734,430 | 63,336,025 | 63,931,027 | 64,812,512 | 65,101,670 |
| Daily BaseLoad Therms                 | 52,834     | 53,040     | 51,940     | 56,199     | 57,635     | 58,481     | 59,611     | 60,972     | 61,845     | 63,285     |
| Peak Day Therms                       | 555,392    | 561,425    | 567,357    | 573,219    | 570,944    | 576,542    | 590,340    | 595,897    | 601,407    | 606,633    |
| Therms Per Residential Customer       | 8,540      | 8,491      | 8,490      | 8,493      | 8,532      | 8,495      | 8,495      | 8,492      | 8,531      | 8,497      |
| Therms Per Commercial Customer        | 38,082     | 37,900     | 37,876     | 37,861     | 38,012     | 37,835     | 37,818     | 37,804     | 37,951     | 37,782     |
| Therms Per Industrial Customer        | 131,266    | 130,649    | 130,625    | 130,640    | 131,237    | 130,665    | 130,668    | 130,655    | 131,209    | 130,693    |
| Residential Customers                 | 48,086     | 48,747     | 49,460     | 50,162     | 50,854     | 51,535     | 52,208     | 52,872     | 53,527     | 54,173     |
| Commercial Customers                  | 6,873      | 6,902      | 6,933      | 6,964      | 6,995      | 7,025      | 7,055      | 7,085      | 7,115      | 7,145      |
| Industrial Customers                  | 99         | 100        | 101        | 103        | 104        | 105        | 106        | 107        | 108        | 110        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 55,058     | 55,750     | 56,495     | 57,229     | 57,953     | 58,666     | 59,370     | 60,065     | 60,751     | 61,429     |
| <b>Pendleton District</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | -0.19%     | 0.34%      | 0.42%      | 0.98%      | -0.10%     | 0.33%      | 0.40%      | 0.91%      | -0.10%     |
| Residential Therms                    | 6,164,385  | 6,177,357  | 6,227,637  | 6,298,129  | 6,417,978  | 6,396,212  | 6,476,357  | 6,534,088  | 6,627,749  | 6,647,689  |
| Commercial Therms                     | 7,383,897  | 7,349,919  | 7,347,082  | 7,351,725  | 7,395,089  | 7,364,697  | 7,362,998  | 7,361,562  | 7,407,192  | 7,379,132  |
| Industrial Therms                     | 540,634    | 536,120    | 534,819    | 533,327    | 535,231    | 530,739    | 529,491    | 528,027    | 529,681    | 525,373    |
| Ind., Inst., & Cmcl. Interrup. Therms | 692,517    | 689,957    | 683,858    | 682,942    | 685,592    | 685,952    | 677,056    | 676,158    | 678,476    | 676,158    |
| Total Core Therms                     | 14,781,434 | 14,753,353 | 14,803,397 | 14,866,143 | 15,012,125 | 14,996,472 | 15,045,900 | 15,105,836 | 15,243,098 | 15,228,353 |
| Daily BaseLoad Therms                 | 14,643     | 14,076     | 14,024     | 14,919     | 15,098     | 15,247     | 15,340     | 14,751     | 15,494     | 15,485     |
| Peak Day Therms                       | 149,113    | 149,851    | 150,498    | 151,219    | 149,527    | 150,219    | 153,258    | 153,947    | 154,638    | 155,313    |
| Therms Per Residential Customer       | 3,170      | 3,149      | 3,149      | 3,149      | 3,166      | 3,149      | 3,149      | 3,149      | 3,166      | 3,149      |
| Therms Per Commercial Customer        | 29,128     | 29,000     | 28,948     | 28,940     | 29,070     | 28,942     | 28,892     | 28,884     | 29,008     | 28,884     |
| Therms Per Industrial Customer        | 88,290     | 87,792     | 87,811     | 87,792     | 88,315     | 87,815     | 87,841     | 87,826     | 88,314     | 87,839     |
| Residential Customers                 | 11,176     | 11,283     | 11,398     | 11,512     | 11,625     | 11,736     | 11,846     | 11,954     | 12,061     | 12,168     |
| Commercial Customers                  | 1,871      | 1,873      | 1,874      | 1,876      | 1,878      | 1,880      | 1,881      | 1,883      | 1,885      | 1,887      |
| Industrial Customers                  | 28         | 28         | 27         | 27         | 27         | 27         | 27         | 27         | 27         | 27         |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Total Core Customers                  | 13,077     | 13,185     | 13,302     | 13,418     | 13,532     | 13,645     | 13,756     | 13,866     | 13,975     | 14,083     |

Appendix B  
Demand Forecast  
Low Scenario

|  | 2020        | 2021        | 2022        | 2023        | 2024        | 2025        | 2026        | 2027        | 2028        | 2029        |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Eastern Oregon (Ontario) District</b> |             |             |             |             |             |             |             |             |             |             |
| Total Therms Pct. Growth                 |             | -0.35%      | 0.25%       | 0.30%       | 0.94%       | -0.29%      | 0.25%       | 0.29%       | 0.91%       | -0.29%      |
| Residential Therms                       | 4,378,315   | 4,370,034   | 4,395,376   | 4,420,670   | 4,475,069   | 4,470,922   | 4,495,789   | 4,520,514   | 4,574,698   | 4,569,557   |
| Commercial Therms                        | 4,203,659   | 4,162,438   | 4,190,088   | 4,196,777   | 4,230,172   | 4,211,085   | 4,218,532   | 4,224,996   | 4,257,759   | 4,238,688   |
| Industrial Therms                        | 343,228     | 342,468     | 342,089     | 341,831     | 341,965     | 341,323     | 340,974     | 340,701     | 340,794     | 340,189     |
| Ind., Inst., & Cmcl. Interrup. Therms    | 942,210     | 937,558     | 929,897     | 928,091     | 932,887     | 928,182     | 920,413     | 918,807     | 923,283     | 918,807     |
| Total Core Therms                        | 9,867,512   | 9,832,699   | 9,857,449   | 9,887,370   | 9,980,093   | 9,951,513   | 9,975,908   | 10,005,018  | 10,096,535  | 10,067,241  |
| Daily BaseLoad Therms                    | 5,303       | 5,406       | 5,376       | 5,435       | 5,465       | 5,488       | 5,549       | 5,653       | 5,640       | 5,700       |
| Peak Day Therms                          | 110,574     | 110,988     | 111,302     | 111,709     | 111,707     | 112,109     | 112,820     | 113,217     | 113,005     | 114,005     |
| Therms Per Residential Customer          | 1,692       | 1,680       | 1,679       | 1,679       | 1,690       | 1,679       | 1,679       | 1,679       | 1,690       | 1,679       |
| Therms Per Commercial Customer           | 7,794       | 7,740       | 7,739       | 7,737       | 7,786       | 7,734       | 7,733       | 7,731       | 7,779       | 7,728       |
| Therms Per Industrial Customer           | 53,344      | 53,239      | 53,240      | 53,236      | 53,345      | 53,239      | 53,239      | 53,234      | 53,348      | 53,239      |
| Residential Customers                    | 7,311       | 7,351       | 7,394       | 7,436       | 7,478       | 7,520       | 7,562       | 7,604       | 7,645       | 7,686       |
| Commercial Customers                     | 1,464       | 1,466       | 1,470       | 1,473       | 1,476       | 1,479       | 1,482       | 1,485       | 1,488       | 1,491       |
| Industrial Customers                     | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          |
| Interruptible Customers                  | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| Total Core Customers                     | 8,799       | 8,841       | 8,887       | 8,933       | 8,978       | 9,023       | 9,068       | 9,113       | 9,157       | 9,201       |
| <b>Oregon</b>                            |             |             |             |             |             |             |             |             |             |             |
| Total Therms Pct. Growth                 |             | 0.27%       | 0.63%       | 0.84%       | 1.35%       | 0.31%       | 0.77%       | 0.77%       | 1.25%       | 0.27%       |
| Residential Therms                       | 46,733,514  | 47,006,093  | 47,614,361  | 48,218,983  | 49,071,392  | 49,408,988  | 49,989,461  | 50,562,513  | 51,379,355  | 51,687,540  |
| Commercial Therms                        | 32,827,481  | 32,742,632  | 32,826,978  | 32,920,240  | 33,183,392  | 33,113,988  | 33,200,312  | 33,290,988  | 33,339,706  | 33,475,381  |
| Industrial Therms                        | 3,154,639   | 3,166,604   | 3,193,556   | 3,220,077   | 3,260,946   | 3,271,762   | 3,296,265   | 3,319,772   | 3,356,588   | 3,365,734   |
| Ind., Inst., & Cmcl. Interrup. Therms    | 1,915,310   | 1,908,744   | 1,890,606   | 1,887,421   | 1,896,157   | 1,887,677   | 1,871,796   | 1,868,610   | 1,876,498   | 1,868,610   |
| Total Core Therms                        | 84,630,944  | 84,822,073  | 85,525,500  | 86,246,722  | 87,411,886  | 87,682,415  | 88,357,834  | 89,041,881  | 90,152,146  | 90,397,244  |
| Daily BaseLoad Therms                    | 72,781      | 72,522      | 71,341      | 76,553      | 78,199      | 79,216      | 80,500      | 81,376      | 82,979      | 84,470      |
| Peak Day Therms                          | 815,079     | 822,264     | 829,158     | 836,147     | 832,177     | 838,890     | 856,418     | 863,062     | 869,656     | 876,151     |
| Therms Per Residential Customer          | 13,401      | 13,319      | 13,318      | 13,321      | 13,388      | 13,323      | 13,324      | 13,322      | 13,387      | 13,326      |
| Therms Per Commercial Customer           | 75,004      | 74,640      | 74,564      | 74,538      | 74,867      | 74,511      | 74,443      | 74,420      | 74,738      | 74,394      |
| Therms Per Industrial Customer           | 272,900     | 271,679     | 271,676     | 271,688     | 272,898     | 271,718     | 271,748     | 271,716     | 272,871     | 271,716     |
| Residential Customers                    | 66,573      | 67,381      | 68,252      | 69,110      | 69,957      | 70,792      | 71,616      | 72,430      | 73,233      | 74,027      |
| Commercial Customers                     | 10,208      | 10,241      | 10,277      | 10,313      | 10,348      | 10,384      | 10,419      | 10,453      | 10,488      | 10,522      |
| Industrial Customers                     | 149         | 150         | 152         | 153         | 154         | 155         | 156         | 157         | 158         | 159         |
| Interruptible Customers                  | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           |
| Total Core Customers                     | 76,934      | 77,776      | 78,684      | 79,580      | 80,463      | 81,335      | 82,195      | 83,044      | 83,884      | 84,713      |
| <b>Washington</b>                        |             |             |             |             |             |             |             |             |             |             |
| Total Therms Pct. Growth                 |             | -0.03%      | 0.57%       | 0.58%       | 1.12%       | 0.05%       | 0.55%       | 0.55%       | 1.03%       | 0.05%       |
| Residential Therms                       | 128,056,993 | 128,223,765 | 129,250,017 | 130,284,449 | 132,036,758 | 132,342,355 | 133,346,874 | 134,342,023 | 136,019,410 | 136,305,221 |
| Commercial Therms                        | 112,461,533 | 112,217,818 | 112,592,744 | 112,988,746 | 113,985,699 | 113,805,161 | 114,186,233 | 114,567,280 | 115,492,358 | 115,332,603 |
| Industrial Therms                        | 11,701,360  | 11,719,268  | 11,791,805  | 11,866,998  | 11,995,256  | 12,015,201  | 12,086,054  | 12,155,415  | 12,291,264  | 12,291,264  |
| Ind., Inst., & Cmcl. Interrup. Therms    | 3,114,486   | 3,095,226   | 3,082,202   | 3,072,991   | 3,083,932   | 3,064,791   | 3,052,077   | 3,042,863   | 3,052,767   | 3,034,355   |
| Total Core Therms                        | 255,334,371 | 255,256,076 | 256,716,768 | 258,212,284 | 261,101,646 | 261,227,507 | 262,671,238 | 264,107,581 | 266,934,255 | 266,963,443 |
| Daily BaseLoad Therms                    | 263,045     | 266,440     | 268,133     | 272,307     | 276,781     | 279,845     | 282,932     | 286,416     | 288,831     | 292,645     |
| Peak Day Therms                          | 2,246,676   | 2,261,567   | 2,276,288   | 2,290,807   | 2,260,110   | 2,274,153   | 2,333,827   | 2,347,769   | 2,361,821   | 2,375,552   |
| Therms Per Residential Customer          | 129,606     | 129,119     | 129,166     | 129,671     | 130,718     | 130,239     | 130,291     | 130,812     | 131,854     | 131,385     |
| Therms Per Commercial Customer           | 181,826     | 181,104     | 180,645     | 180,632     | 181,511     | 180,799     | 180,380     | 180,404     | 181,151     | 180,551     |
| Therms Per Industrial Customer           | 637,773     | 635,610     | 636,013     | 636,330     | 639,577     | 637,441     | 638,063     | 638,511     | 641,214     | 639,383     |
| Residential Customers                    | 193,071     | 194,559     | 196,169     | 197,763     | 199,339     | 200,899     | 202,443     | 203,971     | 205,486     | 206,986     |
| Commercial Customers                     | 26,816      | 26,945      | 27,086      | 27,225      | 27,364      | 27,501      | 27,637      | 27,772      | 27,905      | 28,038      |
| Industrial Customers                     | 481         | 484         | 487         | 490         | 493         | 495         | 498         | 501         | 503         | 506         |
| Interruptible Customers                  | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           |
| Total Core Customers                     | 220,377     | 221,997     | 223,752     | 225,487     | 227,204     | 228,904     | 230,586     | 232,253     | 233,903     | 235,539     |
| <b>System</b>                            |             |             |             |             |             |             |             |             |             |             |
| Total Therms Pct. Growth                 |             | 0.03%       | 0.64%       | 0.65%       | 1.18%       | 0.11%       | 0.61%       | 0.60%       | 1.09%       | 0.10%       |
| Residential Therms                       | 174,790,507 | 175,229,857 | 176,864,377 | 178,503,433 | 181,108,150 | 181,751,343 | 183,336,335 | 184,904,536 | 187,398,764 | 187,992,760 |
| Commercial Therms                        | 145,289,013 | 144,960,450 | 145,419,722 | 145,908,985 | 147,169,091 | 146,919,149 | 147,386,544 | 147,858,268 | 149,032,064 | 148,807,984 |
| Industrial Therms                        | 14,855,999  | 14,885,872  | 14,985,361  | 15,086,175  | 15,256,201  | 15,286,963  | 15,382,319  | 15,475,186  | 15,626,307  | 15,656,998  |
| Ind., Inst., & Cmcl. Interrup. Therms    | 5,029,796   | 5,001,971   | 4,972,808   | 4,960,412   | 4,980,089   | 4,952,468   | 4,923,873   | 4,911,472   | 4,929,265   | 4,902,965   |
| Total Core Therms                        | 339,965,315 | 340,078,150 | 342,242,268 | 344,459,006 | 348,513,532 | 348,909,923 | 351,029,071 | 353,149,462 | 356,986,400 | 357,360,707 |
| Daily BaseLoad Therms                    | 335,826     | 338,961     | 339,474     | 340,860     | 354,980     | 359,042     | 363,452     | 367,792     | 371,811     | 371,115     |
| Peak Day Therms                          | 3,061,754   | 3,083,831   | 3,105,445   | 3,126,955   | 3,092,287   | 3,113,043   | 3,190,244   | 3,210,830   | 3,231,478   | 3,251,703   |
| Therms Per Residential Customer          | 143,007     | 142,438     | 142,485     | 142,992     | 144,107     | 143,562     | 143,615     | 144,133     | 145,241     | 144,711     |
| Therms Per Commercial Customer           | 256,830     | 255,744     | 255,209     | 255,170     | 256,378     | 255,310     | 254,823     | 254,823     | 255,888     | 254,946     |
| Therms Per Industrial Customer           | 910,674     | 907,289     | 907,688     | 908,018     | 912,474     | 909,160     | 909,811     | 910,227     | 914,085     | 911,155     |
| Residential Customers                    | 259,643     | 261,940     | 264,421     | 266,873     | 269,206     | 271,690     | 274,059     | 276,401     | 278,719     | 281,013     |
| Commercial Customers                     | 37,024      | 37,186      | 37,363      | 37,538      | 37,712      | 37,884      | 38,055      | 38,225      | 38,394      | 38,561      |
| Industrial Customers                     | 631         | 635         | 639         | 643         | 647         | 651         | 654         | 658         | 662         | 665         |
| Interruptible Customers                  | 13          | 13          | 13          | 13          | 13          | 13          | 13          | 13          | 13          | 13          |
| Total Core Customers                     | 297,311     | 299,773     | 302,436     | 305,066     | 307,667     | 310,238     | 312,781     | 315,297     | 317,787     | 320,252     |

Appendix B  
Demand Forecast  
Low Scenario

| Athena                                | 2030             | 2031             | 2032             | 2033             | 2034             | 2035             | 2036             | 2037             | 2038             | 2039             |
|---------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| <b>Total Therms Pct. Growth</b>       | 0.33%            | 0.34%            | 0.76%            | -0.09%           | 0.32%            | 0.32%            | 0.75%            | -0.10%           | 0.30%            | 0.31%            |
| Residential Therms                    | 316,324          | 318,191          | 321,386          | 321,881          | 323,715          | 325,548          | 328,733          | 329,165          | 330,960          | 332,735          |
| Commercial Therms                     | 129,805          | 129,468          | 129,689          | 128,800          | 128,468          | 128,135          | 128,350          | 127,471          | 127,139          | 126,794          |
| Industrial Therms                     | 6,201            | 6,189            | 6,217            | 6,188            | 6,136            | 6,126            | 6,152            | 6,126            | 6,074            | 6,061            |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>452,330</b>   | <b>453,849</b>   | <b>457,291</b>   | <b>456,870</b>   | <b>458,320</b>   | <b>459,808</b>   | <b>463,235</b>   | <b>462,761</b>   | <b>464,172</b>   | <b>465,590</b>   |
| Daily BaseLoad Therms                 | 310              | 313              | 314              | 305              | 322              | 325              | 338              | 331              | 331              | 321              |
| Peak Day Therms                       | 5,059            | 5,075            | 5,104            | 5,120            | 5,135            | 5,151            | 5,152            | 5,182            | 5,196            | 5,211            |
| Therms Per Residential Customer       | 569              | 569              | 572              | 569              | 569              | 569              | 572              | 569              | 569              | 569              |
| Therms Per Commercial Customer        | 2,051            | 2,051            | 2,059            | 2,051            | 2,051            | 2,051            | 2,059            | 2,051            | 2,051            | 2,050            |
| Therms Per Industrial Customer        | 6,387            | 6,381            | 6,409            | 6,380            | 6,386            | 6,381            | 6,409            | 6,381            | 6,388            | 6,380            |
| Residential Customers                 | 556              | 559              | 562              | 566              | 569              | 572              | 575              | 578              | 582              | 585              |
| Commercial Customers                  | 63               | 63               | 63               | 63               | 63               | 62               | 62               | 62               | 62               | 62               |
| Industrial Customers                  | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>620</b>       | <b>623</b>       | <b>626</b>       | <b>629</b>       | <b>632</b>       | <b>635</b>       | <b>638</b>       | <b>641</b>       | <b>644</b>       | <b>647</b>       |
| <b>Baker</b>                          | <b>2030</b>      | <b>2031</b>      | <b>2032</b>      | <b>2033</b>      | <b>2034</b>      | <b>2035</b>      | <b>2036</b>      | <b>2037</b>      | <b>2038</b>      | <b>2039</b>      |
| <b>Total Therms Pct. Growth</b>       | 0.21%            | 0.21%            | 0.85%            | -0.42%           | 0.21%            | 0.20%            | 0.84%            | -0.43%           | 0.20%            | 0.20%            |
| Residential Therms                    | 2,355,540        | 2,346,105        | 2,396,310        | 2,393,392        | 2,405,034        | 2,418,094        | 2,446,284        | 2,442,666        | 2,454,058        | 2,461,117        |
| Commercial Therms                     | 1,491,925        | 1,494,076        | 1,499,634        | 1,486,461        | 1,482,615        | 1,478,697        | 1,484,153        | 1,471,008        | 1,467,166        | 1,463,327        |
| Industrial Therms                     | 123,834          | 123,539          | 123,572          | 122,957          | 122,569          | 122,268          | 122,296          | 121,678          | 121,290          | 121,003          |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>3,977,299</b> | <b>3,963,801</b> | <b>4,019,516</b> | <b>4,002,810</b> | <b>4,011,018</b> | <b>4,019,058</b> | <b>4,052,735</b> | <b>4,035,352</b> | <b>4,043,314</b> | <b>4,051,447</b> |
| Daily BaseLoad Therms                 | 2,415            | 2,425            | 2,438            | 2,443            | 2,454            | 2,465            | 2,480            | 2,491            | 2,220            | 2,225            |
| Peak Day Therms                       | 44,068           | 44,172           | 44,079           | 44,182           | 44,284           | 44,385           | 44,683           | 44,585           | 44,684           | 44,778           |
| Therms Per Residential Customer       | 659              | 659              | 663              | 659              | 659              | 659              | 663              | 659              | 659              | 659              |
| Therms Per Commercial Customer        | 3,002            | 3,002            | 3,021            | 3,003            | 3,003            | 3,003            | 3,022            | 3,003            | 3,003            | 3,004            |
| Therms Per Industrial Customer        | 42,397           | 42,393           | 42,501           | 42,399           | 42,399           | 42,393           | 42,501           | 42,397           | 42,397           | 42,395           |
| Residential Customers                 | 3,577            | 3,596            | 3,615            | 3,634            | 3,653            | 3,672            | 3,691            | 3,709            | 3,728            | 3,746            |
| Commercial Customers                  | 499              | 498              | 496              | 495              | 494              | 492              | 491              | 490              | 489              | 487              |
| Industrial Customers                  | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>4,079</b>     | <b>4,097</b>     | <b>4,114</b>     | <b>4,132</b>     | <b>4,150</b>     | <b>4,167</b>     | <b>4,185</b>     | <b>4,202</b>     | <b>4,219</b>     | <b>4,236</b>     |
| <b>Umatilla</b>                       | <b>2030</b>      | <b>2031</b>      | <b>2032</b>      | <b>2033</b>      | <b>2034</b>      | <b>2035</b>      | <b>2036</b>      | <b>2037</b>      | <b>2038</b>      | <b>2039</b>      |
| <b>Total Therms Pct. Growth</b>       | 0.09%            | 0.40%            | 0.90%            | -0.01%           | 0.06%            | 0.36%            | 0.86%            | -0.05%           | 0.03%            | 0.33%            |
| Residential Therms                    | 497,996          | 506,949          | 518,684          | 524,419          | 532,930          | 541,284          | 552,663          | 557,659          | 565,668          | 573,591          |
| Commercial Therms                     | 1,235,565        | 1,234,534        | 1,239,629        | 1,234,581        | 1,227,539        | 1,226,479        | 1,231,540        | 1,226,485        | 1,219,441        | 1,218,450        |
| Industrial Therms                     | 154,621          | 154,158          | 154,306          | 153,366          | 153,035          | 152,570          | 152,714          | 151,776          | 151,446          | 150,985          |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>1,888,182</b> | <b>1,895,640</b> | <b>1,912,619</b> | <b>1,912,366</b> | <b>1,913,504</b> | <b>1,920,333</b> | <b>1,936,917</b> | <b>1,935,921</b> | <b>1,936,555</b> | <b>1,943,025</b> |
| Daily BaseLoad Therms                 | 2,928            | 2,948            | 2,968            | 2,988            | 3,007            | 3,027            | 3,047            | 3,067            | 3,087            | 3,107            |
| Peak Day Therms                       | 14,945           | 15,033           | 15,068           | 15,153           | 15,202           | 15,284           | 15,424           | 15,447           | 15,491           | 15,569           |
| Therms Per Residential Customer       | 461              | 461              | 463              | 461              | 461              | 461              | 463              | 461              | 461              | 461              |
| Therms Per Commercial Customer        | 8,689            | 8,682            | 8,718            | 8,682            | 8,633            | 8,626            | 8,661            | 8,626            | 8,576            | 8,569            |
| Therms Per Industrial Customer        | 26,457           | 26,450           | 26,540           | 26,450           | 26,458           | 26,450           | 26,540           | 26,450           | 26,457           | 26,450           |
| Residential Customers                 | 1,081            | 1,100            | 1,119            | 1,138            | 1,157            | 1,175            | 1,193            | 1,210            | 1,228            | 1,245            |
| Commercial Customers                  | 142              | 142              | 142              | 142              | 142              | 142              | 142              | 142              | 142              | 142              |
| Industrial Customers                  | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>1,229</b>     | <b>1,248</b>     | <b>1,267</b>     | <b>1,286</b>     | <b>1,305</b>     | <b>1,323</b>     | <b>1,341</b>     | <b>1,358</b>     | <b>1,376</b>     | <b>1,393</b>     |
| <b>Chemult</b>                        | <b>2030</b>      | <b>2031</b>      | <b>2032</b>      | <b>2033</b>      | <b>2034</b>      | <b>2035</b>      | <b>2036</b>      | <b>2037</b>      | <b>2038</b>      | <b>2039</b>      |
| <b>Total Therms Pct. Growth</b>       | -0.26%           | -0.26%           | 0.19%            | -0.70%           | -0.26%           | -0.26%           | 0.19%            | -0.70%           | -0.26%           | -0.27%           |
| Residential Therms                    | 13,347           | 13,313           | 13,338           | 13,244           | 13,210           | 13,176           | 13,201           | 13,107           | 13,072           | 13,038           |
| Commercial Therms                     | 39,142           | 39,042           | 39,115           | 38,839           | 38,739           | 38,640           | 38,711           | 38,439           | 38,338           | 38,236           |
| Industrial Therms                     | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>52,489</b>    | <b>52,355</b>    | <b>52,453</b>    | <b>52,083</b>    | <b>51,948</b>    | <b>51,815</b>    | <b>51,912</b>    | <b>51,546</b>    | <b>51,411</b>    | <b>51,274</b>    |
| Daily BaseLoad Therms                 | 56               | 56               | 56               | 56               | 56               | 56               | 56               | 56               | 56               | 56               |
| Peak Day Therms                       | 437              | 436              | 437              | 436              | 435              | 434              | 430              | 431              | 430              | 429              |
| Therms Per Residential Customer       | 539              | 540              | 542              | 540              | 540              | 540              | 543              | 541              | 541              | 541              |
| Therms Per Commercial Customer        | 2,010            | 2,010            | 2,019            | 2,010            | 2,010            | 2,010            | 2,019            | 2,010            | 2,010            | 2,010            |
| Therms Per Industrial Customer        | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Residential Customers                 | 25               | 25               | 25               | 25               | 24               | 24               | 24               | 24               | 24               | 24               |
| Commercial Customers                  | 19               | 19               | 19               | 19               | 19               | 19               | 19               | 19               | 19               | 19               |
| Industrial Customers                  | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>44</b>        | <b>44</b>        | <b>44</b>        | <b>44</b>        | <b>44</b>        | <b>44</b>        | <b>43</b>        | <b>43</b>        | <b>43</b>        | <b>43</b>        |
| <b>Gilchrist</b>                      | <b>2030</b>      | <b>2031</b>      | <b>2032</b>      | <b>2033</b>      | <b>2034</b>      | <b>2035</b>      | <b>2036</b>      | <b>2037</b>      | <b>2038</b>      | <b>2039</b>      |
| <b>Total Therms Pct. Growth</b>       | -0.26%           | -0.26%           | 0.23%            | -0.74%           | -0.26%           | -0.26%           | 0.22%            | -0.74%           | -0.26%           | -0.26%           |
| Residential Therms                    | 111,096          | 110,810          | 111,047          | 110,239          | 109,954          | 109,669          | 109,900          | 109,100          | 108,814          | 108,525          |
| Commercial Therms                     | 134,006          | 133,658          | 133,975          | 132,977          | 132,627          | 132,281          | 132,592          | 131,598          | 131,250          | 130,907          |
| Industrial Therms                     | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>245,102</b>   | <b>244,468</b>   | <b>245,021</b>   | <b>243,216</b>   | <b>242,581</b>   | <b>241,951</b>   | <b>242,492</b>   | <b>240,698</b>   | <b>240,063</b>   | <b>239,432</b>   |
| Daily BaseLoad Therms                 | 168              | 168              | 168              | 168              | 168              | 168              | 168              | 168              | 168              | 168              |
| Peak Day Therms                       | 2,257            | 2,251            | 2,245            | 2,239            | 2,234            | 2,228            | 2,222            | 2,216            | 2,210            | 2,204            |
| Therms Per Residential Customer       | 588              | 588              | 591              | 588              | 589              | 589              | 592              | 590              | 590              | 590              |
| Therms Per Commercial Customer        | 3,546            | 3,546            | 3,544            | 3,547            | 3,547            | 3,548            | 3,546            | 3,549            | 3,549            | 3,549            |
| Therms Per Industrial Customer        | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Residential Customers                 | 189              | 188              | 188              | 187              | 187              | 186              | 186              | 185              | 184              | 184              |
| Commercial Customers                  | 38               | 38               | 38               | 37               | 37               | 37               | 37               | 37               | 37               | 37               |
| Industrial Customers                  | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>227</b>       | <b>226</b>       | <b>225</b>       | <b>225</b>       | <b>224</b>       | <b>223</b>       | <b>223</b>       | <b>222</b>       | <b>221</b>       | <b>221</b>       |



**Appendix B  
Demand Forecast  
Low Scenario**

|                                       | 2030      | 2031      | 2032      | 2033      | 2034      | 2035      | 2036      | 2037      | 2038      | 2039      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Hermiston</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.58%     | 0.58%     | 1.11%     | 0.00%     | 0.55%     | 0.57%     | 1.07%     | -0.01%    | 0.52%     | 0.49%     |
| Residential Therms                    | 2,560,780 | 2,587,512 | 2,629,540 | 2,639,426 | 2,665,347 | 2,691,775 | 2,733,407 | 2,742,427 | 2,767,406 | 2,791,378 |
| Commercial Therms                     | 2,986,338 | 2,993,002 | 3,013,975 | 3,005,426 | 3,012,026 | 3,019,513 | 3,040,516 | 3,032,692 | 3,039,221 | 3,044,788 |
| Industrial Therms                     | 175,254   | 174,804   | 175,411   | 173,865   | 173,415   | 173,004   | 173,601   | 172,105   | 171,655   | 171,166   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 5,722,371 | 5,755,318 | 5,818,927 | 5,818,717 | 5,850,789 | 5,884,293 | 5,947,524 | 5,947,224 | 5,978,282 | 6,007,332 |
| Daily BaseLoad Therms                 | 5,820     | 5,901     | 5,220     | 5,126     | 4,059     | 4,057     | 4,243     | 4,174     | 5,476     | 5,262     |
| Peak Day Therms                       | 58,946    | 59,303    | 61,342    | 61,702    | 62,059    | 62,412    | 61,047    | 63,113    | 63,458    | 63,800    |
| Therms Per Residential Customer       | 535       | 535       | 538       | 535       | 535       | 535       | 538       | 535       | 535       | 535       |
| Therms Per Commercial Customer        | 3,827     | 3,825     | 3,841     | 3,820     | 3,818     | 3,817     | 3,833     | 3,813     | 3,811     | 3,808     |
| Therms Per Industrial Customer        | 22,492    | 22,492    | 22,629    | 22,487    | 22,487    | 22,492    | 22,629    | 22,492    | 22,492    | 22,487    |
| Residential Customers                 | 4,787     | 4,837     | 4,887     | 4,936     | 4,984     | 5,032     | 5,080     | 5,127     | 5,174     | 5,220     |
| Commercial Customers                  | 780       | 782       | 785       | 787       | 789       | 791       | 793       | 795       | 797       | 799       |
| Industrial Customers                  | 8         | 8         | 8         | 8         | 8         | 8         | 8         | 8         | 8         | 8         |
| Interruptible Customers               | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         |
| Total Core Customers                  | 5,576     | 5,628     | 5,680     | 5,731     | 5,782     | 5,832     | 5,882     | 5,931     | 5,980     | 6,028     |
| <b>Huntington</b>                     |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -0.08%    | -0.08%    | 0.58%     | -0.23%    | -0.08%    | -0.07%    | 0.58%     | -0.73%    | 0.28%     | -0.09%    |
| Residential Therms                    | 62,992    | 62,994    | 63,394    | 62,994    | 62,995    | 63,000    | 63,400    | 63,004    | 63,007    | 63,003    |
| Commercial Therms                     | 28,500    | 28,429    | 28,556    | 28,282    | 28,136    | 28,242    | 27,989    | 27,989    | 27,917    | 27,838    |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 91,493    | 91,423    | 91,950    | 91,276    | 91,201    | 91,136    | 91,662    | 90,994    | 90,923    | 90,841    |
| Daily BaseLoad Therms                 | 15        | 15        | 15        | 15        | 15        | 15        | 15        | 15        | 15        | 15        |
| Peak Day Therms                       | 1,286     | 1,285     | 1,289     | 1,288     | 1,287     | 1,286     | 1,280     | 1,284     | 1,283     | 1,282     |
| Therms Per Residential Customer       | 480       | 480       | 483       | 479       | 479       | 480       | 483       | 480       | 480       | 479       |
| Therms Per Commercial Customer        | 1,952     | 1,952     | 1,965     | 1,951     | 1,950     | 1,950     | 1,964     | 1,950     | 1,949     | 1,949     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 131       | 131       | 131       | 131       | 131       | 131       | 131       | 131       | 131       | 131       |
| Commercial Customers                  | 15        | 15        | 15        | 14        | 14        | 14        | 14        | 14        | 14        | 14        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 146       | 146       | 146       | 146       | 146       | 146       | 146       | 146       | 146       | 146       |
| <b>La Pine</b>                        |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.34%     | 0.34%     | 0.80%     | -0.19%    | 0.31%     | 0.34%     | 0.77%     | -0.18%    | 0.28%     | 0.24%     |
| Residential Therms                    | 191,464   | 194,265   | 197,960   | 199,684   | 202,366   | 205,088   | 208,689   | 210,294   | 212,845   | 215,290   |
| Commercial Therms                     | 364,358   | 363,422   | 364,201   | 361,428   | 360,492   | 359,681   | 360,445   | 357,810   | 356,875   | 355,803   |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 555,823   | 557,687   | 562,161   | 561,112   | 562,859   | 564,769   | 569,134   | 568,104   | 569,720   | 571,093   |
| Daily BaseLoad Therms                 | 518       | 517       | 528       | 528       | 533       | 546       | 545       | 550       | 563       | 562       |
| Peak Day Therms                       | 4,840     | 4,856     | 5,068     | 5,084     | 5,100     | 5,116     | 4,933     | 5,146     | 5,161     | 5,174     |
| Therms Per Residential Customer       | 645       | 645       | 648       | 645       | 645       | 645       | 645       | 645       | 645       | 645       |
| Therms Per Commercial Customer        | 2,810     | 2,811     | 2,824     | 2,811     | 2,811     | 2,813     | 2,826     | 2,814     | 2,814     | 2,813     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 297       | 301       | 305       | 310       | 314       | 318       | 322       | 326       | 330       | 334       |
| Commercial Customers                  | 130       | 129       | 129       | 129       | 128       | 128       | 128       | 127       | 127       | 126       |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 426       | 430       | 434       | 438       | 442       | 446       | 450       | 453       | 457       | 460       |
| <b>Madras</b>                         |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.12%     | 0.17%     | 0.69%     | -0.34%    | 0.11%     | 0.18%     | 0.68%     | -0.33%    | 0.10%     | 0.13%     |
| Residential Therms                    | 789,469   | 797,554   | 809,723   | 813,288   | 821,131   | 829,103   | 841,130   | 844,436   | 851,999   | 859,288   |
| Commercial Therms                     | 1,171,345 | 1,171,369 | 1,177,174 | 1,171,168 | 1,171,505 | 1,177,320 | 1,177,320 | 1,171,592 | 1,171,616 | 1,171,357 |
| Industrial Therms                     | 887,371   | 885,082   | 887,410   | 880,318   | 878,052   | 875,971   | 878,252   | 871,415   | 869,148   | 866,655   |
| Ind., Inst., & Cmcl. Interrup. Therms | 271,336   | 270,852   | 272,068   | 270,785   | 268,477   | 268,060   | 269,264   | 268,060   | 265,750   | 265,202   |
| Total Core Therms                     | 3,119,522 | 3,124,858 | 3,146,375 | 3,135,559 | 3,138,854 | 3,144,639 | 3,165,966 | 3,155,303 | 3,158,513 | 3,162,502 |
| Daily BaseLoad Therms                 | 2,651     | 2,638     | 2,676     | 2,363     | 2,376     | 1,832     | 1,825     | 1,838     | 1,867     | 1,866     |
| Peak Day Therms                       | 29,472    | 29,527    | 30,344    | 30,399    | 30,437    | 30,490    | 29,767    | 30,600    | 30,635    | 30,666    |
| Therms Per Residential Customer       | 561       | 561       | 564       | 561       | 561       | 561       | 561       | 561       | 561       | 561       |
| Therms Per Commercial Customer        | 3,086     | 3,086     | 3,101     | 3,085     | 3,085     | 3,086     | 3,101     | 3,086     | 3,086     | 3,085     |
| Therms Per Industrial Customer        | 50,620    | 50,619    | 50,884    | 50,608    | 50,608    | 50,620    | 50,884    | 50,620    | 50,620    | 50,608    |
| Residential Customers                 | 1,407     | 1,421     | 1,436     | 1,450     | 1,464     | 1,478     | 1,491     | 1,505     | 1,518     | 1,532     |
| Commercial Customers                  | 380       | 380       | 380       | 380       | 380       | 380       | 380       | 380       | 380       | 380       |
| Industrial Customers                  | 18        | 17        | 17        | 17        | 17        | 17        | 17        | 17        | 17        | 17        |
| Interruptible Customers               | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         |
| Total Core Customers                  | 1,805     | 1,819     | 1,834     | 1,848     | 1,862     | 1,875     | 1,889     | 1,903     | 1,916     | 1,929     |
| <b>Milton-Freewater</b>               |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -0.20%    | -0.19%    | 0.44%     | -0.85%    | -0.19%    | 0.44%     | -0.82%    | -0.19%    | -0.23%    |           |
| Residential Therms                    | 106,579   | 106,584   | 107,340   | 106,569   | 106,574   | 106,614   | 107,367   | 106,633   | 106,637   | 106,609   |
| Commercial Therms                     | 285,236   | 284,508   | 285,442   | 282,936   | 282,206   | 281,580   | 282,495   | 280,109   | 279,379   | 278,537   |
| Industrial Therms                     | 30,078    | 30,019    | 30,166    | 29,849    | 29,786    | 29,696    | 29,861    | 29,546    | 29,476    | 29,390    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 421,893   | 421,111   | 422,948   | 419,353   | 418,566   | 417,890   | 419,724   | 416,288   | 415,492   | 414,536   |
| Daily BaseLoad Therms                 | 411       | 414       | 416       | 414       | 405       | 394       | 414       | 414       | 416       | 392       |
| Peak Day Therms                       | 4,280     | 4,273     | 4,411     | 4,403     | 4,395     | 4,387     | 4,235     | 4,371     | 4,364     | 4,355     |
| Therms Per Residential Customer       | 450       | 450       | 453       | 450       | 450       | 450       | 453       | 450       | 450       | 450       |
| Therms Per Commercial Customer        | 2,847     | 2,848     | 2,865     | 2,847     | 2,848     | 2,849     | 2,866     | 2,850     | 2,850     | 2,850     |
| Therms Per Industrial Customer        | 5,499     | 5,508     | 5,555     | 5,516     | 5,524     | 5,528     | 5,580     | 5,542     | 5,549     | 5,554     |
| Residential Customers                 | 237       | 237       | 237       | 237       | 237       | 237       | 237       | 237       | 237       | 237       |
| Commercial Customers                  | 100       | 100       | 100       | 99        | 99        | 99        | 99        | 98        | 98        | 98        |
| Industrial Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 343       | 342       | 342       | 342       | 341       | 341       | 341       | 341       | 340       | 340       |

**Appendix B  
Demand Forecast  
Low Scenario**

| Mission Tap                                      | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>                  | 0.00%      | 0.00%      | 0.37%      | -0.36%     | 0.00%      | -0.01%     | 0.37%      | -0.37%     | 0.00%      | 0.00%      |
| <b>Residential Therms</b>                        | 120,525    | 120,522    | 121,002    | 120,532    | 120,529    | 120,522    | 121,002    | 120,527    | 120,525    | 120,527    |
| <b>Commercial Therms</b>                         | 369,721    | 369,718    | 371,060    | 369,739    | 369,736    | 369,718    | 371,061    | 369,724    | 369,721    | 369,733    |
| <b>Industrial Therms</b>                         | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>                         | 490,246    | 490,241    | 492,062    | 490,271    | 490,265    | 490,240    | 492,062    | 490,252    | 490,246    | 490,260    |
| <b>Daily BaseLoad Therms</b>                     | 546        | 546        | 546        | 546        | 546        | 546        | 546        | 546        | 546        | 546        |
| <b>Peak Day Therms</b>                           | 4,481      | 4,481      | 4,462      | 4,462      | 4,463      | 4,483      | 4,483      | 4,464      | 4,464      | 4,464      |
| <b>Therms Per Residential Customer</b>           | 560        | 560        | 562        | 560        | 560        | 560        | 563        | 560        | 560        | 561        |
| <b>Therms Per Commercial Customer</b>            | 8,279      | 8,281      | 8,312      | 8,285      | 8,286      | 8,287      | 8,318      | 8,290      | 8,291      | 8,293      |
| <b>Therms Per Industrial Customer</b>            | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Residential Customers</b>                     | 215        | 215        | 215        | 215        | 215        | 215        | 215        | 215        | 215        | 215        |
| <b>Commercial Customers</b>                      | 45         | 45         | 45         | 45         | 45         | 45         | 45         | 45         | 45         | 45         |
| <b>Industrial Customers</b>                      | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Interruptible Customers</b>                   | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>                      | 260        | 260        | 260        | 260        | 260        | 260        | 260        | 260        | 260        | 260        |
| <b>Nyssa-Ontario</b>                             |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>                  | 0.25%      | 0.23%      | 0.96%      | -0.24%     | 0.24%      | 0.23%      | 0.95%      | -0.24%     | 0.23%      | 0.30%      |
| <b>Residential Therms</b>                        | 2,175,345  | 2,186,893  | 2,212,873  | 2,209,589  | 2,220,958  | 2,232,492  | 2,258,532  | 2,254,946  | 2,266,090  | 2,276,949  |
| <b>Commercial Therms</b>                         | 2,719,505  | 2,729,678  | 2,757,167  | 2,750,539  | 2,761,501  | 2,771,770  | 2,799,347  | 2,792,546  | 2,803,325  | 2,812,840  |
| <b>Industrial Therms</b>                         | 215,993    | 216,017    | 216,112    | 216,074    | 216,103    | 216,157    | 216,229    | 216,225    | 216,263    | 216,248    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 911,239    | 909,431    | 914,041    | 909,342    | 901,774    | 900,056    | 904,618    | 900,056    | 892,486    | 890,592    |
| <b>Total Core Therms</b>                         | 6,022,083  | 6,042,020  | 6,100,193  | 6,085,544  | 6,100,335  | 6,120,475  | 6,178,726  | 6,163,773  | 6,178,163  | 6,196,629  |
| <b>Daily BaseLoad Therms</b>                     | 3,282      | 3,293      | 3,406      | 3,369      | 3,417      | 3,417      | 3,443      | 3,443      | 3,425      | 3,425      |
| <b>Peak Day Therms</b>                           | 68,532     | 68,816     | 69,706     | 69,989     | 70,175     | 70,456     | 70,116     | 71,011     | 71,193     | 71,468     |
| <b>Therms Per Residential Customer</b>           | 541        | 541        | 545        | 541        | 541        | 541        | 545        | 541        | 541        | 541        |
| <b>Therms Per Commercial Customer</b>            | 2,774      | 2,772      | 2,788      | 2,769      | 2,768      | 2,767      | 2,782      | 2,764      | 2,763      | 2,761      |
| <b>Therms Per Industrial Customer</b>            | 10,842     | 10,841     | 10,844     | 10,841     | 10,841     | 10,841     | 10,844     | 10,842     | 10,842     | 10,840     |
| <b>Residential Customers</b>                     | 4,019      | 4,040      | 4,062      | 4,083      | 4,104      | 4,125      | 4,146      | 4,167      | 4,187      | 4,208      |
| <b>Commercial Customers</b>                      | 980        | 985        | 989        | 993        | 998        | 1,002      | 1,006      | 1,010      | 1,014      | 1,019      |
| <b>Industrial Customers</b>                      | 20         | 20         | 20         | 20         | 20         | 20         | 20         | 20         | 20         | 20         |
| <b>Interruptible Customers</b>                   | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>                      | 5,020      | 5,046      | 5,072      | 5,097      | 5,123      | 5,148      | 5,173      | 5,198      | 5,223      | 5,248      |
| <b>Pendleton</b>                                 |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>                  | 0.18%      | 0.26%      | 0.85%      | -0.31%     | 0.17%      | 0.26%      | 0.84%      | -0.30%     | 0.16%      | 0.23%      |
| <b>Residential Therms</b>                        | 3,101,406  | 3,119,210  | 3,155,836  | 3,154,173  | 3,171,674  | 3,189,435  | 3,226,089  | 3,223,974  | 3,241,107  | 3,257,787  |
| <b>Commercial Therms</b>                         | 2,370,685  | 2,370,592  | 2,384,127  | 2,370,502  | 2,370,147  | 2,370,339  | 2,383,872  | 2,370,530  | 2,370,176  | 2,369,803  |
| <b>Industrial Therms</b>                         | 157,942    | 157,474    | 158,302    | 156,650    | 156,308    | 155,853    | 156,669    | 155,042    | 154,700    | 154,219    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 670,157    | 669,259    | 671,741    | 669,164    | 663,163    | 662,359    | 664,816    | 662,359    | 656,356    | 655,367    |
| <b>Total Core Therms</b>                         | 6,300,190  | 6,316,534  | 6,370,006  | 6,350,489  | 6,361,293  | 6,377,986  | 6,431,446  | 6,411,905  | 6,422,339  | 6,437,176  |
| <b>Daily BaseLoad Therms</b>                     | 5,779      | 5,823      | 5,851      | 5,871      | 5,845      | 5,817      | 5,947      | 5,947      | 5,947      | 5,947      |
| <b>Peak Day Therms</b>                           | 65,709     | 65,905     | 66,838     | 67,034     | 67,182     | 67,376     | 66,831     | 67,764     | 67,908     | 68,097     |
| <b>Therms Per Residential Customer</b>           | 575        | 575        | 578        | 575        | 575        | 575        | 578        | 575        | 575        | 574        |
| <b>Therms Per Commercial Customer</b>            | 3,140      | 3,140      | 3,158      | 3,140      | 3,139      | 3,139      | 3,157      | 3,139      | 3,139      | 3,138      |
| <b>Therms Per Industrial Customer</b>            | 27,026     | 27,019     | 27,227     | 27,016     | 27,023     | 27,019     | 27,227     | 27,019     | 27,026     | 27,016     |
| <b>Residential Customers</b>                     | 5,397      | 5,428      | 5,459      | 5,490      | 5,520      | 5,551      | 5,581      | 5,611      | 5,641      | 5,671      |
| <b>Commercial Customers</b>                      | 755        | 755        | 755        | 755        | 755        | 755        | 755        | 755        | 755        | 755        |
| <b>Industrial Customers</b>                      | 6          | 6          | 6          | 6          | 6          | 6          | 6          | 6          | 6          | 6          |
| <b>Interruptible Customers</b>                   | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>                      | 6,159      | 6,190      | 6,221      | 6,251      | 6,282      | 6,313      | 6,343      | 6,373      | 6,403      | 6,433      |
| <b>Prineville</b>                                |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>                  | 0.73%      | 0.70%      | 1.20%      | 0.16%      | 0.68%      | 0.67%      | 1.15%      | 0.13%      | 0.63%      | 0.58%      |
| <b>Residential Therms</b>                        | 1,778,396  | 1,801,664  | 1,833,844  | 1,846,904  | 1,869,304  | 1,891,866  | 1,923,417  | 1,935,398  | 1,956,799  | 1,977,522  |
| <b>Commercial Therms</b>                         | 1,856,042  | 1,859,948  | 1,873,484  | 1,867,865  | 1,872,306  | 1,876,590  | 1,890,160  | 1,884,851  | 1,889,249  | 1,892,612  |
| <b>Industrial Therms</b>                         | 189,751    | 189,263    | 189,612    | 188,251    | 187,762    | 187,314    | 187,655    | 186,344    | 185,855    | 185,313    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>                         | 3,824,190  | 3,850,874  | 3,896,939  | 3,903,020  | 3,929,371  | 3,955,770  | 4,001,222  | 4,006,593  | 4,031,903  | 4,055,448  |
| <b>Daily BaseLoad Therms</b>                     | 3,108      | 3,119      | 3,193      | 3,218      | 3,260      | 3,335      | 3,038      | 3,092      | 3,154      | 3,179      |
| <b>Peak Day Therms</b>                           | 37,374     | 37,636     | 38,790     | 39,053     | 39,321     | 39,578     | 39,930     | 40,092     | 40,349     | 40,595     |
| <b>Therms Per Residential Customer</b>           | 583        | 583        | 586        | 583        | 583        | 583        | 586        | 583        | 583        | 583        |
| <b>Therms Per Commercial Customer</b>            | 3,441      | 3,438      | 3,454      | 3,434      | 3,433      | 3,433      | 3,447      | 3,428      | 3,427      | 3,424      |
| <b>Therms Per Industrial Customer</b>            | 6,719      | 6,719      | 6,749      | 6,717      | 6,717      | 6,719      | 6,749      | 6,719      | 6,719      | 6,717      |
| <b>Residential Customers</b>                     | 3,050      | 3,090      | 3,130      | 3,169      | 3,207      | 3,245      | 3,283      | 3,320      | 3,357      | 3,393      |
| <b>Commercial Customers</b>                      | 539        | 541        | 542        | 544        | 545        | 547        | 548        | 550        | 551        | 553        |
| <b>Industrial Customers</b>                      | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         |
| <b>Interruptible Customers</b>                   | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>                      | 3,618      | 3,659      | 3,700      | 3,741      | 3,781      | 3,820      | 3,859      | 3,897      | 3,936      | 3,973      |
| <b>Redmond</b>                                   |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>                  | 1.26%      | 1.22%      | 1.70%      | 0.63%      | 1.14%      | 1.14%      | 1.59%      | 0.56%      | 1.04%      | 0.98%      |
| <b>Residential Therms</b>                        | 4,914,613  | 4,985,392  | 5,080,846  | 5,122,136  | 5,190,016  | 5,258,958  | 5,352,213  | 5,390,560  | 5,455,169  | 5,516,986  |
| <b>Commercial Therms</b>                         | 4,164,571  | 4,199,564  | 4,256,041  | 4,267,606  | 4,301,992  | 4,337,206  | 4,393,262  | 4,404,380  | 4,437,322  | 4,469,089  |
| <b>Industrial Therms</b>                         | 950,199    | 967,151    | 986,033    | 999,984    | 1,016,122  | 1,032,195  | 1,052,330  | 1,063,271  | 1,078,497  | 1,093,135  |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>                         | 10,029,383 | 10,152,108 | 10,324,941 | 10,389,727 | 10,508,130 | 10,628,359 | 10,797,806 | 10,858,212 | 10,971,999 | 11,079,190 |
| <b>Daily BaseLoad Therms</b>                     | 9,696      | 9,812      | 10,176     | 10,286     | 10,531     | 8,649      | 8,708      | 8,888      | 9,199      | 9,237      |
| <b>Peak Day Therms</b>                           | 95,987     | 97,129     | 101,736    | 102,891    | 104,034    | 105,164    | 102,650    | 107,384    | 108,479    | 109,558    |
| <b>Therms Per Residential Customer</b>           | 747        | 747        | 751        | 747        | 747        | 747        | 751        | 747        | 747        | 747        |
| <b>Therms Per Commercial Customer</b>            | 3,220      | 3,219      | 3,235      | 3,217      | 3,217      | 3,217      | 3,233      | 3,216      | 3,216      | 3,214      |
| <b>Therms Per Industrial Customer</b>            | 38,818     | 38,818     | 38,983     | 38,810     | 38,810     | 38,820     | 38,985     | 38,821     | 38,822     | 38,812     |
| <b>Residential Customers</b>                     | 6,578      | 6,673      | 6,766      | 6,858      | 6,949      | 7,039      | 7,128      | 7,215      | 7,302      | 7,387      |
| <b>Commercial Customers</b>                      | 1,293      | 1,304      | 1,316      | 1,326      | 1,337      | 1,348      | 1,359      | 1,369      | 1,380      | 1,390      |
| <b>Industrial Customers</b>                      | 24         | 25         | 25         | 26         | 26         | 27         | 27         | 27         | 28         | 28         |
| <b>Interruptible Customers</b>                   | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>                      | 7,896      | 8,002      | 8,107      | 8,211      | 8,313      | 8,414      | 8,513      | 8,612      | 8,709      | 8,806      |

**Appendix B  
Demand Forecast  
Low Scenario**

|                                       | 2030      | 2031      | 2032      | 2033      | 2034      | 2035      | 2036      | 2037      | 2038      | 2039      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Stanfield</b>                      |           |           |           |           |           |           |           |           |           |           |
| <b>Total Therms Pct. Growth</b>       | 0.53%     | 0.52%     | 1.01%     | 0.01%     | 0.50%     | 0.50%     | 0.98%     | -0.01%    | 0.48%     | 0.46%     |
| Residential Therms                    | 214,703   | 216,427   | 219,228   | 219,829   | 221,515   | 223,207   | 225,988   | 226,525   | 228,161   | 229,762   |
| Commercial Therms                     | 77,916    | 77,712    | 77,878    | 77,305    | 77,109    | 76,912    | 77,074    | 76,512    | 76,316    | 76,102    |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Therms</b>              | 292,618   | 294,139   | 297,106   | 297,135   | 298,624   | 300,119   | 303,063   | 303,037   | 304,476   | 305,864   |
| Daily BaseLoad Therms                 | 224       | 227       | 230       | 232       | 233       | 233       | 239       | 242       | 245       | 247       |
| Peak Day Therms                       | 3,273     | 3,291     | 3,334     | 3,351     | 3,369     | 3,386     | 3,377     | 3,420     | 3,437     | 3,453     |
| Therms Per Residential Customer       | 574       | 574       | 577       | 574       | 574       | 574       | 577       | 574       | 574       | 574       |
| Therms Per Commercial Customer        | 2,162     | 2,162     | 2,172     | 2,162     | 2,162     | 2,172     | 2,162     | 2,162     | 2,162     | 2,162     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 374       | 377       | 380       | 383       | 386       | 389       | 392       | 395       | 397       | 400       |
| Commercial Customers                  | 36        | 36        | 36        | 36        | 36        | 36        | 35        | 35        | 35        | 35        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Customers</b>           | 410       | 413       | 416       | 419       | 421       | 424       | 427       | 430       | 433       | 435       |
| <b>Stearns (Sunriver)</b>             |           |           |           |           |           |           |           |           |           |           |
| <b>Total Therms Pct. Growth</b>       | 0.35%     | 0.25%     | 0.80%     | -0.11%    | 0.34%     | 0.33%     | 0.79%     | -0.12%    | 0.33%     | 0.33%     |
| Residential Therms                    | 3,901,003 | 3,921,137 | 3,959,933 | 3,961,286 | 3,981,118 | 4,000,720 | 4,039,497 | 4,039,951 | 4,059,396 | 4,078,884 |
| Commercial Therms                     | 1,045,214 | 1,042,531 | 1,043,744 | 1,037,212 | 1,034,529 | 1,031,797 | 1,032,971 | 1,026,431 | 1,023,747 | 1,021,082 |
| Industrial Therms                     | 43,671    | 43,571    | 43,612    | 43,357    | 43,223    | 43,122    | 43,162    | 42,907    | 42,773    | 42,675    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Therms</b>              | 4,989,887 | 5,007,238 | 5,047,289 | 5,041,854 | 5,058,869 | 5,075,639 | 5,115,629 | 5,109,289 | 5,125,917 | 5,142,640 |
| Daily BaseLoad Therms                 | 5,386     | 5,423     | 5,464     | 5,497     | 5,460     | 5,494     | 5,526     | 5,562     | 5,604     | 5,637     |
| Peak Day Therms                       | 42,526    | 42,695    | 42,684    | 42,851    | 43,017    | 43,181    | 43,527    | 43,509    | 43,671    | 43,831    |
| Therms Per Residential Customer       | 997       | 996       | 1,001     | 997       | 996       | 996       | 1,001     | 996       | 996       | 997       |
| Therms Per Commercial Customer        | 4,791     | 4,791     | 4,809     | 4,792     | 4,792     | 4,791     | 4,809     | 4,791     | 4,791     | 4,792     |
| Therms Per Industrial Customer        | 14,951    | 14,951    | 15,000    | 14,951    | 14,952    | 14,951    | 15,000    | 14,951    | 14,951    | 14,952    |
| Residential Customers                 | 3,915     | 3,935     | 3,955     | 3,975     | 3,995     | 4,015     | 4,035     | 4,054     | 4,074     | 4,093     |
| Commercial Customers                  | 218       | 218       | 217       | 216       | 216       | 215       | 215       | 214       | 214       | 213       |
| Industrial Customers                  | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Customers</b>           | 4,136     | 4,155     | 4,175     | 4,194     | 4,214     | 4,233     | 4,252     | 4,271     | 4,290     | 4,309     |
| <b>Pronghorn</b>                      |           |           |           |           |           |           |           |           |           |           |
| <b>Total Therms Pct. Growth</b>       | 1.19%     | 1.15%     | 1.53%     | 0.67%     | 1.04%     | 1.00%     | 1.41%     | 0.54%     | 0.93%     | 0.92%     |
| Residential Therms                    | 499,386   | 509,583   | 522,020   | 529,494   | 539,128   | 548,514   | 560,430   | 566,988   | 575,988   | 584,939   |
| Commercial Therms                     | 317,654   | 316,840   | 317,084   | 315,252   | 314,437   | 313,578   | 313,811   | 311,945   | 311,130   | 310,349   |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Therms</b>              | 817,040   | 826,423   | 839,104   | 844,746   | 853,565   | 862,092   | 874,241   | 878,933   | 887,119   | 895,288   |
| Daily BaseLoad Therms                 | 1,260     | 1,288     | 1,322     | 1,347     | 1,376     | 1,404     | 1,432     | 1,460     | 1,494     | 1,519     |
| Peak Day Therms                       | 6,491     | 6,579     | 6,547     | 6,631     | 6,713     | 6,794     | 6,996     | 6,951     | 7,027     | 7,102     |
| Therms Per Residential Customer       | 1,044     | 1,044     | 1,049     | 1,044     | 1,044     | 1,044     | 1,049     | 1,044     | 1,044     | 1,044     |
| Therms Per Commercial Customer        | 9,319     | 9,320     | 9,351     | 9,321     | 9,321     | 9,320     | 9,351     | 9,319     | 9,319     | 9,321     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 478       | 488       | 498       | 507       | 516       | 525       | 534       | 543       | 552       | 560       |
| Commercial Customers                  | 34        | 34        | 34        | 34        | 34        | 34        | 34        | 33        | 33        | 33        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Customers</b>           | 512       | 522       | 532       | 541       | 550       | 559       | 568       | 576       | 585       | 593       |
| <b>North Bend</b>                     |           |           |           |           |           |           |           |           |           |           |
| <b>Total Therms Pct. Growth</b>       | -0.71%    | -0.23%    | 0.07%     | -0.38%    | -0.45%    | -0.13%    | 0.11%     | -0.36%    | -0.80%    | -0.21%    |
| Residential Therms                    | 5,758     | 5,741     | 5,729     | 5,701     | 5,695     | 5,684     | 5,679     | 5,652     | 5,628     | 5,612     |
| Commercial Therms                     | 45,685    | 45,626    | 45,684    | 45,560    | 45,213    | 45,194    | 45,293    | 45,178    | 44,717    | 44,666    |
| Industrial Therms                     | 14,078    | 14,007    | 14,004    | 13,906    | 13,966    | 13,910    | 13,885    | 13,791    | 13,760    | 13,690    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Therms</b>              | 65,521    | 65,374    | 65,417    | 65,166    | 64,875    | 64,788    | 64,856    | 64,621    | 64,105    | 63,968    |
| Daily BaseLoad Therms                 | 11        | 11        | 8         | (1)       | (6)       | (6)       | (6)       | (7)       | (10)      | (10)      |
| Peak Day Therms                       | 316       | 315       | 327       | 327       | 324       | 324       | 312       | 323       | 321       | 320       |
| Therms Per Residential Customer       | 1,478     | 1,477     | 1,478     | 1,475     | 1,477     | 1,478     | 1,480     | 1,477     | 1,475     | 1,475     |
| Therms Per Commercial Customer        | 467       | 478       | 471       | 463       | 453       | 446       | 441       | 434       | 424       | 418       |
| Therms Per Industrial Customer        | 7,220     | 7,217     | 7,219     | 7,202     | 7,236     | 7,241     | 7,232     | 7,217     | 7,204     | 7,202     |
| Residential Customers                 | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         |
| Commercial Customers                  | 94        | 95        | 97        | 98        | 100       | 101       | 103       | 104       | 106       | 107       |
| Industrial Customers                  | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Customers</b>           | 100       | 101       | 103       | 104       | 106       | 107       | 109       | 110       | 111       | 113       |

**Appendix B  
Demand Forecast  
Low Scenario**

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| Bend Loop                             | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>       | 0.94%      | 0.92%      | 1.38%      | 0.40%      | 0.87%      | 0.86%      | 1.32%      | 0.34%      | 0.81%      | 0.78%      |
| Residential Therms                    | 28,523,298 | 28,853,224 | 29,319,738 | 29,499,495 | 29,818,543 | 30,136,791 | 30,595,700 | 30,758,521 | 31,064,719 | 31,365,240 |
| Commercial Therms                     | 12,720,145 | 12,764,014 | 12,867,562 | 12,850,370 | 12,893,553 | 12,937,918 | 13,041,632 | 13,024,124 | 13,066,481 | 13,108,106 |
| Industrial Therms                     | 438,766    | 447,877    | 456,630    | 465,598    | 474,211    | 482,718    | 492,992    | 499,232    | 507,270    | 515,144    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 41,682,208 | 42,065,115 | 42,645,930 | 42,815,463 | 43,186,307 | 43,557,427 | 44,130,324 | 44,281,877 | 44,638,670 | 44,988,490 |
| Daily Baseload Therms                 | 41,372     | 41,998     | 42,829     | 43,476     | 42,121     | 42,973     | 43,575     | 44,288     | 45,090     | 45,684     |
| Peak Day Therms                       | 380,633    | 384,110    | 391,232    | 394,670    | 398,064    | 401,436    | 400,967    | 408,080    | 411,349    | 414,556    |
| Therms Per Residential Customer       | 741        | 741        | 745        | 741        | 741        | 741        | 745        | 741        | 741        | 741        |
| Therms Per Commercial Customer        | 2,896      | 2,895      | 2,908      | 2,893      | 2,893      | 2,892      | 2,905      | 2,891      | 2,890      | 2,889      |
| Therms Per Industrial Customer        | 12,346     | 12,346     | 12,395     | 12,345     | 12,345     | 12,347     | 12,395     | 12,347     | 12,347     | 12,345     |
| Residential Customers                 | 38,496     | 38,941     | 39,381     | 39,816     | 40,247     | 40,673     | 41,095     | 41,512     | 41,925     | 42,335     |
| Commercial Customers                  | 4,393      | 4,409      | 4,425      | 4,441      | 4,457      | 4,473      | 4,489      | 4,505      | 4,521      | 4,537      |
| Industrial Customers                  | 36         | 36         | 37         | 38         | 38         | 39         | 40         | 40         | 41         | 42         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 42,924     | 43,386     | 43,843     | 44,295     | 44,743     | 45,186     | 45,624     | 46,058     | 46,488     | 46,913     |
| <b>McCleary (Aberdeen/Hoquiam)</b>    | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 0.06%      | 0.01%      | 0.54%      | -0.51%     | 0.05%      | 0.04%      | 0.54%      | -0.48%     | 0.05%      | -0.03%     |
| Residential Therms                    | 2,677,551  | 2,687,516  | 2,711,536  | 2,704,485  | 2,716,335  | 2,727,008  | 2,751,084  | 2,746,544  | 2,756,262  | 2,765,068  |
| Commercial Therms                     | 2,868,238  | 2,859,560  | 2,866,535  | 2,843,996  | 2,837,858  | 2,830,117  | 2,836,958  | 2,815,393  | 2,809,349  | 2,799,672  |
| Industrial Therms                     | 270,597    | 269,911    | 270,362    | 268,428    | 267,725    | 267,133    | 267,571    | 265,743    | 265,040    | 264,242    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 5,816,387  | 5,816,987  | 5,848,433  | 5,818,809  | 5,821,918  | 5,824,258  | 5,855,613  | 5,827,680  | 5,830,611  | 5,829,002  |
| Daily Baseload Therms                 | 6,165      | 6,153      | 6,231      | 6,200      | 6,186      | 6,237      | 6,234      | 5,335      | 6,330      | 4,901      |
| Peak Day Therms                       | 47,913     | 47,938     | 49,865     | 49,889     | 49,931     | 49,954     | 48,108     | 50,018     | 50,058     | 50,076     |
| Therms Per Residential Customer       | 715        | 715        | 719        | 715        | 715        | 715        | 719        | 715        | 715        | 715        |
| Therms Per Commercial Customer        | 4,062      | 4,061      | 4,081      | 4,059      | 4,061      | 4,061      | 4,081      | 4,061      | 4,062      | 4,059      |
| Therms Per Industrial Customer        | 19,847     | 19,848     | 19,922     | 19,841     | 19,840     | 19,848     | 19,932     | 19,848     | 19,841     | 19,841     |
| Residential Customers                 | 3,745      | 3,759      | 3,773      | 3,787      | 3,801      | 3,814      | 3,828      | 3,842      | 3,855      | 3,869      |
| Commercial Customers                  | 706        | 704        | 702        | 701        | 699        | 697        | 695        | 692        | 692        | 690        |
| Industrial Customers                  | 14         | 14         | 14         | 14         | 13         | 13         | 13         | 13         | 13         | 13         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 4,465      | 4,477      | 4,489      | 4,501      | 4,513      | 4,525      | 4,537      | 4,549      | 4,560      | 4,572      |
| <b>Acme</b>                           | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | -0.26%     | -0.26%     | 0.23%      | -0.75%     | -0.26%     | -0.25%     | 0.23%      | -0.74%     | -0.26%     | -0.27%     |
| Residential Therms                    | 53,898     | 53,760     | 53,882     | 53,479     | 53,340     | 53,206     | 53,326     | 52,929     | 52,791     | 52,647     |
| Commercial Therms                     | 30,893     | 30,811     | 30,883     | 30,654     | 30,573     | 30,494     | 30,564     | 30,339     | 30,258     | 30,174     |
| Industrial Therms                     | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 84,791     | 84,570     | 84,765     | 84,133     | 83,913     | 83,700     | 83,890     | 83,269     | 83,049     | 82,821     |
| Daily Baseload Therms                 | 64         | 64         | 64         | 64         | 64         | 64         | 64         | 64         | 64         | 64         |
| Peak Day Therms                       | 703        | 701        | 706        | 704        | 702        | 700        | 692        | 697        | 695        | 693        |
| Therms Per Residential Customer       | 814        | 814        | 818        | 814        | 814        | 814        | 818        | 814        | 814        | 814        |
| Therms Per Commercial Customer        | 3,525      | 3,524      | 3,542      | 3,524      | 3,524      | 3,524      | 3,542      | 3,525      | 3,525      | 3,524      |
| Therms Per Industrial Customer        | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Residential Customers                 | 66         | 66         | 66         | 66         | 66         | 65         | 65         | 65         | 65         | 65         |
| Commercial Customers                  | 9          | 9          | 9          | 9          | 9          | 9          | 9          | 9          | 9          | 9          |
| Industrial Customers                  | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 75         | 75         | 75         | 74         | 74         | 74         | 74         | 74         | 73         | 73         |
| <b>Arlington</b>                      | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 0.55%      | 0.55%      | 1.01%      | 0.04%      | 0.52%      | 0.54%      | 0.99%      | 0.03%      | 0.50%      | 0.47%      |
| Residential Therms                    | 3,391,432  | 3,400,098  | 3,425,233  | 3,416,678  | 3,425,276  | 3,434,585  | 3,459,797  | 3,451,716  | 3,460,235  | 3,467,992  |
| Commercial Therms                     | 2,104,924  | 2,120,076  | 2,145,010  | 2,149,650  | 2,164,473  | 2,179,686  | 2,204,480  | 2,208,930  | 2,223,371  | 2,237,224  |
| Industrial Therms                     | 530,896    | 539,943    | 551,737    | 557,604    | 566,281    | 574,925    | 585,928    | 591,653    | 599,840    | 607,774    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 6,027,251  | 6,060,118  | 6,121,620  | 6,123,931  | 6,156,031  | 6,189,195  | 6,250,204  | 6,252,299  | 6,283,447  | 6,312,990  |
| Daily Baseload Therms                 | 6,355      | 6,389      | 6,513      | 6,550      | 6,629      | 6,755      | 6,782      | 6,861      | 6,934      | 7,009      |
| Peak Day Therms                       | 45,379     | 45,616     | 47,172     | 47,412     | 47,661     | 47,888     | 46,778     | 48,358     | 48,590     | 48,820     |
| Therms Per Residential Customer       | 691        | 691        | 695        | 691        | 691        | 691        | 695        | 691        | 691        | 691        |
| Therms Per Commercial Customer        | 3,150      | 3,150      | 3,165      | 3,150      | 3,150      | 3,150      | 3,165      | 3,150      | 3,150      | 3,149      |
| Therms Per Industrial Customer        | 13,911     | 13,911     | 13,972     | 13,908     | 13,908     | 13,910     | 13,972     | 13,911     | 13,910     | 13,907     |
| Residential Customers                 | 4,906      | 4,919      | 4,931      | 4,944      | 4,956      | 4,969      | 4,981      | 4,994      | 5,006      | 5,018      |
| Commercial Customers                  | 668        | 673        | 678        | 683        | 687        | 692        | 697        | 701        | 706        | 710        |
| Industrial Customers                  | 38         | 39         | 39         | 40         | 41         | 42         | 43         | 43         | 43         | 44         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 5,613      | 5,631      | 5,649      | 5,666      | 5,684      | 5,702      | 5,720      | 5,737      | 5,755      | 5,772      |
| <b>Bremerton (Shelton)</b>            | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 0.39%      | 0.38%      | 0.85%      | -0.09%     | 0.37%      | 0.37%      | 0.84%      | -0.10%     | 0.35%      | 0.34%      |
| Residential Therms                    | 24,947,551 | 25,131,258 | 25,438,386 | 25,492,961 | 25,672,728 | 25,855,012 | 26,158,628 | 26,206,448 | 26,381,388 | 26,553,363 |
| Commercial Therms                     | 21,821,710 | 21,835,532 | 21,944,460 | 21,862,819 | 21,877,804 | 21,892,548 | 22,001,251 | 21,920,217 | 21,934,642 | 21,948,791 |
| Industrial Therms                     | 432,645    | 431,518    | 432,540    | 429,252    | 428,173    | 427,076    | 428,016    | 424,839    | 423,761    | 422,665    |
| Ind., Inst., & Cmcl. Interrup. Therms | 2,485,609  | 2,477,101  | 2,485,342  | 2,468,409  | 2,459,901  | 2,451,574  | 2,459,720  | 2,443,065  | 2,434,556  | 2,425,868  |
| <b>Total Core Therms</b>              | 49,687,516 | 49,875,409 | 50,300,729 | 50,253,440 | 50,438,607 | 50,624,211 | 51,047,676 | 50,994,569 | 51,174,346 | 51,347,627 |
| Daily Baseload Therms                 | 55,642     | 55,945     | 56,460     | 56,760     | 57,179     | 57,937     | 56,782     | 54,682     | 55,198     | 55,081     |
| Peak Day Therms                       | 388,381    | 390,051    | 395,279    | 396,936    | 398,646    | 400,279    | 398,513    | 403,627    | 405,290    | 406,877    |
| Therms Per Residential Customer       | 691        | 691        | 694        | 691        | 691        | 691        | 694        | 691        | 691        | 690        |
| Therms Per Commercial Customer        | 6,792      | 6,772      | 6,781      | 6,732      | 6,713      | 6,694      | 6,704      | 6,657      | 6,639      | 6,619      |
| Therms Per Industrial Customer        | 29,616     | 29,615     | 29,762     | 29,614     | 29,614     | 29,615     | 29,762     | 29,616     | 29,616     | 29,613     |
| Residential Customers                 | 36,127     | 36,393     | 36,657     | 36,919     | 37,180     | 37,438     | 37,695     | 37,950     | 38,204     | 38,456     |
| Commercial Customers                  | 3,213      | 3,225      | 3,236      | 3,248      | 3,259      | 3,270      | 3,282      | 3,293      | 3,304      | 3,315      |
| Industrial Customers                  | 15         | 15         | 15         | 14         | 14         | 14         | 14         | 14         | 14         | 14         |
| Interruptible Customers               | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| <b>Total Core Customers</b>           | 39,357     | 39,635     | 39,911     | 40,184     | 40,456     | 40,726     | 40,994     | 41,261     | 41,525     | 41,788     |





Appendix B  
Demand Forecast  
Low Scenario

|                                       | 2030      | 2031      | 2032      | 2033      | 2034      | 2035      | 2036      | 2037      | 2038      | 2039      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Patterson</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -0.92%    | -0.12%    | 0.28%     | -0.28%    | -0.95%    | -0.05%    | 0.22%     | -0.26%    | -0.90%    | -0.11%    |
| Residential Therms                    | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Commercial Therms                     | 248,939   | 248,644   | 249,335   | 248,649   | 246,276   | 246,146   | 246,691   | 246,044   | 243,818   | 243,557   |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 248,939   | 248,644   | 249,335   | 248,649   | 246,276   | 246,146   | 246,691   | 246,044   | 243,818   | 243,557   |
| Daily BaseLoad Therms                 | 227       | 227       | 200       | 193       | 227       | 227       | 227       | 227       | 200       | 193       |
| Peak Day Therms                       | 1,220     | 1,219     | 1,253     | 1,252     | 1,240     | 1,240     | 1,207     | 1,239     | 1,227     | 1,227     |
| Therms Per Residential Customer       | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Therms Per Commercial Customer        | 51,152    | 51,205    | 51,453    | 51,418    | 51,130    | 51,218    | 51,439    | 51,411    | 51,151    | 51,212    |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Commercial Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| <b>Prosser</b>                        |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -0.27%    | -0.26%    | 0.30%     | -0.85%    | -0.27%    | -0.21%    | 0.30%     | -0.80%    | -0.27%    | -0.32%    |
| Residential Therms                    | 252,994   | 252,344   | 253,270   | 250,940   | 250,290   | 249,746   | 250,657   | 248,448   | 247,797   | 247,034   |
| Commercial Therms                     | 478,672   | 477,440   | 478,765   | 474,758   | 473,531   | 472,526   | 473,822   | 470,075   | 468,843   | 467,369   |
| Industrial Therms                     | 221,585   | 220,996   | 221,582   | 219,858   | 219,189   | 218,721   | 219,296   | 217,703   | 217,033   | 216,326   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 953,251   | 950,779   | 953,617   | 945,557   | 943,010   | 940,993   | 943,774   | 936,226   | 933,672   | 930,729   |
| Daily BaseLoad Therms                 | 1,014     | 1,018     | 1,033     | 1,019     | 1,019     | 1,030     | 1,018     | 1,018     | 1,033     | 756       |
| Peak Day Therms                       | 8,826     | 8,804     | 9,237     | 9,214     | 9,187     | 9,164     | 8,692     | 9,119     | 9,092     | 9,067     |
| Therms Per Residential Customer       | 585       | 585       | 589       | 585       | 585       | 585       | 589       | 585       | 585       | 585       |
| Therms Per Commercial Customer        | 3,637     | 3,637     | 3,657     | 3,635     | 3,635     | 3,637     | 3,656     | 3,637     | 3,637     | 3,635     |
| Therms Per Industrial Customer        | 45,508    | 45,504    | 45,742    | 45,496    | 45,483    | 45,504    | 45,742    | 45,521    | 45,507    | 45,479    |
| Residential Customers                 | 433       | 432       | 430       | 429       | 428       | 427       | 426       | 424       | 423       | 422       |
| Commercial Customers                  | 132       | 131       | 131       | 131       | 130       | 130       | 130       | 129       | 129       | 129       |
| Industrial Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 569       | 568       | 566       | 565       | 563       | 561       | 560       | 558       | 557       | 555       |
| <b>Quincy</b>                         |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -0.50%    | -0.20%    | 0.24%     | -0.58%    | -0.50%    | -0.19%    | 0.24%     | -0.57%    | -0.51%    | -0.22%    |
| Residential Therms                    | 25,298    | 25,232    | 25,293    | 25,100    | 25,036    | 24,973    | 25,032    | 24,843    | 24,779    | 24,710    |
| Commercial Therms                     | 664,098   | 662,840   | 664,559   | 660,839   | 657,203   | 656,012   | 657,703   | 654,077   | 650,441   | 649,101   |
| Industrial Therms                     | 104,319   | 104,052   | 104,183   | 103,505   | 103,238   | 102,980   | 103,107   | 102,445   | 102,177   | 101,898   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 793,715   | 792,124   | 794,034   | 789,445   | 786,477   | 783,965   | 786,842   | 781,365   | 777,396   | 775,709   |
| Daily BaseLoad Therms                 | 1,380     | 1,381     | 1,384     | 1,381     | 1,381     | 1,383     | 1,381     | 1,381     | 1,384     | 1,381     |
| Peak Day Therms                       | 5,856     | 5,845     | 5,912     | 5,900     | 5,875     | 5,863     | 5,772     | 5,839     | 5,814     | 5,801     |
| Therms Per Residential Customer       | 426       | 426       | 428       | 426       | 426       | 426       | 428       | 426       | 426       | 426       |
| Therms Per Commercial Customer        | 9,216     | 9,221     | 9,269     | 9,241     | 9,215     | 9,221     | 9,269     | 9,242     | 9,215     | 9,220     |
| Therms Per Industrial Customer        | 26,777    | 26,777    | 26,880    | 26,774    | 26,774    | 26,777    | 26,880    | 26,777    | 26,777    | 26,774    |
| Residential Customers                 | 59        | 59        | 59        | 59        | 59        | 59        | 58        | 58        | 58        | 58        |
| Commercial Customers                  | 72        | 72        | 72        | 72        | 71        | 71        | 71        | 71        | 71        | 70        |
| Industrial Customers                  | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 135       | 135       | 135       | 134       | 134       | 134       | 133       | 133       | 133       | 132       |
| <b>Sunnyside</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.01%     | -0.01%    | 0.49%     | -0.50%    | 0.01%     | 0.01%     | 0.49%     | -0.49%    | 0.01%     | -0.03%    |
| Residential Therms                    | 1,049,188 | 1,046,494 | 1,049,425 | 1,040,925 | 1,038,232 | 1,035,721 | 1,038,593 | 1,030,333 | 1,027,640 | 1,024,719 |
| Commercial Therms                     | 1,759,369 | 1,763,299 | 1,776,377 | 1,771,317 | 1,775,719 | 1,779,923 | 1,793,036 | 1,788,176 | 1,792,525 | 1,796,032 |
| Industrial Therms                     | 569,078   | 567,561   | 568,109   | 564,552   | 563,103   | 561,717   | 562,246   | 558,840   | 557,390   | 555,743   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 3,377,635 | 3,377,354 | 3,393,911 | 3,376,793 | 3,377,054 | 3,377,360 | 3,393,875 | 3,377,349 | 3,377,555 | 3,376,494 |
| Daily BaseLoad Therms                 | 2,476     | 2,490     | 2,189     | 2,147     | 2,518     | 2,537     | 2,535     | 2,508     | 2,070     | 2,193     |
| Peak Day Therms                       | 33,301    | 33,301    | 33,950    | 33,951    | 33,959    | 33,959    | 33,328    | 33,948    | 33,976    | 33,972    |
| Therms Per Residential Customer       | 570       | 572       | 576       | 574       | 575       | 577       | 581       | 580       | 581       | 582       |
| Therms Per Commercial Customer        | 3,229     | 3,227     | 3,242     | 3,224     | 3,223     | 3,222     | 3,236     | 3,219     | 3,218     | 3,216     |
| Therms Per Industrial Customer        | 34,373    | 34,372    | 34,492    | 34,365    | 34,365    | 34,372    | 34,492    | 34,373    | 34,373    | 34,363    |
| Residential Customers                 | 1,839     | 1,831     | 1,822     | 1,813     | 1,804     | 1,795     | 1,787     | 1,778     | 1,769     | 1,760     |
| Commercial Customers                  | 545       | 546       | 548       | 549       | 551       | 552       | 554       | 556       | 557       | 559       |
| Industrial Customers                  | 17        | 17        | 16        | 16        | 16        | 16        | 16        | 16        | 16        | 16        |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 2,401     | 2,393     | 2,386     | 2,379     | 2,372     | 2,364     | 2,357     | 2,350     | 2,342     | 2,335     |
| <b>Moses Lake</b>                     |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.22%     | 0.21%     | 0.72%     | -0.31%    | 0.20%     | 0.22%     | 0.70%     | -0.30%    | 0.19%     | 0.17%     |
| Residential Therms                    | 294,368   | 293,615   | 294,444   | 292,055   | 291,297   | 290,592   | 291,405   | 289,080   | 288,323   | 287,598   |
| Commercial Therms                     | 2,638,120 | 2,645,721 | 2,646,685 | 2,640,271 | 2,647,659 | 2,675,462 | 2,696,274 | 2,689,931 | 2,697,074 | 2,703,668 |
| Industrial Therms                     | 127,200   | 126,858   | 127,008   | 126,224   | 125,876   | 125,551   | 125,697   | 124,934   | 124,586   | 124,227   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 3,059,688 | 3,066,193 | 3,068,137 | 3,078,549 | 3,068,832 | 3,091,605 | 3,113,375 | 3,103,946 | 3,109,983 | 3,115,404 |
| Daily BaseLoad Therms                 | 4,048     | 4,085     | 4,130     | 4,145     | 4,177     | 4,225     | 4,246     | 4,278     | 4,324     | 2,917     |
| Peak Day Therms                       | 29,605    | 29,667    | 30,262    | 30,325    | 30,385    | 30,445    | 29,966    | 30,565    | 30,623    | 30,680    |
| Therms Per Residential Customer       | 427       | 427       | 430       | 428       | 429       | 430       | 433       | 431       | 431       | 432       |
| Therms Per Commercial Customer        | 6,484     | 6,459     | 6,466     | 6,408     | 6,385     | 6,362     | 6,371     | 6,317     | 6,295     | 6,272     |
| Therms Per Industrial Customer        | 18,660    | 18,658    | 18,726    | 18,658    | 18,657    | 18,658    | 18,726    | 18,661    | 18,660    | 18,655    |
| Residential Customers                 | 690       | 687       | 684       | 682       | 679       | 676       | 674       | 671       | 668       | 665       |
| Commercial Customers                  | 407       | 410       | 412       | 415       | 418       | 421       | 423       | 426       | 428       | 431       |
| Industrial Customers                  | 7         | 7         | 7         | 7         | 7         | 7         | 7         | 7         | 7         | 7         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 1,103     | 1,104     | 1,104     | 1,104     | 1,104     | 1,104     | 1,104     | 1,103     | 1,103     | 1,103     |





**Appendix B  
Demand Forecast  
Low Scenario**

| 7th Day School                        | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>       | -0.36%     | -0.05%     | 0.34%      | -0.28%     | -0.50%     | -0.08%     | 0.21%      | -0.30%     | -0.21%     | -0.06%     |
| Residential Therms                    | 8,536      | 8,514      | 8,515      | 8,470      | 8,448      | 8,426      | 8,427      | 8,382      | 8,361      | 8,339      |
| Commercial Therms                     | 11,388     | 11,402     | 11,442     | 11,416     | 11,424     | 11,429     | 11,476     | 11,446     | 11,452     | 11,463     |
| Industrial Therms                     | 9,339      | 9,332      | 9,389      | 9,377      | 9,243      | 9,236      | 9,249      | 9,236      | 9,191      | 9,184      |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 29,263     | 29,248     | 29,346     | 29,262     | 29,115     | 29,091     | 29,152     | 29,065     | 29,003     | 28,985     |
| Daily BaseLoad Therms                 | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 26         | 28         | 28         |
| Peak Day Therms                       | 126        | 126        | 125        | 126        | 125        | 125        | 125        | 125        | 125        | 125        |
| Therms Per Residential Customer       | 1,096      | 1,096      | 1,098      | 1,095      | 1,095      | 1,096      | 1,098      | 1,096      | 1,096      | 1,095      |
| Therms Per Commercial Customer        | 2,223      | 2,223      | 2,230      | 2,223      | 2,223      | 2,223      | 2,231      | 2,223      | 2,223      | 2,223      |
| Therms Per Industrial Customer        | 9,620      | 9,621      | 9,680      | 9,667      | 9,620      | 9,621      | 9,634      | 9,621      | 9,666      | 9,667      |
| Residential Customers                 | 8          | 8          | 8          | 8          | 8          | 8          | 8          | 8          | 8          | 8          |
| Commercial Customers                  | 5          | 5          | 5          | 5          | 5          | 5          | 5          | 5          | 5          | 5          |
| Industrial Customers                  | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         |
| <b>Yakima Training Center</b>         | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 0.44%      | 0.43%      | 0.94%      | -0.07%     | 0.42%      | 0.41%      | 0.92%      | -0.09%     | 0.41%      | 0.41%      |
| Residential Therms                    | 21,329     | 21,615     | 21,998     | 22,177     | 22,449     | 22,722     | 23,098     | 23,258     | 23,521     | 23,780     |
| Commercial Therms                     | 374,440    | 375,871    | 379,216    | 378,744    | 380,167    | 381,562    | 384,910    | 384,375    | 385,780    | 387,186    |
| Industrial Therms                     | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 395,768    | 397,486    | 401,214    | 400,922    | 402,616    | 404,284    | 408,008    | 407,633    | 409,301    | 410,966    |
| Daily BaseLoad Therms                 | 253        | 255        | 258        | 262        | 262        | 265        | 267        | 269        | 271        | 274        |
| Peak Day Therms                       | 4,542      | 4,562      | 4,567      | 4,587      | 4,606      | 4,625      | 4,657      | 4,663      | 4,681      | 4,700      |
| Therms Per Residential Customer       | 796        | 796        | 800        | 796        | 796        | 796        | 800        | 796        | 796        | 796        |
| Therms Per Commercial Customer        | 3,317      | 3,317      | 3,333      | 3,317      | 3,317      | 3,317      | 3,333      | 3,317      | 3,317      | 3,317      |
| Therms Per Industrial Customer        | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Residential Customers                 | 27         | 27         | 28         | 28         | 28         | 29         | 29         | 29         | 30         | 30         |
| Commercial Customers                  | 113        | 113        | 114        | 114        | 115        | 115        | 115        | 116        | 116        | 117        |
| Industrial Customers                  | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 140        | 140        | 141        | 142        | 143        | 144        | 144        | 145        | 146        | 147        |
| <b>Burbank Heights Loop</b>           | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 1.26%      | 1.23%      | 1.88%      | 0.47%      | 1.14%      | 1.14%      | 1.77%      | 0.39%      | 1.04%      | 1.00%      |
| Residential Therms                    | 7,328,950  | 7,433,700  | 7,588,773  | 7,637,777  | 7,737,777  | 7,838,683  | 7,991,245  | 8,033,533  | 8,129,206  | 8,221,997  |
| Commercial Therms                     | 5,177,631  | 5,230,511  | 5,318,300  | 5,333,589  | 5,384,952  | 5,436,791  | 5,523,793  | 5,536,815  | 5,586,184  | 5,633,667  |
| Industrial Therms                     | 264,462    | 263,783    | 264,132    | 262,364    | 261,685    | 261,067    | 261,406    | 259,708    | 259,029    | 258,290    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 12,771,042 | 12,927,994 | 13,171,205 | 13,233,714 | 13,384,414 | 13,536,541 | 13,776,444 | 13,830,056 | 13,974,419 | 14,113,955 |
| Daily BaseLoad Therms                 | 13,813     | 14,246     | 14,662     | 14,902     | 15,112     | 15,200     | 15,979     | 16,326     | 16,756     | 16,433     |
| Peak Day Therms                       | 147,393    | 149,189    | 153,803    | 155,587    | 157,356    | 159,097    | 157,861    | 162,525    | 164,214    | 165,878    |
| Therms Per Residential Customer       | 548        | 548        | 552        | 548        | 548        | 548        | 552        | 548        | 548        | 548        |
| Therms Per Commercial Customer        | 3,983      | 3,980      | 4,003      | 3,973      | 3,971      | 3,969      | 3,993      | 3,964      | 3,961      | 3,961      |
| Therms Per Industrial Customer        | 22,633     | 22,633     | 22,721     | 22,627     | 22,627     | 22,631     | 22,716     | 22,628     | 22,628     | 22,622     |
| Residential Customers                 | 13,374     | 13,566     | 13,754     | 13,940     | 14,124     | 14,305     | 14,484     | 14,665     | 14,835     | 15,008     |
| Commercial Customers                  | 1,300      | 1,314      | 1,328      | 1,342      | 1,356      | 1,370      | 1,383      | 1,397      | 1,410      | 1,423      |
| Industrial Customers                  | 12         | 12         | 12         | 12         | 12         | 12         | 12         | 11         | 11         | 11         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 14,686     | 14,892     | 15,094     | 15,294     | 15,491     | 15,688     | 15,879     | 16,069     | 16,257     | 16,442     |
| <b>East Stanwood Loop</b>             | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 0.34%      | 0.35%      | 0.80%      | -0.13%     | 0.32%      | 0.35%      | 0.79%      | -0.14%     | 0.31%      | 0.32%      |
| Residential Therms                    | 5,780,303  | 5,808,289  | 5,864,783  | 5,863,530  | 5,891,117  | 5,919,012  | 5,975,525  | 5,973,654  | 6,000,742  | 6,027,260  |
| Commercial Therms                     | 4,944,623  | 4,957,219  | 4,991,070  | 4,980,285  | 4,991,409  | 5,004,101  | 5,037,901  | 5,026,985  | 5,037,829  | 5,049,460  |
| Industrial Therms                     | 435,770    | 434,705    | 434,851    | 432,241    | 431,259    | 430,220    | 430,353    | 427,783    | 426,801    | 425,708    |
| Ind., Inst., & Cmcl. Interrup. Therms | 92,531     | 92,418     | 92,660     | 92,408     | 91,570     | 91,465     | 91,705     | 91,465     | 90,626     | 90,503     |
| <b>Total Core Therms</b>              | 11,253,228 | 11,292,631 | 11,383,365 | 11,368,463 | 11,405,354 | 11,444,799 | 11,555,485 | 11,519,887 | 11,555,988 | 11,592,932 |
| Daily BaseLoad Therms                 | 12,254     | 12,351     | 12,462     | 12,521     | 12,608     | 12,726     | 12,786     | 12,742     | 12,854     | 12,951     |
| Peak Day Therms                       | 82,811     | 83,116     | 84,299     | 84,622     | 84,919     | 85,221     | 84,659     | 85,057     | 86,149     | 86,444     |
| Therms Per Residential Customer       | 456        | 456        | 459        | 456        | 456        | 456        | 459        | 456        | 456        | 456        |
| Therms Per Commercial Customer        | 4,827      | 4,817      | 4,827      | 4,794      | 4,783      | 4,774      | 4,784      | 4,753      | 4,742      | 4,733      |
| Therms Per Industrial Customer        | 153,530    | 153,923    | 154,843    | 154,694    | 155,129    | 155,595    | 156,492    | 156,411    | 156,912    | 157,330    |
| Residential Customers                 | 8,811      | 8,853      | 8,896      | 8,938      | 8,980      | 9,022      | 9,064      | 9,105      | 9,147      | 9,188      |
| Commercial Customers                  | 1,024      | 1,029      | 1,034      | 1,039      | 1,044      | 1,048      | 1,053      | 1,058      | 1,062      | 1,067      |
| Industrial Customers                  | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 9,839      | 9,886      | 9,934      | 9,981      | 10,027     | 10,074     | 10,120     | 10,167     | 10,213     | 10,258     |
| <b>Kennewick Loop</b>                 | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 1.06%      | 1.05%      | 1.64%      | 0.38%      | 0.97%      | 0.97%      | 1.55%      | 0.32%      | 0.90%      | 0.87%      |
| Residential Therms                    | 11,601,664 | 11,753,196 | 11,980,591 | 12,048,929 | 12,194,841 | 12,340,677 | 12,564,843 | 12,624,177 | 12,738,303 | 12,899,709 |
| Commercial Therms                     | 11,902,794 | 12,009,493 | 12,184,322 | 12,218,013 | 12,321,587 | 12,425,968 | 12,599,236 | 12,628,425 | 12,728,303 | 12,825,468 |
| Industrial Therms                     | 754,182    | 752,238    | 753,367    | 748,236    | 746,308    | 744,495    | 745,591    | 740,623    | 738,694    | 736,621    |
| Ind., Inst., & Cmcl. Interrup. Therms | 201,452    | 201,152    | 202,106    | 201,119    | 199,345    | 199,079    | 200,022    | 199,079    | 197,304    | 196,972    |
| <b>Total Core Therms</b>              | 24,460,082 | 24,716,079 | 25,120,385 | 25,216,297 | 25,462,081 | 25,710,218 | 26,109,692 | 26,192,304 | 26,427,863 | 26,658,770 |
| Daily BaseLoad Therms                 | 30,067     | 30,791     | 31,489     | 31,973     | 32,431     | 32,738     | 33,855     | 32,412     | 34,845     | 32,322     |
| Peak Day Therms                       | 259,156    | 261,965    | 268,227    | 271,010    | 273,744    | 276,463    | 275,536    | 281,819    | 284,440    | 287,050    |
| Therms Per Residential Customer       | 600        | 600        | 604        | 600        | 600        | 600        | 604        | 600        | 600        | 600        |
| Therms Per Commercial Customer        | 4,193      | 4,189      | 4,209      | 4,181      | 4,177      | 4,174      | 4,195      | 4,167      | 4,164      | 4,160      |
| Therms Per Industrial Customer        | 70,402     | 70,401     | 70,689     | 70,389     | 70,390     | 70,401     | 70,689     | 70,401     | 70,402     | 70,389     |
| Residential Customers                 | 19,325     | 19,578     | 19,827     | 20,073     | 20,316     | 20,557     | 20,794     | 21,029     | 21,261     | 21,491     |
| Commercial Customers                  | 2,839      | 2,867      | 2,895      | 2,922      | 2,950      | 2,977      | 3,004      | 3,030      | 3,057      | 3,083      |
| Industrial Customers                  | 11         | 11         | 11         | 11         | 11         | 11         | 11         | 11         | 10         | 10         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 22,176     | 22,456     | 22,734     | 23,007     | 23,278     | 23,545     | 23,810     | 24,071     | 24,330     | 24,585     |

Appendix B  
Demand Forecast  
Low Scenario

|                                       | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Longview South Loop</b>            |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.19%      | 0.20%      | 0.73%      | -0.35%     | 0.18%      | 0.22%      | 0.72%      | -0.33%     | 0.17%      | 0.15%      |
| Residential Therms                    | 1,195,364  | 1,208,415  | 1,227,851  | 1,233,684  | 1,246,323  | 1,259,266  | 1,278,454  | 1,283,938  | 1,296,099  | 1,307,699  |
| Commercial Therms                     | 4,113,549  | 4,112,483  | 4,133,156  | 4,109,291  | 4,138,204  | 4,108,303  | 4,138,951  | 4,106,508  | 4,105,207  | 4,102,740  |
| Industrial Therms                     | 186,255    | 185,756    | 186,186    | 184,743    | 184,205    | 183,844    | 184,266    | 182,888    | 182,430    | 181,875    |
| Ind., Inst., & Cmcl. Interrup. Therms | 92,398     | 92,232     | 92,688     | 92,204     | 91,419     | 91,281     | 91,733     | 91,281     | 90,496     | 90,302     |
| Total Core Therms                     | 5,587,566  | 5,598,886  | 5,639,881  | 5,619,921  | 5,630,031  | 5,642,694  | 5,683,403  | 5,664,615  | 5,674,232  | 5,682,637  |
| Daily BaseLoad Therms                 | 4,787      | 4,794      | 4,887      | 4,865      | 4,894      | 4,991      | 4,948      | 4,945      | 4,938      | 4,938      |
| Peak Day Therms                       | 45,634     | 45,740     | 47,334     | 47,841     | 47,932     | 48,036     | 46,243     | 48,247     | 48,334     | 48,434     |
| Therms Per Residential Customer       | 521        | 521        | 524        | 521        | 521        | 521        | 524        | 521        | 521        | 521        |
| Therms Per Commercial Customer        | 4,542      | 4,541      | 4,564      | 4,538      | 4,536      | 4,537      | 4,560      | 4,535      | 4,533      | 4,531      |
| Therms Per Industrial Customer        | 14,711     | 14,710     | 14,783     | 14,706     | 14,707     | 14,710     | 14,783     | 14,710     | 14,711     | 14,706     |
| Residential Customers                 | 2,293      | 2,318      | 2,343      | 2,368      | 2,392      | 2,416      | 2,440      | 2,464      | 2,487      | 2,510      |
| Commercial Customers                  | 906        | 906        | 906        | 906        | 906        | 906        | 906        | 906        | 906        | 906        |
| Industrial Customers                  | 13         | 13         | 13         | 13         | 13         | 13         | 12         | 12         | 12         | 12         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 3,213      | 3,238      | 3,262      | 3,287      | 3,311      | 3,335      | 3,359      | 3,382      | 3,406      | 3,429      |
| <b>Sedro-Woolley Loop</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.52%      | 0.51%      | 1.02%      | -0.02%     | 0.49%      | 0.50%      | 1.00%      | -0.03%     | 0.47%      | 0.46%      |
| Residential Therms                    | 18,936,780 | 19,042,760 | 19,246,999 | 19,251,130 | 19,355,354 | 19,460,869 | 19,664,993 | 19,666,585 | 19,768,636 | 19,868,263 |
| Commercial Therms                     | 10,533,522 | 10,586,659 | 10,693,495 | 10,691,055 | 10,743,363 | 10,796,237 | 10,902,803 | 10,899,083 | 10,999,617 | 10,999,617 |
| Industrial Therms                     | 1,147,081  | 1,144,130  | 1,146,062  | 1,138,098  | 1,135,150  | 1,132,348  | 1,134,244  | 1,126,458  | 1,123,507  | 1,120,414  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 30,617,382 | 30,773,548 | 31,086,556 | 31,080,282 | 31,233,866 | 31,389,454 | 31,702,040 | 31,692,125 | 31,883,279 | 31,988,294 |
| Daily BaseLoad Therms                 | 32,661     | 32,910     | 33,345     | 33,599     | 33,941     | 34,383     | 34,623     | 33,813     | 33,452     | 33,700     |
| Peak Day Therms                       | 249,386    | 250,676    | 254,976    | 256,264    | 257,556    | 258,831    | 257,042    | 261,368    | 262,632    | 263,877    |
| Therms Per Residential Customer       | 681        | 681        | 685        | 681        | 681        | 681        | 685        | 681        | 681        | 681        |
| Therms Per Commercial Customer        | 2,942      | 2,939      | 2,951      | 2,933      | 2,930      | 2,927      | 2,939      | 2,922      | 2,919      | 2,916      |
| Therms Per Industrial Customer        | 13,501     | 13,501     | 13,558     | 13,498     | 13,498     | 13,499     | 13,557     | 13,499     | 13,498     | 13,498     |
| Residential Customers                 | 27,791     | 27,947     | 28,101     | 28,255     | 28,409     | 28,561     | 28,713     | 28,865     | 29,013     | 29,162     |
| Commercial Customers                  | 3,580      | 3,602      | 3,624      | 3,645      | 3,667      | 3,688      | 3,709      | 3,730      | 3,751      | 3,772      |
| Industrial Customers                  | 85         | 85         | 85         | 84         | 84         | 84         | 84         | 83         | 83         | 83         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 31,456     | 31,633     | 31,810     | 31,985     | 32,160     | 32,333     | 32,506     | 32,677     | 32,848     | 33,018     |
| <b>Sumas SPE Loop</b>                 |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.61%      | 0.60%      | 1.09%      | 0.08%      | 0.58%      | 0.59%      | 1.07%      | 0.07%      | 0.55%      | 0.54%      |
| Residential Therms                    | 34,938,471 | 35,159,193 | 35,557,786 | 35,592,504 | 35,809,110 | 36,028,489 | 36,426,176 | 36,455,347 | 36,666,907 | 36,873,069 |
| Commercial Therms                     | 17,715,432 | 17,796,383 | 17,963,272 | 17,954,788 | 18,034,413 | 18,115,790 | 18,282,555 | 18,272,922 | 18,350,884 | 18,426,210 |
| Industrial Therms                     | 2,141,205  | 2,170,478  | 2,208,320  | 2,227,750  | 2,255,891  | 2,284,046  | 2,320,814  | 2,338,724  | 2,365,602  | 2,391,855  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 54,795,109 | 55,126,054 | 55,729,378 | 55,775,042 | 56,099,414 | 56,428,325 | 57,029,545 | 57,066,993 | 57,383,392 | 57,691,133 |
| Daily BaseLoad Therms                 | 69,629     | 70,312     | 71,172     | 71,839     | 72,702     | 73,761     | 74,677     | 75,563     | 76,427     | 77,283     |
| Peak Day Therms                       | 407,548    | 410,021    | 418,924    | 421,407    | 423,872    | 426,321    | 422,162    | 431,179    | 433,584    | 435,977    |
| Therms Per Residential Customer       | 725        | 725        | 729        | 725        | 725        | 725        | 729        | 725        | 725        | 725        |
| Therms Per Commercial Customer        | 3,180      | 3,177      | 3,190      | 3,172      | 3,170      | 3,168      | 3,181      | 3,164      | 3,162      | 3,159      |
| Therms Per Industrial Customer        | 24,755     | 24,755     | 24,855     | 24,752     | 24,752     | 24,755     | 24,855     | 24,755     | 24,755     | 24,752     |
| Residential Customers                 | 48,177     | 48,482     | 48,785     | 49,085     | 49,384     | 49,682     | 49,977     | 50,271     | 50,563     | 50,853     |
| Commercial Customers                  | 5,571      | 5,601      | 5,630      | 5,660      | 5,689      | 5,718      | 5,747      | 5,775      | 5,804      | 5,832      |
| Industrial Customers                  | 86         | 88         | 89         | 90         | 91         | 92         | 93         | 94         | 96         | 97         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 53,835     | 54,170     | 54,504     | 54,835     | 55,164     | 55,492     | 55,817     | 56,141     | 56,462     | 56,782     |
| <b>Yakima Loop</b>                    |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.63%      | 0.62%      | 1.17%      | 0.02%      | 0.60%      | 0.63%      | 1.14%      | 0.02%      | 0.57%      | 0.53%      |
| Residential Therms                    | 13,427,884 | 13,512,092 | 13,672,697 | 13,674,470 | 13,751,100 | 13,843,797 | 14,004,235 | 14,006,707 | 14,087,467 | 14,163,071 |
| Commercial Therms                     | 13,314,667 | 13,381,750 | 13,523,529 | 13,509,897 | 13,575,821 | 13,646,525 | 13,788,316 | 13,776,932 | 13,841,509 | 13,900,426 |
| Industrial Therms                     | 3,510,438  | 3,547,431  | 3,602,058  | 3,618,780  | 3,654,517  | 3,691,699  | 3,745,677  | 3,761,906  | 3,796,499  | 3,828,938  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 30,252,990 | 30,441,273 | 30,798,284 | 30,803,148 | 30,987,438 | 31,182,011 | 31,538,228 | 31,545,546 | 31,725,476 | 31,892,435 |
| Daily BaseLoad Therms                 | 27,948     | 28,359     | 29,111     | 29,150     | 29,523     | 30,220     | 30,220     | 30,592     | 31,372     | 31,382     |
| Peak Day Therms                       | 318,759    | 320,695    | 333,830    | 335,809    | 337,768    | 339,721    | 330,185    | 343,598    | 345,510    | 347,417    |
| Therms Per Residential Customer       | 647        | 647        | 650        | 647        | 647        | 647        | 647        | 647        | 647        | 646        |
| Therms Per Commercial Customer        | 3,559      | 3,557      | 3,574      | 3,553      | 3,551      | 3,551      | 3,549      | 3,548      | 3,546      | 3,543      |
| Therms Per Industrial Customer        | 37,467     | 37,467     | 37,655     | 37,450     | 37,451     | 37,467     | 37,655     | 37,468     | 37,468     | 37,451     |
| Residential Customers                 | 20,758     | 20,889     | 21,019     | 21,148     | 21,277     | 21,404     | 21,531     | 21,657     | 21,783     | 21,907     |
| Commercial Customers                  | 3,741      | 3,762      | 3,782      | 3,803      | 3,823      | 3,843      | 3,863      | 3,883      | 3,903      | 3,923      |
| Industrial Customers                  | 94         | 95         | 96         | 97         | 98         | 99         | 100        | 101        | 102        | 102        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 24,594     | 24,746     | 24,898     | 25,049     | 25,198     | 25,347     | 25,495     | 25,642     | 25,788     | 25,934     |
| <b>Zone 10</b>                        |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | -0.45%     | -0.37%     | 0.13%      | -0.91%     | -0.46%     | -0.32%     | 0.13%      | -0.86%     | -0.46%     | -0.45%     |
| Residential Therms                    | 3,022,695  | 3,011,310  | 3,015,128  | 2,995,058  | 2,972,716  | 2,961,847  | 2,965,411  | 2,937,101  | 2,924,747  | 2,910,822  |
| Commercial Therms                     | 15,410,457 | 15,387,734 | 15,390,953 | 15,340,860 | 15,310,231 | 15,290,964 | 15,295,667 | 15,247,544 | 15,216,795 | 15,190,558 |
| Industrial Therms                     | 1,581,304  | 1,579,083  | 1,583,221  | 1,573,971  | 1,571,611  | 1,570,428  | 1,574,490  | 1,566,318  | 1,564,045  | 1,560,788  |
| Ind., Inst., & Cmcl. Interrup. Therms | 59,048     | 59,048     | 59,128     | 58,998     | 58,998     | 59,048     | 59,128     | 59,048     | 59,048     | 58,998     |
| Total Core Therms                     | 10,074,504 | 10,037,176 | 10,050,430 | 9,958,887  | 9,913,556  | 9,882,286  | 9,894,696  | 9,810,012  | 9,764,634  | 9,721,166  |
| Daily BaseLoad Therms                 | 8,918      | 8,865      | 7,539      | 7,356      | 8,503      | 8,691      | 8,779      | 6,749      | 5,554      | 5,562      |
| Peak Day Therms                       | 90,434     | 90,298     | 96,637     | 96,490     | 96,298     | 96,152     | 89,602     | 95,865     | 95,673     | 95,510     |
| Therms Per Residential Customer       | 115,956    | 116,483    | 117,466    | 117,068    | 117,121    | 117,661    | 118,655    | 118,259    | 118,314    | 118,863    |
| Therms Per Commercial Customer        | 21,528     | 21,553     | 21,690     | 21,601     | 21,584     | 21,626     | 21,767     | 21,695     | 21,680     | 21,699     |
| Therms Per Industrial Customer        | 127,682    | 127,764    | 128,418    | 127,922    | 127,950    | 128,096    | 128,715    | 128,289    | 128,421    | 128,421    |
| Residential Customers                 | 4,945      | 4,911      | 4,878      | 4,844      | 4,811      | 4,777      | 4,744      | 4,710      | 4,677      | 4,643      |
| Commercial Customers                  | 1,287      | 1,280      | 1,272      | 1,265      | 1,257      | 1,250      | 1,243      | 1,235      | 1,228      | 1,220      |
| Industrial Customers                  | 53         | 53         | 53         | 52         | 52         | 52         | 52         | 52         | 52         | 52         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 6,286      | 6,245      | 6,204      | 6,163      | 6,122      | 6,080      | 6,039      | 5,998      | 5,957      | 5,916      |

**Appendix B**  
**Demand Forecast**  
**Low Scenario**

| Zone 11  | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>                  | 0.51%      | 0.51%      | 1.06%      | -0.08%     | 0.49%      | 0.52%      | 1.04%      | -0.07%     | 0.47%      | 0.43%      |
| <b>Residential Therms</b>                        | 14,701,365 | 14,789,876 | 14,962,081 | 14,960,439 | 15,047,223 | 15,138,327 | 15,310,269 | 15,309,345 | 15,994,084 | 15,473,294 |
| <b>Commercial Therms</b>                         | 18,286,345 | 18,351,838 | 18,517,796 | 18,476,445 | 18,538,590 | 18,608,867 | 18,774,758 | 18,736,841 | 18,797,643 | 18,853,716 |
| <b>Industrial Therms</b>                         | 4,027,415  | 4,063,165  | 4,118,861  | 4,132,036  | 4,166,648  | 4,202,682  | 4,257,695  | 4,270,505  | 4,303,983  | 4,335,075  |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> |            |            |            |            |            |            |            |            |            |            |
| <b>Total Core Therms</b>                         | 37,015,124 | 37,204,880 | 37,598,738 | 37,568,921 | 37,752,461 | 37,949,876 | 38,342,723 | 38,316,492 | 38,495,710 | 38,662,085 |
| <b>Daily BaseLoad Therms</b>                     | 36,163     | 36,581     | 37,338     | 37,347     | 37,750     | 38,503     | 38,492     | 38,639     | 39,230     | 39,641     |
| <b>Peak Day Therms</b>                           | 376,381    | 378,348    | 393,109    | 395,124    | 397,108    | 399,090    | 388,013    | 404,976    | 404,976    | 406,907    |
| <b>Therms Per Residential Customer</b>           | 2,899      | 2,900      | 2,916      | 2,901      | 2,902      | 2,904      | 2,920      | 2,906      | 2,907      | 2,907      |
| <b>Therms Per Commercial Customer</b>            | 28,668     | 28,670     | 28,816     | 28,682     | 28,658     | 28,665     | 28,811     | 28,683     | 28,658     | 28,655     |
| <b>Therms Per Industrial Customer</b>            | 95,088     | 95,093     | 95,527     | 95,081     | 95,094     | 95,123     | 95,557     | 95,138     | 95,153     | 95,130     |
| <b>Residential Customers</b>                     | 23,252     | 23,387     | 23,520     | 23,653     | 23,785     | 23,916     | 24,046     | 24,175     | 24,303     | 24,431     |
| <b>Commercial Customers</b>                      | 4,670      | 4,691      | 4,711      | 4,732      | 4,752      | 4,773      | 4,793      | 4,813      | 4,833      | 4,853      |
| <b>Industrial Customers</b>                      | 123        | 124        | 125        | 126        | 127        | 128        | 129        | 129        | 130        | 131        |
| <b>Interruptible Customers</b>                   | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>                      | 28,047     | 28,203     | 28,358     | 28,512     | 28,665     | 28,817     | 28,968     | 29,118     | 29,267     | 29,416     |
| <b>Zone 20</b>                                   | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>                  | 1.00%      | 0.99%      | 1.58%      | 0.32%      | 0.92%      | 0.92%      | 1.59%      | 0.26%      | 0.65%      | 0.82%      |
| <b>Residential Therms</b>                        | 19,870,964 | 20,126,485 | 20,512,335 | 20,424,244 | 20,849,908 | 21,115,931 | 21,496,025 | 21,592,784 | 21,827,077 | 22,055,205 |
| <b>Commercial Therms</b>                         | 21,030,878 | 21,197,889 | 21,485,865 | 21,523,785 | 21,685,952 | 21,849,786 | 22,135,256 | 22,166,473 | 22,322,705 | 22,473,778 |
| <b>Industrial Therms</b>                         | 1,341,151  | 1,337,671  | 1,339,456  | 1,330,647  | 1,327,185  | 1,323,888  | 1,325,630  | 1,317,079  | 1,313,615  | 1,309,925  |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 292,055    | 291,630    | 293,007    | 291,597    | 289,016    | 288,623    | 289,986    | 288,623    | 286,041    | 285,584    |
| <b>Total Core Therms</b>                         | 42,535,048 | 42,953,676 | 43,630,662 | 43,770,273 | 44,172,661 | 44,578,228 | 45,246,897 | 45,364,959 | 45,749,438 | 46,124,492 |
| <b>Daily BaseLoad Therms</b>                     | 46,943     | 48,138     | 49,685     | 50,055     | 50,737     | 51,180     | 53,096     | 51,866     | 55,161     | 50,470     |
| <b>Peak Day Therms</b>                           | 455,473    | 460,135    | 471,577    | 476,202    | 480,751    | 485,266    | 482,646    | 494,162    | 498,516    | 502,841    |
| <b>Therms Per Residential Customer</b>           | 2,719      | 2,719      | 2,736      | 2,720      | 2,721      | 2,722      | 2,738      | 2,724      | 2,724      | 2,724      |
| <b>Therms Per Commercial Customer</b>            | 23,390     | 23,357     | 23,458     | 23,294     | 23,265     | 23,238     | 23,340     | 23,182     | 23,155     | 23,124     |
| <b>Therms Per Industrial Customer</b>            | 133,977    | 133,973    | 134,492    | 133,960    | 133,959    | 133,970    | 134,487    | 133,974    | 133,973    | 133,948    |
| <b>Residential Customers</b>                     | 34,506     | 34,947     | 35,382     | 35,811     | 36,235     | 36,654     | 37,068     | 37,477     | 37,881     | 38,280     |
| <b>Commercial Customers</b>                      | 4,866      | 4,911      | 4,956      | 5,000      | 5,044      | 5,087      | 5,130      | 5,173      | 5,215      | 5,257      |
| <b>Industrial Customers</b>                      | 38         | 38         | 38         | 38         | 38         | 37         | 37         | 37         | 37         | 37         |
| <b>Interruptible Customers</b>                   | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| <b>Total Core Customers</b>                      | 39,412     | 39,898     | 40,378     | 40,851     | 41,319     | 41,781     | 42,237     | 42,689     | 43,135     | 43,576     |
| <b>Zone 24</b>                                   | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>                  | 0.23%      | 0.28%      | 0.91%      | -0.31%     | 0.23%      | 0.28%      | 0.90%      | -0.32%     | 0.22%      | 0.26%      |
| <b>Residential Therms</b>                        | 4,593,878  | 4,618,072  | 4,672,577  | 4,665,975  | 4,689,787  | 4,713,586  | 4,768,218  | 4,760,616  | 4,783,955  | 4,807,068  |
| <b>Commercial Therms</b>                         | 4,245,931  | 4,252,183  | 4,285,357  | 4,265,281  | 4,272,322  | 4,278,603  | 4,311,761  | 4,291,543  | 4,298,407  | 4,304,005  |
| <b>Industrial Therms</b>                         | 339,827    | 339,556    | 339,684    | 339,031    | 338,672    | 338,425    | 338,525    | 337,904    | 337,555    | 337,251    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 911,239    | 909,431    | 914,041    | 909,342    | 901,774    | 900,056    | 904,618    | 900,056    | 892,486    | 890,592    |
| <b>Total Core Therms</b>                         | 10,090,875 | 10,119,243 | 10,211,658 | 10,179,630 | 10,202,555 | 10,230,610 | 10,323,123 | 10,290,119 | 10,312,400 | 10,338,916 |
| <b>Daily BaseLoad Therms</b>                     | 5,712      | 5,733      | 5,859      | 5,827      | 5,886      | 4,986      | 5,938      | 5,042      | 4,861      | 4,830      |
| <b>Peak Day Therms</b>                           | 113,886    | 114,273    | 115,074    | 115,460    | 115,746    | 116,127    | 116,079    | 116,881    | 117,160    | 117,529    |
| <b>Therms Per Residential Customer</b>           | 1,679      | 1,679      | 1,690      | 1,679      | 1,679      | 1,679      | 1,690      | 1,679      | 1,679      | 1,679      |
| <b>Therms Per Commercial Customer</b>            | 7,727      | 7,725      | 7,774      | 7,722      | 7,721      | 7,720      | 7,768      | 7,717      | 7,716      | 7,714      |
| <b>Therms Per Industrial Customer</b>            | 53,238     | 53,234     | 53,345     | 53,240     | 53,240     | 53,234     | 53,345     | 53,239     | 53,239     | 53,235     |
| <b>Residential Customers</b>                     | 7,727      | 7,718      | 7,808      | 7,849      | 7,889      | 7,928      | 7,968      | 8,008      | 8,047      | 8,086      |
| <b>Commercial Customers</b>                      | 1,494      | 1,497      | 1,500      | 1,503      | 1,506      | 1,509      | 1,512      | 1,514      | 1,517      | 1,520      |
| <b>Industrial Customers</b>                      | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         |
| <b>Interruptible Customers</b>                   | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>                      | 9,245      | 9,289      | 9,332      | 9,375      | 9,418      | 9,461      | 9,504      | 9,546      | 9,588      | 9,630      |
| <b>Zone 26</b>                                   | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>                  | 0.14%      | 0.20%      | 0.72%      | -0.34%     | 0.13%      | 0.22%      | 0.70%      | -0.32%     | 0.13%      | 0.14%      |
| <b>Residential Therms</b>                        | 1,385,618  | 1,400,002  | 1,421,805  | 1,427,913  | 1,441,851  | 1,456,082  | 1,477,625  | 1,483,307  | 1,496,728  | 1,509,579  |
| <b>Commercial Therms</b>                         | 4,571,351  | 4,569,879  | 4,592,057  | 4,566,643  | 4,562,355  | 4,562,442  | 4,584,447  | 4,560,522  | 4,556,374  | 4,553,528  |
| <b>Industrial Therms</b>                         | 223,134    | 222,636    | 223,188    | 221,591    | 221,134    | 220,724    | 221,267    | 219,767    | 219,309    | 218,724    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 92,398     | 92,232     | 92,688     | 92,204     | 91,419     | 91,281     | 91,733     | 91,281     | 90,496     | 90,302     |
| <b>Total Core Therms</b>                         | 6,272,502  | 6,284,749  | 6,329,739  | 6,308,351  | 6,316,758  | 6,330,529  | 6,375,072  | 6,354,878  | 6,362,908  | 6,372,133  |
| <b>Daily BaseLoad Therms</b>                     | 7,569      | 7,579      | 7,643      | 7,616      | 7,690      | 7,789      | 7,745      | 7,744      | 7,809      | 7,811      |
| <b>Peak Day Therms</b>                           | 49,914     | 50,030     | 52,126     | 52,244     | 52,328     | 52,442     | 50,568     | 52,672     | 52,752     | 52,861     |
| <b>Therms Per Residential Customer</b>           | 1,767      | 1,767      | 1,776      | 1,767      | 1,767      | 1,767      | 1,776      | 1,767      | 1,767      | 1,767      |
| <b>Therms Per Commercial Customer</b>            | 58,889     | 58,938     | 59,220     | 59,143     | 58,849     | 58,935     | 59,189     | 59,122     | 58,856     | 58,913     |
| <b>Therms Per Industrial Customer</b>            | 16,939     | 16,944     | 17,029     | 16,949     | 16,955     | 16,967     | 17,053     | 16,979     | 16,985     | 16,984     |
| <b>Residential Customers</b>                     | 3,440      | 3,479      | 3,517      | 3,554      | 3,592      | 3,628      | 3,665      | 3,701      | 3,737      | 3,772      |
| <b>Commercial Customers</b>                      | 1,235      | 1,237      | 1,238      | 1,240      | 1,242      | 1,243      | 1,245      | 1,246      | 1,248      | 1,249      |
| <b>Industrial Customers</b>                      | 31         | 31         | 31         | 31         | 31         | 31         | 31         | 31         | 31         | 30         |
| <b>Interruptible Customers</b>                   | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>                      | 4,707      | 4,748      | 4,787      | 4,826      | 4,865      | 4,903      | 4,941      | 4,979      | 5,016      | 5,053      |
| <b>Zone 30-S</b>                                 | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>                  | 0.35%      | 0.34%      | 0.82%      | -0.14%     | 0.34%      | 0.33%      | 0.81%      | -0.14%     | 0.32%      | 0.30%      |
| <b>Residential Therms</b>                        | 27,625,103 | 27,818,775 | 28,149,922 | 28,199,446 | 28,389,064 | 28,580,020 | 28,909,712 | 28,952,992 | 29,137,650 | 29,318,431 |
| <b>Commercial Therms</b>                         | 24,689,949 | 24,695,092 | 24,810,996 | 24,704,715 | 24,715,661 | 24,722,665 | 24,838,210 | 24,735,610 | 24,743,991 | 24,745,463 |
| <b>Industrial Therms</b>                         | 702,242    | 701,429    | 702,902    | 697,680    | 695,899    | 696,209    | 695,648    | 690,582    | 689,801    | 686,967    |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 2,485,609  | 2,477,101  | 2,485,342  | 2,468,409  | 2,459,901  | 2,451,574  | 2,459,720  | 2,443,065  | 2,434,556  | 2,425,868  |
| <b>Total Core Therms</b>                         | 55,503,902 | 55,692,397 | 56,149,161 | 56,072,249 | 56,240,525 | 56,448,469 | 56,903,289 | 56,822,249 | 57,004,997 | 57,176,629 |
| <b>Daily BaseLoad Therms</b>                     | 61,808     | 62,098     | 62,691     | 62,960     | 63,366     | 60,173     | 63,016     | 60,017     | 61,529     | 59,982     |
| <b>Peak Day Therms</b>                           | 436,294    | 437,989    | 445,144    | 446,825    | 448,577    | 450,233    | 446,621    | 453,645    | 455,349    | 456,954    |
| <b>Therms Per Residential Customer</b>           | 1,406      | 1,405      | 1,413      | 1,405      | 1,405      | 1,405      | 1,413      | 1,405      | 1,405      | 1,405      |
| <b>Therms Per Commercial Customer</b>            | 10,854     | 10,832     | 10,862     | 10,791     | 10,774     | 10,755     | 10,785     | 10,717     | 10,701     | 10,679     |
| <b>Therms Per Industrial Customer</b>            | 49,463     | 49,463     | 49,694     | 49,454     | 49,454     | 49,463     | 49,694     | 49,463     | 49,463     | 49,454     |
| <b>Residential Customers</b>                     | 39,872     | 40,152     | 40,430     | 40,706     | 40,980     | 41,253     | 41,523     | 41,792     | 42,059     | 42,325     |
| <b>Commercial Customers</b>                      | 3,919      | 3,929      | 3,939      | 3,948      | 3,958      | 3,967      | 3,977      | 3,986      | 3,996      | 4,005      |
| <b>Industrial Customers</b>                      | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         |
| <b>Interruptible Customers</b>                   | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| <b>Total Core Customers</b>                      | 43,822     | 44,112     | 44,400     | 44,685     | 44,969     | 45,251     | 45,531     | 45,809     | 46,086     | 46,360     |

Appendix B  
Demand Forecast  
Low Scenario

| Zone 30-W  | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Total Therms Pct. Growth</b>                  | 0.55%       | 0.54%       | 1.03%       | 0.02%       | 0.52%       | 0.53%       | 1.01%       | 0.01%       | 0.50%       | 0.48%       |
| <b>Residential Therms</b>                        | 63,169,069  | 63,532,110  | 64,216,849  | 64,244,982  | 64,601,675  | 64,963,470  | 65,647,271  | 65,667,191  | 66,016,106  | 66,355,841  |
| <b>Commercial Therms</b>                         | 35,454,255  | 35,615,727  | 35,948,858  | 35,930,681  | 36,087,743  | 36,249,609  | 36,582,144  | 36,561,297  | 36,714,769  | 36,864,623  |
| <b>Industrial Therms</b>                         | 4,255,529   | 4,289,831   | 4,341,136   | 4,356,267   | 4,389,150   | 4,422,108   | 4,471,909   | 4,485,187   | 4,516,313   | 4,546,315   |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 92,531      | 92,418      | 92,660      | 92,408      | 91,570      | 91,465      | 91,705      | 91,465      | 90,626      | 90,503      |
| <b>Total Core Therms</b>                         | 102,971,384 | 103,530,086 | 104,599,554 | 104,624,339 | 105,170,138 | 105,726,652 | 106,793,028 | 106,805,139 | 107,337,815 | 107,857,282 |
| <b>Daily BaseLoad Therms</b>                     | 121,084     | 122,143     | 123,677     | 124,691     | 126,062     | 127,809     | 129,049     | 129,160     | 128,952     | 119,777     |
| <b>Peak Day Therms</b>                           | 787,387     | 791,688     | 807,705     | 812,046     | 816,327     | 820,585     | 812,873     | 829,079     | 833,259     | 837,417     |
| <b>Therms Per Residential Customer</b>           | 6,098       | 6,098       | 6,127       | 6,100       | 6,097       | 6,098       | 6,125       | 6,098       | 6,100       | 6,099       |
| <b>Therms Per Commercial Customer</b>            | 32,027      | 32,014      | 32,154      | 32,005      | 31,964      | 31,954      | 32,095      | 31,951      | 31,907      | 31,893      |
| <b>Therms Per Industrial Customer</b>            | 206,290     | 206,683     | 207,822     | 207,445     | 207,880     | 208,353     | 209,469     | 209,168     | 209,668     | 210,078     |
| <b>Residential Customers</b>                     | 89,844      | 90,359      | 90,871      | 91,380      | 91,887      | 92,390      | 92,891      | 93,389      | 93,884      | 94,376      |
| <b>Commercial Customers</b>                      | 10,884      | 10,945      | 11,006      | 11,066      | 11,126      | 11,185      | 11,245      | 11,304      | 11,362      | 11,421      |
| <b>Industrial Customers</b>                      | 213         | 215         | 217         | 218         | 220         | 221         | 223         | 224         | 226         | 227         |
| <b>Interruptible Customers</b>                   | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| <b>Total Core Customers</b>                      | 100,942     | 101,520     | 102,094     | 102,665     | 103,233     | 103,798     | 104,359     | 104,918     | 105,473     | 106,025     |
| <b>Zone GTN</b>                                  | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
| <b>Total Therms Pct. Growth</b>                  | 0.88%       | 0.86%       | 1.23%       | 0.34%       | 0.81%       | 0.81%       | 1.27%       | 0.29%       | 0.76%       | 0.73%       |
| <b>Residential Therms</b>                        | 40,942,533  | 41,409,110  | 42,073,406  | 42,321,299  | 42,771,979  | 43,222,777  | 43,875,845  | 44,100,531  | 44,532,591  | 44,955,086  |
| <b>Commercial Therms</b>                         | 21,936,078  | 22,013,725  | 22,195,941  | 22,145,983  | 22,242,190  | 22,321,302  | 22,472,860  | 22,547,651  | 22,618,289  | 22,688,289  |
| <b>Industrial Therms</b>                         | 2,523,836   | 2,546,951   | 2,581,300   | 2,591,414   | 2,613,337   | 2,638,230   | 2,668,275   | 2,676,960   | 2,697,304   | 2,716,612   |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 271,336     | 270,852     | 272,068     | 270,785     | 268,477     | 268,060     | 269,264     | 268,060     | 265,750     | 265,202     |
| <b>Total Core Therms</b>                         | 65,673,783  | 66,240,638  | 67,122,735  | 67,349,081  | 67,895,982  | 68,447,369  | 69,316,654  | 69,518,411  | 70,043,296  | 70,555,189  |
| <b>Daily BaseLoad Therms</b>                     | 64,449      | 65,257      | 66,651      | 67,170      | 66,108      | 64,684      | 65,105      | 66,127      | 67,434      | 68,145      |
| <b>Peak Day Therms</b>                           | 603,605     | 608,825     | 622,744     | 627,932     | 633,049     | 638,129     | 634,132     | 648,153     | 653,049     | 657,949     |
| <b>Therms Per Residential Customer</b>           | 8,498       | 8,497       | 8,532       | 8,495       | 8,497       | 8,500       | 8,536       | 8,498       | 8,498       | 8,497       |
| <b>Therms Per Commercial Customer</b>            | 37,768      | 37,756      | 37,909      | 37,734      | 37,722      | 37,716      | 37,870      | 37,699      | 37,688      | 37,677      |
| <b>Therms Per Industrial Customer</b>            | 130,674     | 130,671     | 131,229     | 130,633     | 130,669     | 130,698     | 131,244     | 130,673     | 130,663     | 130,636     |
| <b>Residential Customers</b>                     | 54,812      | 55,443      | 56,067      | 56,683      | 57,293      | 57,896      | 58,492      | 59,083      | 59,667      | 60,245      |
| <b>Commercial Customers</b>                      | 7,174       | 7,203       | 7,232       | 7,261       | 7,290       | 7,318       | 7,347       | 7,375       | 7,403       | 7,431       |
| <b>Industrial Customers</b>                      | 111         | 112         | 113         | 114         | 115         | 116         | 117         | 118         | 118         | 119         |
| <b>Interruptible Customers</b>                   | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| <b>Total Core Customers</b>                      | 62,098      | 62,759      | 63,413      | 64,059      | 64,699      | 65,331      | 65,957      | 66,576      | 67,189      | 67,797      |
| <b>Zone ME-OR</b>                                | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
| <b>Total Therms Pct. Growth</b>                  | 0.31%       | 0.38%       | 0.92%       | -0.17%      | 0.29%       | 0.37%       | 0.90%       | -0.17%      | 0.27%       | 0.32%       |
| <b>Residential Therms</b>                        | 6,703,609   | 6,758,967   | 6,853,787   | 6,867,000   | 6,920,769   | 6,975,178   | 7,069,261   | 7,080,386   | 7,132,303   | 7,182,626   |
| <b>Commercial Therms</b>                         | 7,377,350   | 7,381,822   | 7,423,922   | 7,391,984   | 7,390,123   | 7,395,764   | 7,437,834   | 7,407,011   | 7,405,076   | 7,408,104   |
| <b>Industrial Therms</b>                         | 524,096     | 522,644     | 524,402     | 519,918     | 518,681     | 517,250     | 518,997     | 514,595     | 513,350     | 511,821     |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 670,157     | 669,259     | 671,741     | 669,164     | 663,163     | 662,359     | 664,816     | 662,359     | 666,356     | 665,367     |
| <b>Total Core Therms</b>                         | 15,275,213  | 15,332,693  | 15,473,853  | 15,448,066  | 15,492,736  | 15,550,550  | 15,690,909  | 15,664,351  | 15,707,085  | 15,757,918  |
| <b>Daily BaseLoad Therms</b>                     | 15,794      | 15,944      | 15,314      | 15,249      | 16,184      | 16,166      | 16,525      | 15,219      | 14,535      | 12,425      |
| <b>Peak Day Therms</b>                           | 153,420     | 154,071     | 157,225     | 157,874     | 158,436     | 159,073     | 157,173     | 160,341     | 160,881     | 161,496     |
| <b>Therms Per Residential Customer</b>           | 3,149       | 3,149       | 3,166       | 3,149       | 3,149       | 3,149       | 3,167       | 3,150       | 3,150       | 3,149       |
| <b>Therms Per Commercial Customer</b>            | 28,834      | 28,826      | 28,954      | 28,825      | 28,775      | 28,769      | 28,896      | 28,769      | 28,719      | 28,709      |
| <b>Therms Per Industrial Customer</b>            | 87,862      | 87,850      | 88,360      | 87,849      | 87,879      | 87,870      | 88,384      | 87,883      | 87,912      | 87,887      |
| <b>Residential Customers</b>                     | 12,273      | 12,376      | 12,479      | 12,581      | 12,682      | 12,782      | 12,881      | 12,979      | 13,076      | 13,173      |
| <b>Commercial Customers</b>                      | 1,886       | 1,887       | 1,889       | 1,891       | 1,892       | 1,894       | 1,896       | 1,898       | 1,899       | 1,901       |
| <b>Industrial Customers</b>                      | 26          | 26          | 26          | 26          | 26          | 26          | 25          | 25          | 25          | 25          |
| <b>Interruptible Customers</b>                   | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           |
| <b>Total Core Customers</b>                      | 14,186      | 14,292      | 14,396      | 14,500      | 14,602      | 14,704      | 14,804      | 14,904      | 15,003      | 15,101      |
| <b>Zone ME-WA</b>                                | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
| <b>Total Therms Pct. Growth</b>                  | 0.43%       | 0.38%       | 1.03%       | -0.25%      | 0.41%       | 0.37%       | 1.01%       | -0.25%      | 0.39%       | 0.33%       |
| <b>Residential Therms</b>                        | 7,498,081   | 7,555,681   | 7,661,712   | 7,668,590   | 7,724,895   | 7,781,803   | 7,887,629   | 7,892,441   | 7,947,184   | 8,000,590   |
| <b>Commercial Therms</b>                         | 6,256,301   | 6,248,522   | 6,282,491   | 6,238,556   | 6,237,176   | 6,230,303   | 6,264,164   | 6,221,229   | 6,219,850   | 6,211,181   |
| <b>Industrial Therms</b>                         | 225,823     | 228,821     | 232,888     | 234,651     | 237,532     | 240,404     | 244,399     | 246,003     | 248,747     | 251,413     |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | 13,980,205  | 14,033,024  | 14,177,091  | 14,141,797  | 14,199,603  | 14,252,510  | 14,396,192  | 14,359,673  | 14,415,782  | 14,463,103  |
| <b>Total Core Therms</b>                         | 14,195      | 14,335      | 14,489      | 14,555      | 14,556      | 14,519      | 14,880      | 14,527      | 14,727      | 14,727      |
| <b>Daily BaseLoad Therms</b>                     | 146,640     | 147,257     | 149,852     | 150,466     | 151,137     | 151,740     | 150,469     | 152,999     | 153,652     | 154,235     |
| <b>Peak Day Therms</b>                           | 594         | 594         | 598         | 594         | 594         | 594         | 598         | 594         | 594         | 594         |
| <b>Therms Per Residential Customer</b>           | 4,781       | 4,775       | 4,801       | 4,768       | 4,767       | 4,761       | 4,787       | 4,754       | 4,753       | 4,747       |
| <b>Therms Per Commercial Customer</b>            | 10,536      | 10,537      | 10,587      | 10,535      | 10,535      | 10,536      | 10,588      | 10,537      | 10,536      | 10,534      |
| <b>Therms Per Industrial Customer</b>            | 12,613      | 12,710      | 12,807      | 12,902      | 12,997      | 13,091      | 13,185      | 13,278      | 13,370      | 13,462      |
| <b>Residential Customers</b>                     | 1,308       | 1,308       | 1,308       | 1,309       | 1,309       | 1,309       | 1,309       | 1,309       | 1,309       | 1,309       |
| <b>Commercial Customers</b>                      | 21          | 22          | 22          | 22          | 23          | 23          | 23          | 23          | 24          | 24          |
| <b>Industrial Customers</b>                      | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| <b>Interruptible Customers</b>                   | 13,943      | 14,040      | 14,137      | 14,233      | 14,328      | 14,423      | 14,517      | 14,610      | 14,702      | 14,794      |
| <b>Bellingham District</b>                       | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
| <b>Total Therms Pct. Growth</b>                  | 0.61%       | 0.60%       | 1.09%       | 0.08%       | 0.58%       | 0.58%       | 1.06%       | 0.06%       | 0.55%       | 0.53%       |
| <b>Residential Therms</b>                        | 35,055,995  | 35,276,415  | 35,675,281  | 35,709,111  | 35,925,416  | 36,144,504  | 36,542,468  | 36,570,759  | 36,782,018  | 36,987,862  |
| <b>Commercial Therms</b>                         | 17,865,930  | 17,946,519  | 18,114,021  | 18,104,434  | 18,183,290  | 18,264,304  | 18,431,752  | 18,421,100  | 18,498,284  | 18,573,172  |
| <b>Industrial Therms</b>                         | 2,141,781   | 2,171,053   | 2,208,896   | 2,228,325   | 2,256,460   | 2,284,615   | 2,321,384   | 2,339,293   | 2,366,165   | 2,392,418   |
| <b>Ind., Inst., &amp; Cmcl. Interrup. Therms</b> | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| <b>Total Core Therms</b>                         | 55,063,706  | 55,393,987  | 55,998,198  | 56,041,870  | 56,365,166  | 56,693,503  | 57,295,594  | 57,331,151  | 57,646,467  | 57,953,452  |
| <b>Daily BaseLoad Therms</b>                     | 69,809      | 70,489      | 71,353      | 72,016      | 72,879      | 73,941      | 74,854      | 75,740      | 76,607      | 76,973      |
| <b>Peak Day Therms</b>                           | 409,788     | 412,257     | 421,245     | 423,724     | 426,177     | 428,622     | 424,371     | 433,472     | 435,866     | 438,254     |
| <b>Therms Per Residential Customer</b>           | 2,899       | 2,899       | 2,914       | 2,899       | 2,899       | 2,899       | 2,913       | 2,899       | 2,899       | 2,898       |
| <b>Therms Per Commercial Customer</b>            | 15,692      | 15,692      | 15,787      | 15,708      | 15,681      | 15,686      | 15,781      | 15,710      | 15,681      | 15,675      |
| <b>Therms Per Industrial Customer</b>            | 25,348      | 25,348      | 25,449      | 25,345      | 25,345      | 25,348      | 25,448      | 25,348      | 25,348      | 25,344      |
| <b>Residential Customers</b>                     | 48,332      | 48,636      | 48,939      | 49,239      | 49,538      | 49,834      | 50,130      | 50,423      | 50,714      | 51,004      |
| <b>Commercial Customers</b>                      | 5,610       | 5,640       | 5,669       | 5,698       | 5,727       | 5,756       | 5,785       | 5,814       | 5,842       | 5,870       |
| <b>Industrial Customers</b>                      | 87          | 89          | 90          | 91          | 92          | 93          | 94          | 95          | 97          | 98          |
| <b>Interruptible Customers</b>                   | -           | -           | -           | -           | -           | -           | -           | -           | -           | -           |
| <b>Total Core Customers</b>                      | 54,030      | 54,365      | 54,698      | 55,028      | 55,357      | 55,684      | 56,009      | 56,332      | 56,653      | 56,972      |

Appendix B  
Demand Forecast  
Low Scenario

|                                       | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Mount Vernon District</b>          |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.48%      | 0.48%      | 0.97%      | -0.04%     | 0.46%      | 0.47%      | 0.95%      | -0.05%     | 0.44%      | 0.43%      |
| Residential Therms                    | 28,113,074 | 28,255,695 | 28,541,568 | 28,535,871 | 28,676,259 | 28,818,966 | 29,104,812 | 29,096,432 | 29,234,089 | 29,367,979 |
| Commercial Therms                     | 17,588,325 | 17,669,728 | 17,834,836 | 17,826,247 | 17,904,654 | 17,985,225 | 18,150,392 | 18,140,197 | 18,216,485 | 18,291,451 |
| Industrial Therms                     | 2,113,748  | 2,118,778  | 2,132,290  | 2,127,943  | 2,132,690  | 2,137,493  | 2,150,534  | 2,145,894  | 2,150,148  | 2,153,897  |
| Ind., Inst., & Cmcl. Interrup. Therms | 92,531     | 92,418     | 92,640     | 92,408     | 91,570     | 91,465     | 91,705     | 91,465     | 90,626     | 90,503     |
| Total Core Therms                     | 47,907,678 | 48,136,099 | 48,601,356 | 48,582,449 | 48,804,972 | 49,033,149 | 49,497,434 | 49,473,988 | 49,691,348 | 49,903,830 |
| Daily BaseLoad Therms                 | 51,275     | 51,655     | 52,324     | 52,674     | 53,183     | 53,869     | 54,195     | 53,420     | 52,345     | 51,805     |
| Peak Day Therms                       | 377,599    | 379,430    | 386,460    | 388,322    | 390,149    | 391,962    | 388,502    | 397,392    | 399,163    | 399,163    |
| Therms Per Residential Customer       | 3,199      | 3,199      | 3,214      | 3,201      | 3,199      | 3,199      | 3,211      | 3,199      | 3,202      | 3,201      |
| Therms Per Commercial Customer        | 16,335     | 16,322     | 16,367     | 16,298     | 16,283     | 16,268     | 16,313     | 16,241     | 16,226     | 16,219     |
| Therms Per Industrial Customer        | 180,943    | 181,335    | 182,373    | 182,100    | 182,535    | 183,005    | 184,021    | 183,820    | 184,321    | 184,733    |
| Residential Customers                 | 41,512     | 41,723     | 41,933     | 42,141     | 42,349     | 42,556     | 42,761     | 42,966     | 43,169     | 43,372     |
| Commercial Customers                  | 5,274      | 5,305      | 5,337      | 5,368      | 5,399      | 5,429      | 5,460      | 5,490      | 5,520      | 5,550      |
| Industrial Customers                  | 126        | 126        | 127        | 127        | 128        | 128        | 128        | 129        | 129        | 129        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 46,912     | 47,155     | 47,397     | 47,637     | 47,876     | 48,114     | 48,350     | 48,586     | 48,820     | 49,053     |
| <b>Bremerton District</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.39%      | 0.38%      | 0.85%      | -0.09%     | 0.37%      | 0.37%      | 0.84%      | -0.10%     | 0.35%      | 0.34%      |
| Residential Therms                    | 24,947,551 | 25,131,258 | 25,438,386 | 25,492,961 | 25,672,728 | 25,853,012 | 26,158,628 | 26,206,448 | 26,381,388 | 26,555,363 |
| Commercial Therms                     | 21,821,710 | 21,835,532 | 21,944,460 | 21,862,819 | 21,877,804 | 21,892,548 | 22,001,251 | 21,920,217 | 21,934,642 | 21,945,791 |
| Industrial Therms                     | 432,645    | 431,518    | 432,540    | 429,252    | 428,173    | 427,074    | 428,076    | 424,839    | 423,761    | 422,665    |
| Ind., Inst., & Cmcl. Interrup. Therms | 2,485,609  | 2,477,101  | 2,485,342  | 2,468,409  | 2,459,901  | 2,451,574  | 2,459,720  | 2,443,065  | 2,434,556  | 2,425,868  |
| Total Core Therms                     | 49,687,516 | 49,875,409 | 50,300,729 | 50,253,440 | 50,438,607 | 50,624,211 | 51,047,676 | 50,994,569 | 51,174,346 | 51,347,627 |
| Daily BaseLoad Therms                 | 55,642     | 55,945     | 56,460     | 56,760     | 57,179     | 57,937     | 56,782     | 54,882     | 55,198     | 54,882     |
| Peak Day Therms                       | 388,381    | 390,051    | 395,279    | 396,936    | 398,646    | 400,279    | 398,513    | 403,627    | 405,290    | 406,877    |
| Therms Per Residential Customer       | 691        | 691        | 694        | 691        | 691        | 691        | 694        | 691        | 691        | 690        |
| Therms Per Commercial Customer        | 6,792      | 6,772      | 6,781      | 6,732      | 6,713      | 6,694      | 6,704      | 6,657      | 6,639      | 6,619      |
| Therms Per Industrial Customer        | 29,616     | 29,615     | 29,762     | 29,614     | 29,614     | 29,615     | 29,762     | 29,616     | 29,616     | 29,616     |
| Residential Customers                 | 36,127     | 36,393     | 36,657     | 36,919     | 37,180     | 37,438     | 37,695     | 37,950     | 38,204     | 38,456     |
| Commercial Customers                  | 3,213      | 3,225      | 3,236      | 3,248      | 3,259      | 3,270      | 3,282      | 3,293      | 3,304      | 3,315      |
| Industrial Customers                  | 15         | 15         | 15         | 14         | 14         | 14         | 14         | 14         | 14         | 14         |
| Interruptible Customers               | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| Total Core Customers                  | 39,357     | 39,635     | 39,911     | 40,184     | 40,456     | 40,726     | 40,994     | 41,261     | 41,525     | 41,788     |
| <b>Longview District</b>              |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.19%      | 0.21%      | 0.73%      | -0.34%     | 0.18%      | 0.23%      | 0.72%      | -0.32%     | 0.17%      | 0.16%      |
| Residential Therms                    | 1,385,618  | 1,400,002  | 1,421,805  | 1,427,913  | 1,441,851  | 1,456,082  | 1,477,625  | 1,483,307  | 1,496,728  | 1,509,579  |
| Commercial Therms                     | 4,322,413  | 4,321,236  | 4,342,722  | 4,317,995  | 4,316,079  | 4,316,296  | 4,337,757  | 4,314,478  | 4,312,556  | 4,309,971  |
| Industrial Therms                     | 223,134    | 222,636    | 223,188    | 221,591    | 221,134    | 220,724    | 221,267    | 219,767    | 219,300    | 218,724    |
| Ind., Inst., & Cmcl. Interrup. Therms | 92,398     | 92,232     | 92,688     | 92,204     | 91,419     | 91,281     | 91,733     | 91,281     | 90,496     | 90,302     |
| Total Core Therms                     | 6,023,563  | 6,036,105  | 6,080,404  | 6,059,702  | 6,070,483  | 6,084,383  | 6,128,381  | 6,108,833  | 6,119,090  | 6,128,576  |
| Daily BaseLoad Therms                 | 7,342      | 7,352      | 7,443      | 7,423      | 7,463      | 7,562      | 7,518      | 7,517      | 7,609      | 7,588      |
| Peak Day Therms                       | 48,695     | 48,810     | 50,874     | 50,991     | 51,088     | 51,202     | 49,361     | 51,433     | 51,524     | 51,634     |
| Therms Per Residential Customer       | 1,767      | 1,767      | 1,776      | 1,767      | 1,767      | 1,767      | 1,776      | 1,767      | 1,767      | 1,767      |
| Therms Per Commercial Customer        | 7,737      | 7,733      | 7,766      | 7,725      | 7,719      | 7,717      | 7,750      | 7,711      | 7,706      | 7,701      |
| Therms Per Industrial Customer        | 16,939     | 16,944     | 17,029     | 16,949     | 16,955     | 16,967     | 17,053     | 16,979     | 16,985     | 16,984     |
| Residential Customers                 | 3,440      | 3,479      | 3,517      | 3,554      | 3,592      | 3,629      | 3,665      | 3,701      | 3,737      | 3,772      |
| Commercial Customers                  | 1,220      | 1,232      | 1,234      | 1,235      | 1,237      | 1,238      | 1,240      | 1,242      | 1,243      | 1,245      |
| Industrial Customers                  | 31         | 31         | 31         | 31         | 31         | 31         | 31         | 31         | 31         | 30         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 4,703      | 4,743      | 4,782      | 4,821      | 4,860      | 4,899      | 4,937      | 4,974      | 5,011      | 5,048      |
| <b>Aberdeen District</b>              |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.06%      | 0.01%      | 0.54%      | -0.51%     | 0.05%      | 0.04%      | 0.54%      | -0.48%     | 0.05%      | -0.03%     |
| Residential Therms                    | 2,677,551  | 2,687,516  | 2,711,536  | 2,706,485  | 2,716,335  | 2,727,008  | 2,751,084  | 2,746,544  | 2,756,262  | 2,765,068  |
| Commercial Therms                     | 2,868,238  | 2,859,560  | 2,866,535  | 2,843,896  | 2,837,858  | 2,830,117  | 2,836,958  | 2,815,393  | 2,799,679  | 2,792,672  |
| Industrial Therms                     | 270,597    | 269,911    | 270,362    | 268,428    | 267,725    | 267,133    | 267,571    | 265,743    | 265,040    | 264,262    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 5,816,387  | 5,816,987  | 5,848,433  | 5,818,809  | 5,821,918  | 5,824,258  | 5,855,613  | 5,827,680  | 5,830,651  | 5,829,002  |
| Daily BaseLoad Therms                 | 6,165      | 6,153      | 6,231      | 6,200      | 6,186      | 6,237      | 6,234      | 5,335      | 6,330      | 6,401      |
| Peak Day Therms                       | 47,913     | 47,938     | 49,865     | 49,889     | 49,931     | 49,954     | 49,100     | 50,018     | 50,058     | 50,076     |
| Therms Per Residential Customer       | 715        | 715        | 719        | 715        | 715        | 715        | 719        | 715        | 715        | 715        |
| Therms Per Commercial Customer        | 4,062      | 4,061      | 4,081      | 4,059      | 4,061      | 4,061      | 4,061      | 4,061      | 4,062      | 4,059      |
| Therms Per Industrial Customer        | 19,847     | 19,848     | 19,932     | 19,841     | 19,840     | 19,848     | 19,932     | 19,848     | 19,847     | 19,841     |
| Residential Customers                 | 3,745      | 3,759      | 3,773      | 3,787      | 3,801      | 3,814      | 3,828      | 3,842      | 3,855      | 3,869      |
| Commercial Customers                  | 706        | 704        | 702        | 701        | 699        | 697        | 695        | 693        | 692        | 690        |
| Industrial Customers                  | 14         | 14         | 14         | 14         | 13         | 13         | 13         | 13         | 13         | 13         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 4,465      | 4,477      | 4,489      | 4,501      | 4,513      | 4,525      | 4,537      | 4,549      | 4,560      | 4,572      |
| <b>Kennewick District</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 1.12%      | 1.10%      | 1.71%      | 0.41%      | 1.02%      | 1.02%      | 1.62%      | 0.34%      | 0.94%      | 0.91%      |
| Residential Therms                    | 18,946,454 | 19,202,735 | 19,585,308 | 19,702,032 | 19,948,461 | 20,195,204 | 20,572,037 | 20,673,555 | 20,988,612 | 21,137,553 |
| Commercial Therms                     | 17,387,794 | 17,546,927 | 17,810,524 | 17,858,231 | 18,010,654 | 18,166,584 | 18,427,682 | 18,466,666 | 18,615,946 | 18,759,770 |
| Industrial Therms                     | 1,016,644  | 1,016,021  | 1,017,499  | 1,010,600  | 1,007,993  | 1,005,561  | 1,006,997  | 1,000,332  | 997,724    | 994,912    |
| Ind., Inst., & Cmcl. Interrup. Therms | 201,452    | 201,152    | 202,106    | 201,119    | 199,345    | 199,079    | 200,022    | 199,079    | 197,304    | 196,972    |
| Total Core Therms                     | 37,554,344 | 37,966,835 | 38,615,437 | 38,771,982 | 39,166,452 | 39,566,428 | 40,206,739 | 40,341,631 | 40,719,186 | 41,089,207 |
| Daily BaseLoad Therms                 | 44,161     | 45,318     | 46,405     | 47,121     | 47,824     | 48,219     | 50,115     | 49,019     | 51,854     | 49,001     |
| Peak Day Therms                       | 408,761    | 413,364    | 424,272    | 428,836    | 433,325    | 437,782    | 435,584    | 446,562    | 450,859    | 455,129    |
| Therms Per Residential Customer       | 1,712      | 1,712      | 1,723      | 1,712      | 1,712      | 1,712      | 1,723      | 1,712      | 1,712      | 1,712      |
| Therms Per Commercial Customer        | 63,943     | 63,989     | 64,316     | 64,187     | 63,893     | 63,976     | 64,276     | 64,158     | 63,892     | 63,946     |
| Therms Per Industrial Customer        | 93,035     | 93,034     | 93,410     | 93,016     | 93,017     | 93,032     | 93,405     | 93,029     | 93,030     | 93,011     |
| Residential Customers                 | 32,730     | 33,173     | 33,611     | 34,043     | 34,470     | 34,892     | 35,308     | 35,720     | 36,127     | 36,529     |
| Commercial Customers                  | 4,159      | 4,202      | 4,244      | 4,285      | 4,326      | 4,367      | 4,407      | 4,447      | 4,487      | 4,526      |
| Industrial Customers                  | 22         | 22         | 22         | 22         | 22         | 22         | 22         | 22         | 22         | 22         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 36,912     | 37,398     | 37,878     | 38,352     | 38,820     | 39,282     | 39,738     | 40,190     | 40,636     | 41,078     |

Appendix B  
Demand Forecast  
Low Scenario

|                                       | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Walla Walla District</b>           |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.43%      | 0.38%      | 1.03%      | -0.25%     | 0.41%      | 0.37%      | 1.01%      | -0.25%     | 0.39%      | 0.33%      |
| Residential Therms                    | 7,498,081  | 7,555,681  | 7,661,712  | 7,668,590  | 7,724,895  | 7,781,803  | 7,887,629  | 7,892,441  | 7,947,184  | 8,000,509  |
| Commercial Therms                     | 6,256,301  | 6,248,522  | 6,282,491  | 6,238,556  | 6,282,491  | 6,230,303  | 6,264,164  | 6,221,229  | 6,219,850  | 6,211,181  |
| Industrial Therms                     | 225,823    | 228,821    | 232,888    | 234,651    | 237,532    | 240,404    | 244,399    | 246,003    | 248,747    | 251,413    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 13,980,205 | 14,033,024 | 14,177,091 | 14,141,797 | 14,199,603 | 14,252,510 | 14,396,192 | 14,359,673 | 14,415,782 | 14,463,103 |
| Daily BaseLoad Therms                 | 14,195     | 14,335     | 14,489     | 14,555     | 14,556     | 14,519     | 14,880     | 14,527     | 12,363     | 14,727     |
| Peak Day Therms                       | 146,640    | 147,257    | 149,852    | 150,466    | 151,137    | 151,740    | 150,459    | 152,999    | 153,652    | 154,235    |
| Therms Per Residential Customer       | 594        | 594        | 598        | 594        | 594        | 594        | 598        | 594        | 594        | 594        |
| Therms Per Commercial Customer        | 4,781      | 4,775      | 4,801      | 4,768      | 4,767      | 4,761      | 4,787      | 4,754      | 4,753      | 4,747      |
| Therms Per Industrial Customer        | 10,536     | 10,537     | 10,587     | 10,535     | 10,535     | 10,536     | 10,588     | 10,537     | 10,536     | 10,534     |
| Residential Customers                 | 12,613     | 12,710     | 12,807     | 12,902     | 12,997     | 13,091     | 13,185     | 13,278     | 13,370     | 13,462     |
| Commercial Customers                  | 1,308      | 1,308      | 1,308      | 1,309      | 1,309      | 1,309      | 1,309      | 1,309      | 1,309      | 1,309      |
| Industrial Customers                  | 21         | 22         | 22         | 22         | 23         | 23         | 23         | 23         | 24         | 24         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 13,943     | 14,040     | 14,137     | 14,233     | 14,328     | 14,423     | 14,517     | 14,610     | 14,702     | 14,794     |
| <b>Wenatchee District</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | -0.02%     | 0.01%      | 0.50%      | -0.48%     | -0.02%     | 0.02%      | 0.49%      | -0.46%     | 0.02%      | -0.01%     |
| Residential Therms                    | 1,527,713  | 1,525,404  | 1,530,609  | 1,520,403  | 1,518,291  | 1,516,188  | 1,521,341  | 1,511,593  | 1,509,281  | 1,506,733  |
| Commercial Therms                     | 8,044,322  | 8,050,202  | 8,095,077  | 8,060,738  | 8,063,875  | 8,071,073  | 8,115,734  | 8,082,615  | 8,085,523  | 8,089,257  |
| Industrial Therms                     | 784,131    | 782,026    | 783,380    | 777,959    | 775,982    | 773,963    | 775,294    | 770,013    | 768,035    | 765,816    |
| Ind., Inst., & Cmcl. Interrup. Therms | 90,603     | 90,477     | 90,901     | 90,478     | 89,671     | 89,545     | 89,964     | 89,545     | 88,738     | 88,612     |
| Total Core Therms                     | 10,446,769 | 10,448,110 | 10,499,968 | 10,449,777 | 10,447,819 | 10,450,769 | 10,502,333 | 10,453,766 | 10,451,576 | 10,450,418 |
| Daily BaseLoad Therms                 | 9,684      | 9,715      | 10,189     | 9,799      | 9,812      | 9,900      | 9,869      | 9,776      | 9,776      | 9,827      |
| Peak Day Therms                       | 90,773     | 90,792     | 92,706     | 92,734     | 92,728     | 92,745     | 90,874     | 92,790     | 92,783     | 92,794     |
| Therms Per Residential Customer       | 1,877      | 1,879      | 1,890      | 1,882      | 1,883      | 1,885      | 1,896      | 1,889      | 1,890      | 1,892      |
| Therms Per Commercial Customer        | 24,909     | 24,890     | 24,986     | 24,857     | 24,807     | 24,792     | 24,890     | 24,766     | 24,718     | 24,698     |
| Therms Per Industrial Customer        | 93,912     | 93,904     | 94,282     | 93,896     | 93,897     | 93,895     | 94,276     | 93,900     | 93,903     | 93,880     |
| Residential Customers                 | 3,135      | 3,126      | 3,117      | 3,108      | 3,099      | 3,090      | 3,081      | 3,072      | 3,063      | 3,054      |
| Commercial Customers                  | 1,468      | 1,471      | 1,473      | 1,476      | 1,478      | 1,481      | 1,483      | 1,486      | 1,488      | 1,491      |
| Industrial Customers                  | 33         | 33         | 33         | 33         | 33         | 33         | 33         | 33         | 32         | 32         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 4,637      | 4,631      | 4,624      | 4,618      | 4,611      | 4,604      | 4,598      | 4,591      | 4,584      | 4,578      |
| <b>Yakima District</b>                |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.36%      | 0.37%      | 0.91%      | -0.21%     | 0.34%      | 0.40%      | 0.90%      | -0.19%     | 0.33%      | 0.30%      |
| Residential Therms                    | 17,121,857 | 17,199,533 | 17,373,626 | 17,347,107 | 17,423,095 | 17,504,713 | 17,678,327 | 17,654,083 | 17,728,015 | 17,795,035 |
| Commercial Therms                     | 19,544,502 | 19,588,977 | 19,740,348 | 19,670,770 | 19,706,520 | 19,758,105 | 19,908,955 | 19,845,621 | 19,879,891 | 19,912,582 |
| Industrial Therms                     | 5,147,094  | 5,181,872  | 5,240,658  | 5,248,096  | 5,281,469  | 5,317,473  | 5,375,524  | 5,383,558  | 5,415,884  | 5,445,061  |
| Ind., Inst., & Cmcl. Interrup. Therms | 59,048     | 59,048     | 59,128     | 58,998     | 58,998     | 59,048     | 59,128     | 59,048     | 59,048     | 58,998     |
| Total Core Therms                     | 41,872,501 | 42,029,429 | 42,413,761 | 42,324,970 | 42,470,881 | 42,639,340 | 43,021,934 | 42,942,310 | 43,082,838 | 43,211,675 |
| Daily BaseLoad Therms                 | 38,407     | 38,779     | 38,166     | 38,030     | 39,581     | 40,482     | 40,610     | 38,954     | 38,513     | 39,537     |
| Peak Day Therms                       | 423,974    | 425,844    | 445,597    | 447,500    | 449,344    | 451,220    | 435,008    | 454,955    | 456,751    | 458,562    |
| Therms Per Residential Customer       | 117,984    | 118,512    | 119,505    | 119,096    | 119,149    | 119,689    | 120,693    | 120,287    | 120,342    | 120,891    |
| Therms Per Commercial Customer        | 35,885     | 35,907     | 36,116     | 35,952     | 35,936     | 35,978     | 36,191     | 36,046     | 36,034     | 36,047     |
| Therms Per Industrial Customer        | 169,801    | 169,892    | 170,745    | 170,051    | 170,089    | 170,262    | 171,078    | 170,472    | 170,599    | 170,607    |
| Residential Customers                 | 26,838     | 26,946     | 27,052     | 27,157     | 27,262     | 27,365     | 27,468     | 27,570     | 27,672     | 27,772     |
| Commercial Customers                  | 5,200      | 5,214      | 5,227      | 5,241      | 5,254      | 5,267      | 5,280      | 5,292      | 5,306      | 5,318      |
| Industrial Customers                  | 158        | 159        | 160        | 161        | 162        | 162        | 163        | 164        | 165        | 166        |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Total Core Customers                  | 32,199     | 32,321     | 32,441     | 32,561     | 32,679     | 32,797     | 32,913     | 33,029     | 33,144     | 33,257     |
| <b>Central Oregon (Bend) District</b> |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.88%      | 0.86%      | 1.33%      | 0.34%      | 0.81%      | 0.81%      | 1.27%      | 0.29%      | 0.76%      | 0.73%      |
| Residential Therms                    | 40,942,533 | 41,409,110 | 42,073,406 | 42,321,299 | 42,771,979 | 43,222,777 | 43,875,845 | 44,100,531 | 44,532,591 | 44,955,086 |
| Commercial Therms                     | 21,936,078 | 22,013,725 | 22,195,961 | 22,165,583 | 22,242,190 | 22,321,302 | 22,503,271 | 22,472,860 | 22,547,651 | 22,618,289 |
| Industrial Therms                     | 2,523,836  | 2,546,951  | 2,581,300  | 2,591,414  | 2,613,337  | 2,635,230  | 2,668,275  | 2,676,960  | 2,697,304  | 2,716,612  |
| Ind., Inst., & Cmcl. Interrup. Therms | 271,336    | 270,852    | 272,068    | 270,785    | 268,477    | 268,060    | 269,264    | 268,060    | 265,750    | 265,202    |
| Total Core Therms                     | 65,673,783 | 66,240,638 | 67,122,735 | 67,349,081 | 67,895,962 | 68,447,369 | 69,316,654 | 69,518,411 | 70,043,296 | 70,555,189 |
| Daily BaseLoad Therms                 | 64,449     | 65,257     | 66,651     | 67,170     | 66,108     | 64,684     | 65,105     | 66,127     | 67,434     | 68,145     |
| Peak Day Therms                       | 603,605    | 608,825    | 622,744    | 627,922    | 633,049    | 638,129    | 634,122    | 648,153    | 653,049    | 657,949    |
| Therms Per Residential Customer       | 8,498      | 8,497      | 8,532      | 8,495      | 8,497      | 8,500      | 8,536      | 8,500      | 8,498      | 8,497      |
| Therms Per Commercial Customer        | 37,768     | 37,756     | 37,909     | 37,734     | 37,722     | 37,716     | 37,870     | 37,699     | 37,688     | 37,677     |
| Therms Per Industrial Customer        | 130,674    | 130,671    | 131,229    | 130,633    | 130,669    | 130,698    | 131,244    | 130,673    | 130,663    | 130,656    |
| Residential Customers                 | 54,812     | 55,443     | 56,067     | 56,683     | 57,293     | 57,896     | 58,492     | 59,083     | 59,667     | 60,245     |
| Commercial Customers                  | 7,174      | 7,203      | 7,232      | 7,261      | 7,290      | 7,318      | 7,347      | 7,375      | 7,403      | 7,431      |
| Industrial Customers                  | 111        | 112        | 113        | 114        | 115        | 116        | 117        | 118        | 119        | 119        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 62,098     | 62,759     | 63,413     | 64,059     | 64,699     | 65,331     | 66,957     | 66,576     | 67,189     | 67,797     |
| <b>Pendleton District</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.31%      | 0.38%      | 0.92%      | -0.17%     | 0.29%      | 0.37%      | 0.90%      | -0.17%     | 0.27%      | 0.32%      |
| Residential Therms                    | 6,703,609  | 6,758,967  | 6,853,787  | 6,867,000  | 6,920,769  | 6,975,178  | 7,069,261  | 7,088,386  | 7,132,303  | 7,182,626  |
| Commercial Therms                     | 7,337,350  | 7,381,822  | 7,423,922  | 7,391,984  | 7,390,123  | 7,395,764  | 7,437,834  | 7,407,011  | 7,405,076  | 7,408,104  |
| Industrial Therms                     | 524,096    | 522,644    | 524,402    | 519,918    | 518,681    | 517,250    | 518,997    | 514,595    | 513,350    | 511,821    |
| Ind., Inst., & Cmcl. Interrup. Therms | 670,157    | 669,259    | 671,741    | 669,164    | 663,163    | 662,359    | 664,816    | 662,359    | 656,356    | 655,367    |
| Total Core Therms                     | 15,275,213 | 15,332,693 | 15,473,853 | 15,448,066 | 15,492,736 | 15,550,550 | 15,690,909 | 15,664,351 | 15,707,085 | 15,757,918 |
| Daily BaseLoad Therms                 | 15,794     | 15,944     | 15,314     | 15,249     | 16,184     | 16,166     | 16,525     | 15,219     | 14,535     | 14,245     |
| Peak Day Therms                       | 153,420    | 154,071    | 157,225    | 157,874    | 158,436    | 159,073    | 157,173    | 160,341    | 160,881    | 161,496    |
| Therms Per Residential Customer       | 3,149      | 3,149      | 3,149      | 3,149      | 3,149      | 3,149      | 3,149      | 3,150      | 3,150      | 3,149      |
| Therms Per Commercial Customer        | 28,834     | 28,824     | 28,954     | 28,825     | 28,775     | 28,769     | 28,896     | 28,769     | 28,719     | 28,709     |
| Therms Per Industrial Customer        | 87,862     | 87,850     | 88,360     | 87,849     | 87,879     | 87,870     | 88,384     | 87,883     | 87,912     | 87,883     |
| Residential Customers                 | 12,273     | 12,376     | 12,479     | 12,581     | 12,682     | 12,782     | 12,881     | 12,979     | 13,076     | 13,173     |
| Commercial Customers                  | 1,888      | 1,890      | 1,892      | 1,894      | 1,895      | 1,897      | 1,899      | 1,900      | 1,902      | 1,904      |
| Industrial Customers                  | 27         | 27         | 27         | 27         | 27         | 27         | 26         | 26         | 26         | 26         |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Total Core Customers                  | 14,190     | 14,295     | 14,400     | 14,503     | 14,606     | 14,707     | 14,808     | 14,908     | 15,007     | 15,105     |

**Appendix B  
Demand Forecast  
Low Scenario**

| Eastern Oregon (Ontario) District     | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
|---------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Total Therms Pct. Growth</b>       | 0.23%       | 0.28%       | 0.91%       | -0.31%      | 0.23%       | 0.28%       | 0.90%       | -0.32%      | 0.22%       | 0.26%       |
| Residential Therms                    | 4,593,878   | 4,618,072   | 4,672,577   | 4,665,975   | 4,699,787   | 4,713,586   | 4,768,218   | 4,760,616   | 4,783,955   | 4,807,068   |
| Commercial Therms                     | 4,245,931   | 4,252,183   | 4,285,357   | 4,265,281   | 4,272,322   | 4,278,003   | 4,311,761   | 4,291,543   | 4,296,407   | 4,304,005   |
| Industrial Therms                     | 339,827     | 339,356     | 339,684     | 339,031     | 338,672     | 338,475     | 338,535     | 337,904     | 337,553     | 337,251     |
| Ind., Inst., & Cmcl. Interrup. Therms | 911,239     | 909,431     | 914,041     | 909,342     | 901,774     | 900,056     | 904,418     | 900,056     | 892,486     | 890,592     |
| <b>Total Core Therms</b>              | 10,090,875  | 10,119,243  | 10,211,658  | 10,179,630  | 10,202,555  | 10,230,670  | 10,323,123  | 10,290,119  | 10,312,400  | 10,338,916  |
| Daily BaseLoad Therms                 | 5,712       | 5,733       | 5,859       | 5,827       | 5,886       | 4,986       | 5,938       | 5,042       | 4,861       | 4,830       |
| Peak Day Therms                       | 113,886     | 114,273     | 115,074     | 115,460     | 115,746     | 116,127     | 116,079     | 116,881     | 117,160     | 117,529     |
| Therms Per Residential Customer       | 1,679       | 1,679       | 1,690       | 1,679       | 1,679       | 1,679       | 1,690       | 1,679       | 1,679       | 1,679       |
| Therms Per Commercial Customer        | 7,727       | 7,725       | 7,774       | 7,722       | 7,721       | 7,720       | 7,768       | 7,717       | 7,716       | 7,714       |
| Therms Per Industrial Customer        | 53,238      | 53,234      | 53,345      | 53,240      | 53,240      | 53,234      | 53,345      | 53,239      | 53,239      | 53,235      |
| Residential Customers                 | 7,727       | 7,768       | 7,808       | 7,849       | 7,889       | 7,928       | 7,968       | 8,008       | 8,047       | 8,086       |
| Commercial Customers                  | 1,494       | 1,497       | 1,500       | 1,503       | 1,506       | 1,509       | 1,512       | 1,514       | 1,517       | 1,520       |
| Industrial Customers                  | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          |
| Interruptible Customers               | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| <b>Total Core Customers</b>           | 9,245       | 9,289       | 9,332       | 9,375       | 9,418       | 9,461       | 9,504       | 9,546       | 9,588       | 9,630       |
| <b>Oregon</b>                         | <b>2030</b> | <b>2031</b> | <b>2032</b> | <b>2033</b> | <b>2034</b> | <b>2035</b> | <b>2036</b> | <b>2037</b> | <b>2038</b> | <b>2039</b> |
| <b>Total Therms Pct. Growth</b>       | 0.71%       | 0.72%       | 1.22%       | 0.18%       | 0.66%       | 0.68%       | 1.17%       | 0.15%       | 0.62%       | 0.61%       |
| Residential Therms                    | 52,240,020  | 52,786,150  | 53,599,769  | 53,854,274  | 54,382,535  | 54,911,541  | 55,713,324  | 55,941,533  | 56,448,848  | 56,944,780  |
| Commercial Therms                     | 33,559,359  | 33,647,731  | 33,905,240  | 33,822,849  | 33,904,635  | 33,995,669  | 34,252,866  | 34,171,414  | 34,251,135  | 34,330,398  |
| Industrial Therms                     | 3,387,760   | 3,409,151   | 3,445,386   | 3,450,363   | 3,470,690   | 3,490,904   | 3,525,798   | 3,529,459   | 3,548,207   | 3,565,684   |
| Ind., Inst., & Cmcl. Interrup. Therms | 1,852,732   | 1,849,542   | 1,857,851   | 1,849,292   | 1,833,414   | 1,830,475   | 1,838,698   | 1,830,475   | 1,814,591   | 1,811,162   |
| <b>Total Core Therms</b>              | 91,039,871  | 91,692,574  | 92,808,246  | 92,976,778  | 93,591,274  | 94,228,589  | 95,330,686  | 95,472,881  | 96,062,782  | 96,652,024  |
| Daily BaseLoad Therms                 | 85,955      | 86,935      | 87,824      | 88,246      | 88,178      | 85,836      | 87,568      | 86,387      | 86,830      | 86,400      |
| Peak Day Therms                       | 870,911     | 877,169     | 895,043     | 901,266     | 907,231     | 913,330     | 907,384     | 925,375     | 931,110     | 936,974     |
| Therms Per Residential Customer       | 13,326      | 13,326      | 13,389      | 13,323      | 13,326      | 13,328      | 13,393      | 13,329      | 13,327      | 13,326      |
| Therms Per Commercial Customer        | 74,329      | 74,308      | 74,636      | 74,281      | 74,218      | 74,204      | 74,534      | 74,185      | 74,123      | 74,100      |
| Therms Per Industrial Customer        | 271,774     | 271,755     | 272,934     | 271,722     | 271,789     | 271,802     | 272,973     | 271,795     | 271,758     | 271,708     |
| Residential Customers                 | 74,812      | 75,587      | 76,354      | 77,113      | 77,864      | 78,606      | 79,342      | 80,069      | 80,790      | 81,504      |
| Commercial Customers                  | 10,557      | 10,591      | 10,624      | 10,658      | 10,691      | 10,724      | 10,757      | 10,790      | 10,823      | 10,855      |
| Industrial Customers                  | 160         | 161         | 162         | 163         | 164         | 165         | 166         | 167         | 168         | 168         |
| Interruptible Customers               | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           |
| <b>Total Core Customers</b>           | 85,533      | 86,343      | 87,145      | 87,938      | 88,723      | 89,499      | 90,269      | 91,030      | 91,784      | 92,531      |
| <b>Washington</b>                     | <b>2030</b> | <b>2031</b> | <b>2032</b> | <b>2033</b> | <b>2034</b> | <b>2035</b> | <b>2036</b> | <b>2037</b> | <b>2038</b> | <b>2039</b> |
| <b>Total Therms Pct. Growth</b>       | 0.52%       | 0.52%       | 1.04%       | -0.03%      | 0.49%       | 0.51%       | 1.01%       | -0.04%      | 0.47%       | 0.45%       |
| Residential Therms                    | 137,273,894 | 138,234,240 | 139,939,832 | 140,110,672 | 141,047,332 | 141,997,481 | 143,693,941 | 143,835,162 | 144,743,576 | 145,623,461 |
| Commercial Therms                     | 115,699,536 | 116,066,682 | 117,031,015 | 116,783,685 | 117,137,709 | 117,514,635 | 118,474,645 | 118,229,516 | 118,572,127 | 118,892,847 |
| Industrial Therms                     | 12,357,596  | 12,422,637  | 12,541,702  | 12,546,844  | 12,609,159  | 12,674,442  | 12,791,038  | 12,795,441  | 12,854,814  | 12,909,106  |
| Ind., Inst., & Cmcl. Interrup. Therms | 3,021,642   | 3,012,428   | 3,022,825   | 3,003,615   | 2,990,903   | 2,981,991   | 2,992,272   | 2,973,482   | 2,960,767   | 2,951,256   |
| <b>Total Core Therms</b>              | 268,352,668 | 269,735,986 | 272,535,374 | 272,444,816 | 273,785,103 | 275,168,549 | 277,951,896 | 277,833,602 | 279,131,283 | 280,376,890 |
| Daily BaseLoad Therms                 | 296,681     | 299,739     | 303,061     | 304,579     | 308,664     | 308,666     | 315,057     | 308,702     | 310,597     | 298,940     |
| Peak Day Therms                       | 2,342,524   | 2,355,745   | 2,416,150   | 2,429,398   | 2,442,526   | 2,455,509   | 2,420,781   | 2,481,462   | 2,494,175   | 2,506,724   |
| Therms Per Residential Customer       | 131,439     | 131,968     | 133,033     | 132,556     | 132,608     | 133,151     | 134,225     | 133,753     | 133,811     | 134,360     |
| Therms Per Commercial Customer        | 180,136     | 180,140     | 181,001     | 180,286     | 179,860     | 179,934     | 180,774     | 180,104     | 179,711     | 179,710     |
| Therms Per Industrial Customer        | 639,976     | 640,456     | 643,569     | 641,347     | 641,827     | 642,509     | 645,564     | 643,548     | 644,185     | 644,549     |
| Residential Customers                 | 208,472     | 209,945     | 211,405     | 212,852     | 214,287     | 215,710     | 217,121     | 218,522     | 219,911     | 221,289     |
| Commercial Customers                  | 28,110      | 28,201      | 28,431      | 28,559      | 28,687      | 28,814      | 28,941      | 29,066      | 29,190      | 29,314      |
| Industrial Customers                  | 508         | 511         | 513         | 515         | 518         | 520         | 522         | 524         | 527         | 529         |
| Interruptible Customers               | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           |
| <b>Total Core Customers</b>           | 237,159     | 238,765     | 240,357     | 241,935     | 243,500     | 245,053     | 246,593     | 248,121     | 249,636     | 251,140     |
| <b>System</b>                         | <b>2030</b> | <b>2031</b> | <b>2032</b> | <b>2033</b> | <b>2034</b> | <b>2035</b> | <b>2036</b> | <b>2037</b> | <b>2038</b> | <b>2039</b> |
| <b>Total Therms Pct. Growth</b>       | 0.57%       | 0.57%       | 1.08%       | 0.02%       | 0.53%       | 0.55%       | 1.05%       | 0.01%       | 0.51%       | 0.49%       |
| Residential Therms                    | 189,513,914 | 191,020,390 | 193,539,601 | 193,964,946 | 195,429,867 | 196,909,022 | 199,407,265 | 199,776,696 | 201,192,424 | 202,568,461 |
| Commercial Therms                     | 149,258,895 | 149,714,413 | 150,936,256 | 150,606,533 | 151,042,344 | 151,510,304 | 152,727,511 | 152,400,930 | 152,823,262 | 153,223,246 |
| Industrial Therms                     | 15,745,356  | 15,831,788  | 15,987,088  | 15,997,207  | 16,079,848  | 16,165,346  | 16,316,836  | 16,324,900  | 16,403,021  | 16,474,790  |
| Ind., Inst., & Cmcl. Interrup. Therms | 4,874,373   | 4,861,970   | 4,880,676   | 4,852,907   | 4,824,317   | 4,812,466   | 4,830,969   | 4,803,957   | 4,775,358   | 4,762,418   |
| <b>Total Core Therms</b>              | 359,392,538 | 361,428,560 | 365,343,620 | 365,421,593 | 367,376,376 | 369,397,138 | 373,282,562 | 373,306,462 | 375,194,065 | 377,028,914 |
| Daily BaseLoad Therms                 | 382,636     | 386,674     | 390,885     | 392,825     | 396,842     | 394,503     | 402,625     | 395,089     | 397,427     | 389,340     |
| Peak Day Therms                       | 3,213,436   | 3,222,914   | 3,311,193   | 3,330,644   | 3,349,757   | 3,368,038   | 3,320,164   | 3,408,037   | 3,425,286   | 3,443,698   |
| Therms Per Residential Customer       | 144,765     | 145,293     | 146,421     | 145,879     | 145,933     | 146,479     | 147,618     | 147,081     | 147,138     | 147,685     |
| Therms Per Commercial Customer        | 254,465     | 254,448     | 255,637     | 254,567     | 254,078     | 254,139     | 255,308     | 254,289     | 253,834     | 253,810     |
| Therms Per Industrial Customer        | 911,751     | 912,211     | 916,503     | 913,068     | 913,616     | 914,310     | 918,537     | 915,343     | 915,999     | 916,307     |
| Residential Customers                 | 283,284     | 285,532     | 287,759     | 289,965     | 292,150     | 294,316     | 296,463     | 298,591     | 300,701     | 302,793     |
| Commercial Customers                  | 38,727      | 38,891      | 39,055      | 39,217      | 39,378      | 39,539      | 39,698      | 39,856      | 40,013      | 40,169      |
| Industrial Customers                  | 669         | 672         | 675         | 679         | 682         | 685         | 688         | 691         | 694         | 697         |
| Interruptible Customers               | 13          | 13          | 13          | 13          | 12          | 12          | 12          | 12          | 12          | 12          |
| <b>Total Core Customers</b>           | 322,691     | 325,108     | 327,502     | 329,873     | 332,223     | 334,552     | 336,861     | 339,151     | 341,420     | 343,671     |

**Appendix B  
Demand Forecast  
High Scenario**

| Athena                                | 2020             | 2021             | 2022             | 2023             | 2024             | 2025             | 2026             | 2027             | 2028             | 2029             |
|---------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| <b>Total Therms Pct. Growth</b>       |                  | 1.08%            | 1.43%            | 1.41%            | 1.83%            | 0.96%            | 1.39%            | 1.36%            | 1.78%            | 0.92%            |
| Residential Therms                    | 302,489          | 307,556          | 313,574          | 319,638          | 327,114          | 331,893          | 338,073          | 344,290          | 351,993          | 356,839          |
| Commercial Therms                     | 134,045          | 133,804          | 134,136          | 134,470          | 135,383          | 135,137          | 135,473          | 135,806          | 136,715          | 136,470          |
| Industrial Therms                     | 6,409            | 6,381            | 6,443            | 6,443            | 6,473            | 6,445            | 6,508            | 6,508            | 6,535            | 6,508            |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>442,943</b>   | <b>447,741</b>   | <b>454,154</b>   | <b>460,551</b>   | <b>468,970</b>   | <b>473,475</b>   | <b>480,054</b>   | <b>486,605</b>   | <b>495,243</b>   | <b>499,818</b>   |
| Daily BaseLoad Therms                 | 281              | 282              | 274              | 290              | 293              | 296              | 299              | 299              | 305              | 307              |
| Peak Day Therms                       | 5,007            | 5,076            | 5,146            | 5,216            | 5,273            | 5,343            | 5,429            | 5,501            | 5,573            | 5,646            |
| Therms Per Residential Customer       | 572              | 570              | 570              | 570              | 572              | 570              | 570              | 570              | 572              | 570              |
| Therms Per Commercial Customer        | 2,060            | 2,051            | 2,051            | 2,051            | 2,060            | 2,051            | 2,051            | 2,051            | 2,060            | 2,051            |
| Therms Per Industrial Customer        | 6,409            | 6,381            | 6,380            | 6,380            | 6,409            | 6,381            | 6,381            | 6,381            | 6,406            | 6,381            |
| Residential Customers                 | 529              | 540              | 551              | 561              | 572              | 583              | 594              | 605              | 615              | 627              |
| Commercial Customers                  | 65               | 65               | 65               | 66               | 66               | 66               | 66               | 66               | 66               | 67               |
| Industrial Customers                  | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                | 1                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>595</b>       | <b>606</b>       | <b>617</b>       | <b>628</b>       | <b>639</b>       | <b>650</b>       | <b>661</b>       | <b>672</b>       | <b>683</b>       | <b>694</b>       |
| <b>Baker</b>                          | <b>2020</b>      | <b>2021</b>      | <b>2022</b>      | <b>2023</b>      | <b>2024</b>      | <b>2025</b>      | <b>2026</b>      | <b>2027</b>      | <b>2028</b>      | <b>2029</b>      |
| <b>Total Therms Pct. Growth</b>       |                  | 0.58%            | 1.15%            | 1.13%            | 1.76%            | 0.48%            | 1.11%            | 1.10%            | 1.75%            | 0.45%            |
| Residential Therms                    | 2,269,318        | 2,296,182        | 2,339,328        | 2,380,597        | 2,437,785        | 2,463,725        | 2,505,704        | 2,547,921        | 2,607,540        | 2,633,061        |
| Commercial Therms                     | 1,549,331        | 1,543,482        | 1,547,404        | 1,551,244        | 1,546,812        | 1,558,864        | 1,562,711        | 1,566,556        | 1,580,434        | 1,574,243        |
| Industrial Therms                     | 127,699          | 127,614          | 128,045          | 128,336          | 128,974          | 128,886          | 129,310          | 129,601          | 130,245          | 130,157          |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>3,946,349</b> | <b>3,969,278</b> | <b>4,014,778</b> | <b>4,060,177</b> | <b>4,131,571</b> | <b>4,151,476</b> | <b>4,197,727</b> | <b>4,244,078</b> | <b>4,318,238</b> | <b>4,337,461</b> |
| Daily BaseLoad Therms                 | 2,304            | 2,317            | 2,322            | 2,333            | 2,349            | 2,360            | 2,370            | 2,383            | 2,388            | 2,399            |
| Peak Day Therms                       | 43,408           | 43,924           | 44,445           | 44,968           | 45,698           | 46,228           | 46,553           | 47,088           | 47,625           | 48,163           |
| Therms Per Residential Customer       | 664              | 660              | 660              | 660              | 664              | 660              | 660              | 660              | 664              | 660              |
| Therms Per Commercial Customer        | 3,018            | 3,000            | 3,000            | 3,000            | 3,019            | 3,001            | 3,001            | 3,001            | 3,020            | 3,001            |
| Therms Per Industrial Customer        | 42,519           | 42,397           | 42,399           | 42,402           | 42,519           | 42,397           | 42,397           | 42,399           | 42,524           | 42,397           |
| Residential Customers                 | 3,418            | 3,481            | 3,543            | 3,606            | 3,669            | 3,733            | 3,796            | 3,860            | 3,925            | 3,990            |
| Commercial Customers                  | 513              | 515              | 516              | 517              | 518              | 520              | 521              | 522              | 523              | 525              |
| Industrial Customers                  | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                | 3                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>3,934</b>     | <b>3,999</b>     | <b>4,062</b>     | <b>4,126</b>     | <b>4,190</b>     | <b>4,255</b>     | <b>4,320</b>     | <b>4,385</b>     | <b>4,451</b>     | <b>4,517</b>     |
| <b>Umatilla</b>                       | <b>2020</b>      | <b>2021</b>      | <b>2022</b>      | <b>2023</b>      | <b>2024</b>      | <b>2025</b>      | <b>2026</b>      | <b>2027</b>      | <b>2028</b>      | <b>2029</b>      |
| <b>Total Therms Pct. Growth</b>       |                  | 1.82%            | 2.45%            | 2.03%            | 2.48%            | 1.59%            | 2.43%            | 2.04%            | 2.51%            | 1.57%            |
| Residential Therms                    | 429,923          | 467,451          | 505,594          | 544,702          | 588,023          | 625,749          | 667,647          | 710,483          | 758,478          | 798,734          |
| Commercial Therms                     | 1,277,658        | 1,274,167        | 1,282,260        | 1,282,242        | 1,287,487        | 1,282,180        | 1,290,235        | 1,290,216        | 1,295,592        | 1,290,195        |
| Industrial Therms                     | 159,433          | 159,435          | 159,735          | 160,231          | 161,026          | 161,022          | 161,321          | 161,816          | 162,623          | 162,610          |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>1,867,014</b> | <b>1,901,053</b> | <b>1,947,589</b> | <b>1,987,176</b> | <b>2,036,536</b> | <b>2,068,951</b> | <b>2,119,223</b> | <b>2,162,515</b> | <b>2,216,693</b> | <b>2,251,539</b> |
| Daily BaseLoad Therms                 | 2,729            | 2,749            | 2,768            | 2,788            | 2,808            | 2,828            | 2,848            | 2,868            | 2,888            | 2,908            |
| Peak Day Therms                       | 14,660           | 15,060           | 15,506           | 15,927           | 16,417           | 16,859           | 17,282           | 17,742           | 18,209           | 18,686           |
| Therms Per Residential Customer       | 461              | 461              | 461              | 461              | 463              | 461              | 461              | 461              | 463              | 461              |
| Therms Per Commercial Customer        | 8,724            | 8,687            | 8,742            | 8,742            | 8,779            | 8,743            | 8,797            | 8,797            | 8,834            | 8,798            |
| Therms Per Industrial Customer        | 26,543           | 26,469           | 26,461           | 26,470           | 26,543           | 26,469           | 26,460           | 26,469           | 26,544           | 26,469           |
| Residential Customers                 | 932              | 1,015            | 1,098            | 1,182            | 1,269            | 1,358            | 1,449            | 1,542            | 1,637            | 1,734            |
| Commercial Customers                  | 146              | 147              | 147              | 147              | 147              | 147              | 147              | 147              | 147              | 147              |
| Industrial Customers                  | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                | 6                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>1,084</b>     | <b>1,167</b>     | <b>1,250</b>     | <b>1,335</b>     | <b>1,422</b>     | <b>1,511</b>     | <b>1,602</b>     | <b>1,695</b>     | <b>1,790</b>     | <b>1,887</b>     |
| <b>Chemult</b>                        | <b>2020</b>      | <b>2021</b>      | <b>2022</b>      | <b>2023</b>      | <b>2024</b>      | <b>2025</b>      | <b>2026</b>      | <b>2027</b>      | <b>2028</b>      | <b>2029</b>      |
| <b>Total Therms Pct. Growth</b>       |                  | -0.20%           | 0.24%            | 0.25%            | 0.70%            | -0.20%           | 0.25%            | 0.25%            | 0.68%            | -0.19%           |
| Residential Therms                    | 13,782           | 13,755           | 13,788           | 13,823           | 13,919           | 13,892           | 13,926           | 13,961           | 14,056           | 14,030           |
| Commercial Therms                     | 40,419           | 40,340           | 40,439           | 40,540           | 40,823           | 40,742           | 40,843           | 40,943           | 41,223           | 41,144           |
| Industrial Therms                     | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>54,201</b>    | <b>54,095</b>    | <b>54,227</b>    | <b>54,363</b>    | <b>54,742</b>    | <b>54,635</b>    | <b>54,769</b>    | <b>54,904</b>    | <b>55,279</b>    | <b>55,174</b>    |
| Daily BaseLoad Therms                 | 56               | 56               | 56               | 56               | 56               | 56               | 56               | 56               | 56               | 56               |
| Peak Day Therms                       | 453              | 454              | 455              | 456              | 455              | 456              | 460              | 461              | 462              | 463              |
| Therms Per Residential Customer       | 540              | 538              | 538              | 538              | 541              | 539              | 539              | 539              | 542              | 539              |
| Therms Per Commercial Customer        | 2,019            | 2,010            | 2,010            | 2,010            | 2,019            | 2,010            | 2,010            | 2,010            | 2,018            | 2,010            |
| Therms Per Industrial Customer        | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Residential Customers                 | 26               | 26               | 26               | 26               | 26               | 26               | 26               | 26               | 26               | 26               |
| Commercial Customers                  | 20               | 20               | 20               | 20               | 20               | 20               | 20               | 20               | 20               | 20               |
| Industrial Customers                  | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>46</b>        | <b>46</b>        | <b>46</b>        | <b>46</b>        | <b>46</b>        | <b>46</b>        | <b>46</b>        | <b>46</b>        | <b>46</b>        | <b>46</b>        |
| <b>Gilchrist</b>                      | <b>2020</b>      | <b>2021</b>      | <b>2022</b>      | <b>2023</b>      | <b>2024</b>      | <b>2025</b>      | <b>2026</b>      | <b>2027</b>      | <b>2028</b>      | <b>2029</b>      |
| <b>Total Therms Pct. Growth</b>       |                  | -0.23%           | 0.25%            | 0.25%            | 0.73%            | -0.23%           | 0.24%            | 0.25%            | 0.73%            | -0.24%           |
| Residential Therms                    | 114,743          | 114,491          | 114,775          | 115,061          | 115,889          | 115,632          | 115,917          | 116,203          | 117,034          | 116,772          |
| Commercial Therms                     | 138,418          | 138,088          | 138,433          | 138,774          | 139,802          | 139,466          | 139,802          | 140,151          | 141,187          | 140,840          |
| Industrial Therms                     | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Ind., Inst., & Cmcl. Interrup. Therms | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Therms</b>              | <b>253,161</b>   | <b>252,580</b>   | <b>253,208</b>   | <b>253,835</b>   | <b>255,691</b>   | <b>255,098</b>   | <b>255,719</b>   | <b>256,354</b>   | <b>258,221</b>   | <b>257,613</b>   |
| Daily BaseLoad Therms                 | 168              | 168              | 168              | 168              | 168              | 168              | 168              | 168              | 168              | 168              |
| Peak Day Therms                       | 2,325            | 2,331            | 2,337            | 2,343            | 2,349            | 2,355            | 2,360            | 2,366            | 2,372            | 2,378            |
| Therms Per Residential Customer       | 588              | 585              | 585              | 586              | 589              | 586              | 587              | 587              | 590              | 587              |
| Therms Per Commercial Customer        | 3,559            | 3,542            | 3,542            | 3,543            | 3,561            | 3,544            | 3,544            | 3,544            | 3,562            | 3,545            |
| Therms Per Industrial Customer        | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Residential Customers                 | 195              | 196              | 196              | 196              | 197              | 197              | 198              | 198              | 198              | 199              |
| Commercial Customers                  | 39               | 39               | 39               | 39               | 39               | 39               | 39               | 40               | 40               | 40               |
| Industrial Customers                  | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| Interruptible Customers               | -                | -                | -                | -                | -                | -                | -                | -                | -                | -                |
| <b>Total Core Customers</b>           | <b>234</b>       | <b>235</b>       | <b>235</b>       | <b>236</b>       | <b>236</b>       | <b>237</b>       | <b>237</b>       | <b>238</b>       | <b>238</b>       | <b>239</b>       |





**Appendix B  
Demand Forecast  
High Scenario**

| Mission Tap                           | 2020      | 2021      | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|-----------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>       |           | -0.51%    | 0.01%      | 0.01%      | 0.52%      | -0.51%     | 0.00%      | 0.01%      | 0.53%      | -0.52%     |
| Residential Therms                    | 122,197   | 121,507   | 121,515    | 121,520    | 122,210    | 121,529    | 121,533    | 121,538    | 122,242    | 121,551    |
| Commercial Therms                     | 373,715   | 371,859   | 371,880    | 371,910    | 373,780    | 371,942    | 371,948    | 371,962    | 373,892    | 373,025    |
| Industrial Therms                     | -         | -         | -          | -          | -          | -          | -          | -          | -          | -          |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 495,912   | 493,366   | 493,396    | 493,430    | 495,990    | 493,471    | 493,481    | 493,520    | 496,134    | 493,576    |
| Daily BaseLoad Therms                 | 546       | 546       | 546        | 546        | 546        | 546        | 546        | 546        | 546        | 546        |
| Peak Day Therms                       | 4,466     | 4,465     | 4,464      | 4,464      | 4,483      | 4,482      | 4,461      | 4,460      | 4,460      | 4,460      |
| Therms Per Residential Customer       | 563       | 559       | 559        | 559        | 563        | 559        | 559        | 559        | 563        | 559        |
| Therms Per Commercial Customer        | 8,319     | 8,278     | 8,278      | 8,278      | 8,319      | 8,278      | 8,277      | 8,278      | 8,320      | 8,278      |
| Therms Per Industrial Customer        | -         | -         | -          | -          | -          | -          | -          | -          | -          | -          |
| Residential Customers                 | 217       | 217       | 217        | 217        | 217        | 217        | 217        | 217        | 217        | 217        |
| Commercial Customers                  | 45        | 45        | 45         | 45         | 45         | 45         | 45         | 45         | 45         | 45         |
| Industrial Customers                  | -         | -         | -          | -          | -          | -          | -          | -          | -          | -          |
| Interruptible Customers               | -         | -         | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 262       | 262       | 262        | 262        | 262        | 262        | 262        | 262        | 262        | 262        |
| <b>Nyssa-Ontario</b>                  | 2020      | 2021      | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| <b>Total Therms Pct. Growth</b>       |           | 0.72%     | 1.35%      | 1.21%      | 1.79%      | 0.60%      | 1.23%      | 1.17%      | 1.72%      | 0.59%      |
| Residential Therms                    | 2,088,714 | 2,113,652 | 2,149,874  | 2,186,517  | 2,238,280  | 2,260,650  | 2,297,916  | 2,335,387  | 2,388,246  | 2,410,917  |
| Commercial Therms                     | 2,638,746 | 2,661,101 | 2,695,708  | 2,731,729  | 2,783,781  | 2,803,580  | 2,839,100  | 2,875,786  | 2,928,494  | 2,948,624  |
| Industrial Therms                     | 212,578   | 212,517   | 212,395    | 212,290    | 212,313    | 212,154    | 212,034    | 211,941    | 211,883    | 211,746    |
| Ind., Inst., & Cmcl. Interrup. Therms | 942,310   | 937,558   | 946,840    | 946,840    | 951,733    | 946,934    | 956,309    | 960,968    | 963,309    | 956,309    |
| <b>Total Core Therms</b>              | 5,882,348 | 5,924,828 | 6,004,819  | 6,077,376  | 6,186,107  | 6,223,318  | 6,305,380  | 6,379,423  | 6,489,592  | 6,527,596  |
| Daily BaseLoad Therms                 | 2,984     | 3,074     | 3,039      | 3,087      | 3,113      | 3,164      | 3,164      | 3,255      | 3,237      | 3,286      |
| Peak Day Therms                       | 67,455    | 68,347    | 69,339     | 70,240     | 70,526     | 71,429     | 73,069     | 73,989     | 74,915     | 75,844     |
| Therms Per Residential Customer       | 548       | 544       | 544        | 544        | 548        | 544        | 544        | 544        | 548        | 544        |
| Therms Per Commercial Customer        | 2,813     | 2,795     | 2,792      | 2,790      | 2,804      | 2,786      | 2,783      | 2,782      | 2,795      | 2,777      |
| Therms Per Industrial Customer        | 10,818    | 10,814    | 10,813     | 10,812     | 10,815     | 10,815     | 10,814     | 10,813     | 10,816     | 10,814     |
| Residential Customers                 | 3,814     | 3,883     | 3,950      | 4,018      | 4,086      | 4,154      | 4,223      | 4,292      | 4,362      | 4,432      |
| Commercial Customers                  | 938       | 952       | 965        | 979        | 993        | 1,006      | 1,020      | 1,034      | 1,048      | 1,062      |
| Industrial Customers                  | 20        | 20        | 20         | 20         | 20         | 20         | 20         | 20         | 20         | 20         |
| Interruptible Customers               | 1         | 1         | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 4,773     | 4,855     | 4,936      | 5,017      | 5,099      | 5,181      | 5,264      | 5,347      | 5,430      | 5,514      |
| <b>Pendleton</b>                      | 2020      | 2021      | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| <b>Total Therms Pct. Growth</b>       |           | 0.42%     | 1.03%      | 0.92%      | 1.50%      | 0.34%      | 1.02%      | 0.90%      | 1.45%      | 0.35%      |
| Residential Therms                    | 2,968,861 | 3,011,685 | 3,068,415  | 3,125,835  | 3,203,183  | 3,242,100  | 3,300,588  | 3,359,427  | 3,438,477  | 3,478,119  |
| Commercial Therms                     | 2,379,805 | 2,366,046 | 2,366,122  | 2,365,839  | 2,379,272  | 2,365,566  | 2,365,919  | 2,365,645  | 2,378,239  | 2,366,094  |
| Industrial Therms                     | 163,403   | 162,722   | 162,994    | 163,518    | 165,036    | 164,342    | 164,629    | 165,153    | 166,641    | 165,963    |
| Ind., Inst., & Cmcl. Interrup. Therms | 692,517   | 689,957   | 696,759    | 696,759    | 699,442    | 696,857    | 703,757    | 703,757    | 706,169    | 703,756    |
| <b>Total Core Therms</b>              | 6,204,586 | 6,230,410 | 6,294,289  | 6,351,950  | 6,446,933  | 6,468,865  | 6,534,892  | 6,593,981  | 6,689,526  | 6,712,932  |
| Daily BaseLoad Therms                 | 5,551     | 5,577     | 5,597      | 5,575      | 5,631      | 5,674      | 5,700      | 5,726      | 5,698      | 5,672      |
| Peak Day Therms                       | 65,393    | 66,052    | 66,763     | 67,430     | 67,351     | 68,020     | 69,501     | 70,185     | 70,870     | 71,562     |
| Therms Per Residential Customer       | 581       | 578       | 578        | 578        | 581        | 578        | 578        | 578        | 581        | 578        |
| Therms Per Commercial Customer        | 3,166     | 3,148     | 3,149      | 3,149      | 3,167      | 3,149      | 3,150      | 3,150      | 3,167      | 3,150      |
| Therms Per Industrial Customer        | 27,204    | 27,015    | 27,001     | 27,013     | 27,204     | 27,015     | 27,003     | 27,015     | 27,199     | 27,015     |
| Residential Customers                 | 5,108     | 5,210     | 5,309      | 5,409      | 5,504      | 5,612      | 5,712      | 5,815      | 5,918      | 6,021      |
| Commercial Customers                  | 752       | 752       | 751        | 751        | 751        | 751        | 751        | 751        | 751        | 751        |
| Industrial Customers                  | 6         | 6         | 6          | 6          | 6          | 6          | 6          | 6          | 6          | 6          |
| Interruptible Customers               | 1         | 1         | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 5,867     | 5,968     | 6,067      | 6,167      | 6,268      | 6,369      | 6,470      | 6,573      | 6,676      | 6,779      |
| <b>Prineville</b>                     | 2020      | 2021      | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| <b>Total Therms Pct. Growth</b>       |           | 2.47%     | 2.72%      | 2.74%      | 3.21%      | 2.17%      | 2.61%      | 2.60%      | 3.00%      | 2.08%      |
| Residential Therms                    | 1,612,104 | 1,695,897 | 1,783,765  | 1,873,492  | 1,974,949  | 2,057,791  | 2,151,868  | 2,247,332  | 2,354,815  | 2,442,307  |
| Commercial Therms                     | 1,828,074 | 1,834,442 | 1,847,629  | 1,862,244  | 1,885,525  | 1,891,057  | 1,904,845  | 1,919,589  | 1,941,959  | 1,948,268  |
| Industrial Therms                     | 195,931   | 195,544   | 196,002    | 196,479    | 197,888    | 197,492    | 197,993    | 198,471    | 199,758    | 199,441    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 3,636,109 | 3,725,883 | 3,827,396  | 3,932,215  | 4,058,363  | 4,146,340  | 4,254,705  | 4,365,392  | 4,496,532  | 4,590,015  |
| Daily BaseLoad Therms                 | 2,656     | 2,431     | 2,579      | 2,797      | 2,852      | 2,867      | 2,909      | 2,900      | 3,008      | 3,079      |
| Peak Day Therms                       | 36,631    | 37,675    | 38,726     | 39,801     | 39,961     | 41,032     | 43,100     | 44,235     | 45,376     | 46,539     |
| Therms Per Residential Customer       | 586       | 584       | 584        | 584        | 587        | 584        | 584        | 584        | 586        | 584        |
| Therms Per Commercial Customer        | 3,486     | 3,469     | 3,465      | 3,464      | 3,479      | 3,461      | 3,458      | 3,457      | 3,469      | 3,453      |
| Therms Per Industrial Customer        | 6,748     | 6,719     | 6,717      | 6,717      | 6,748      | 6,719      | 6,719      | 6,719      | 6,746      | 6,719      |
| Residential Customers                 | 2,751     | 2,904     | 3,056      | 3,210      | 3,366      | 3,525      | 3,686      | 3,850      | 4,016      | 4,184      |
| Commercial Customers                  | 524       | 529       | 533        | 538        | 542        | 546        | 551        | 555        | 560        | 564        |
| Industrial Customers                  | 29        | 29        | 29         | 29         | 29         | 29         | 29         | 30         | 30         | 30         |
| Interruptible Customers               | -         | -         | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 3,305     | 3,462     | 3,618      | 3,776      | 3,937      | 4,101      | 4,267      | 4,435      | 4,605      | 4,778      |
| <b>Redmond</b>                        | 2020      | 2021      | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| <b>Total Therms Pct. Growth</b>       |           | 4.82%     | 4.86%      | 4.75%      | 5.17%      | 3.97%      | 4.36%      | 4.25%      | 4.57%      | 3.58%      |
| Residential Therms                    | 4,399,746 | 4,644,646 | 4,929,487  | 5,221,272  | 5,537,917  | 5,802,553  | 6,099,769  | 6,401,893  | 6,727,501  | 7,020,397  |
| Commercial Therms                     | 3,925,961 | 4,044,611 | 4,165,232  | 4,288,904  | 4,437,086  | 4,541,006  | 4,685,020  | 4,796,635  | 4,947,602  | 5,056,775  |
| Industrial Therms                     | 808,218   | 875,409   | 945,874    | 1,018,284  | 1,097,505  | 1,168,993  | 1,246,744  | 1,326,034  | 1,412,336  | 1,489,661  |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 9,143,945 | 9,584,507 | 10,050,593 | 10,528,459 | 11,072,508 | 11,512,551 | 12,014,532 | 12,524,562 | 13,097,439 | 13,566,823 |
| Daily BaseLoad Therms                 | 7,113     | 7,442     | 6,298      | 7,832      | 8,205      | 8,340      | 8,585      | 8,933      | 9,059      | 9,430      |
| Peak Day Therms                       | 92,134    | 96,625    | 101,190    | 105,835    | 106,771    | 111,399    | 120,216    | 125,157    | 130,167    | 135,247    |
| Therms Per Residential Customer       | 750       | 747       | 747        | 747        | 751        | 747        | 747        | 747        | 750        | 747        |
| Therms Per Commercial Customer        | 3,233     | 3,218     | 3,215      | 3,214      | 3,230      | 3,212      | 3,211      | 3,210      | 3,223      | 3,208      |
| Therms Per Industrial Customer        | 38,897    | 38,768    | 38,761     | 38,763     | 38,937     | 38,779     | 38,781     | 38,783     | 38,928     | 38,787     |
| Residential Customers                 | 5,869     | 6,242     | 6,612      | 6,990      | 7,374      | 7,765      | 8,163      | 8,567      | 8,978      | 9,395      |
| Commercial Customers                  | 1,218     | 1,257     | 1,295      | 1,334      | 1,374      | 1,414      | 1,454      | 1,494      | 1,535      | 1,576      |
| Industrial Customers                  | 21        | 23        | 24         | 26         | 28         | 30         | 32         | 34         | 36         | 38         |
| Interruptible Customers               | -         | -         | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 7,107     | 7,521     | 7,932      | 8,350      | 8,776      | 9,209      | 9,649      | 10,095     | 10,549     | 11,010     |

**Appendix B  
Demand Forecast  
High Scenario**

|                                       | 2020      | 2021      | 2022      | 2023      | 2024      | 2025      | 2026      | 2027      | 2028      | 2029      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Stanfield</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              |           | 1.84%     | 2.10%     | 2.08%     | 2.57%     | 1.54%     | 2.01%     | 1.98%     | 2.45%     | 1.46%     |
| Residential Therms                    | 202,518   | 207,910   | 213,757   | 219,676   | 226,819   | 231,738   | 237,817   | 243,951   | 251,362   | 256,414   |
| Commercial Therms                     | 80,452    | 80,274    | 80,469    | 80,667    | 81,255    | 81,074    | 81,275    | 81,474    | 82,045    | 81,874    |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 282,969   | 288,184   | 294,226   | 300,343   | 308,074   | 312,812   | 319,093   | 325,425   | 333,407   | 338,288   |
| Daily BaseLoad Therms                 | 200       | 203       | 205       | 206       | 209       | 212       | 215       | 218       | 218       | 219       |
| Peak Day Therms                       | 3,201     | 3,271     | 3,341     | 3,412     | 3,457     | 3,528     | 3,628     | 3,701     | 3,776     | 3,851     |
| Therms Per Residential Customer       | 578       | 576       | 576       | 576       | 579       | 576       | 576       | 576       | 578       | 576       |
| Therms Per Commercial Customer        | 2,172     | 2,162     | 2,162     | 2,162     | 2,172     | 2,162     | 2,162     | 2,162     | 2,162     | 2,162     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 350       | 361       | 371       | 382       | 392       | 402       | 413       | 424       | 435       | 445       |
| Commercial Customers                  | 37        | 37        | 37        | 37        | 37        | 38        | 38        | 38        | 38        | 38        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 388       | 398       | 408       | 419       | 429       | 440       | 451       | 461       | 472       | 483       |
| <b>Stearns (Sunriver)</b>             |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              |           | 1.00%     | 1.39%     | 1.37%     | 1.82%     | 0.89%     | 1.34%     | 1.33%     | 1.78%     | 0.94%     |
| Residential Therms                    | 3,762,066 | 3,812,384 | 3,877,926 | 3,943,712 | 4,028,856 | 4,076,443 | 4,143,320 | 4,210,561 | 4,298,852 | 4,346,328 |
| Commercial Therms                     | 1,078,620 | 1,077,284 | 1,080,017 | 1,082,701 | 1,089,393 | 1,088,017 | 1,090,701 | 1,093,384 | 1,100,268 | 1,098,751 |
| Industrial Therms                     | 45,065    | 45,000    | 45,151    | 45,245    | 45,515    | 45,449    | 45,598    | 45,693    | 45,966    | 45,897    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 4,885,750 | 4,934,668 | 5,003,094 | 5,071,658 | 5,163,764 | 5,209,909 | 5,279,619 | 5,349,637 | 5,445,087 | 5,490,976 |
| Daily BaseLoad Therms                 | 5,017     | 4,976     | 5,009     | 5,136     | 5,165     | 5,201     | 5,238     | 5,280     | 5,321     | 5,354     |
| Peak Day Therms                       | 41,342    | 41,958    | 42,578    | 43,202    | 44,016    | 44,648    | 45,094    | 45,732    | 46,374    | 47,017    |
| Therms Per Residential Customer       | 1,001     | 997       | 997       | 997       | 1,001     | 997       | 997       | 997       | 1,001     | 997       |
| Therms Per Commercial Customer        | 4,810     | 4,792     | 4,792     | 4,792     | 4,810     | 4,792     | 4,792     | 4,792     | 4,810     | 4,792     |
| Therms Per Industrial Customer        | 15,005    | 14,950    | 14,951    | 14,949    | 15,005    | 14,950    | 14,949    | 14,949    | 15,005    | 14,950    |
| Residential Customers                 | 3,758     | 3,825     | 3,891     | 3,957     | 4,023     | 4,090     | 4,157     | 4,225     | 4,293     | 4,361     |
| Commercial Customers                  | 224       | 225       | 225       | 226       | 227       | 228       | 228       | 228       | 229       | 229       |
| Industrial Customers                  | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 3,986     | 4,053     | 4,119     | 4,186     | 4,253     | 4,320     | 4,388     | 4,456     | 4,525     | 4,593     |
| <b>Pronghorn</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              |           | 6.06%     | 5.99%     | 5.81%     | 6.09%     | 5.06%     | 5.35%     | 5.20%     | 5.54%     | 4.45%     |
| Residential Therms                    | 423,606   | 469,396   | 516,281   | 564,566   | 617,082   | 665,383   | 717,794   | 771,517   | 830,660   | 882,932   |
| Commercial Therms                     | 327,650   | 327,372   | 328,245   | 329,048   | 330,923   | 330,634   | 331,460   | 332,263   | 334,290   | 333,896   |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 751,256   | 796,768   | 844,526   | 893,614   | 948,005   | 996,017   | 1,049,254 | 1,103,781 | 1,164,950 | 1,216,828 |
| Daily BaseLoad Therms                 | 974       | 1,006     | 1,032     | 1,061     | 1,088     | 1,117     | 1,145     | 1,178     | 1,204     | 1,233     |
| Peak Day Therms                       | 5,911     | 6,335     | 6,772     | 7,221     | 7,822     | 8,305     | 8,647     | 9,146     | 9,658     | 10,179    |
| Therms Per Residential Customer       | 1,045     | 1,043     | 1,044     | 1,044     | 1,048     | 1,044     | 1,044     | 1,044     | 1,049     | 1,044     |
| Therms Per Commercial Customer        | 9,351     | 9,320     | 9,321     | 9,321     | 9,351     | 9,320     | 9,320     | 9,319     | 9,353     | 9,320     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 405       | 450       | 495       | 541       | 589       | 638       | 688       | 739       | 792       | 846       |
| Commercial Customers                  | 35        | 35        | 35        | 35        | 35        | 35        | 36        | 36        | 36        | 36        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 440       | 485       | 530       | 576       | 624       | 673       | 723       | 775       | 828       | 882       |
| <b>North Bend</b>                     |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              |           | -0.25%    | 0.66%     | 0.33%     | 0.25%     | -0.15%    | 0.68%     | -0.01%    | 0.43%     | -0.04%    |
| Residential Therms                    | 5,938     | 5,930     | 5,944     | 5,969     | 6,000     | 5,999     | 6,014     | 6,019     | 6,054     | 6,061     |
| Commercial Therms                     | 47,087    | 46,908    | 47,347    | 47,407    | 47,552    | 47,415    | 47,863    | 47,802    | 47,967    | 47,879    |
| Industrial Therms                     | 14,463    | 14,480    | 14,475    | 14,618    | 14,613    | 14,651    | 14,650    | 14,696    | 14,790    | 14,845    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 67,488    | 67,319    | 67,764    | 67,993    | 68,165    | 68,065    | 68,527    | 68,517    | 68,811    | 68,786    |
| Daily BaseLoad Therms                 | 11        | 8         | (10)      | 11        | 11        | 11        | 11        | 8         | 11        | 11        |
| Peak Day Therms                       | 337       | 338       | 340       | 341       | 338       | 339       | 343       | 344       | 344       | 344       |
| Therms Per Residential Customer       | 1,483     | 1,477     | 1,477     | 1,479     | 1,483     | 1,479     | 1,479     | 1,477     | 1,482     | 1,480     |
| Therms Per Commercial Customer        | 574       | 530       | 499       | 467       | 440       | 413       | 393       | 371       | 352       | 334       |
| Therms Per Industrial Customer        | 7,232     | 7,204     | 7,202     | 7,236     | 7,234     | 7,217     | 7,217     | 7,204     | 7,250     | 7,242     |
| Residential Customers                 | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         |
| Commercial Customers                  | 82        | 89        | 95        | 101       | 108       | 115       | 122       | 129       | 136       | 144       |
| Industrial Customers                  | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 88        | 95        | 101       | 107       | 114       | 121       | 128       | 135       | 142       | 150       |

**Appendix B  
Demand Forecast  
High Scenario**

| Bend Loop                             | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>       |            | 3.26%      | 3.47%      | 3.40%      | 3.83%      | 2.79%      | 3.21%      | 3.15%      | 3.56%      | 2.56%      |
| Residential Therms                    | 26,146,815 | 27,282,451 | 28,491,298 | 29,719,846 | 31,115,803 | 32,231,142 | 33,510,729 | 34,806,818 | 36,285,215 | 37,447,459 |
| Commercial Therms                     | 12,421,255 | 12,514,579 | 12,658,038 | 12,802,745 | 13,009,499 | 13,095,044 | 13,241,879 | 13,388,846 | 13,597,004 | 13,684,418 |
| Industrial Therms                     | 361,708    | 401,124    | 442,370    | 484,970    | 531,080    | 574,199    | 620,571    | 668,112    | 719,569    | 766,809    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 38,929,778 | 40,198,154 | 41,591,706 | 43,007,540 | 44,656,382 | 45,900,385 | 47,373,179 | 48,863,776 | 50,601,788 | 51,898,687 |
| Daily BaseLoad Therms                 | 33,686     | 34,056     | 34,486     | 35,921     | 36,824     | 37,464     | 38,200     | 39,039     | 39,699     | 40,583     |
| Peak Day Therms                       | 362,563    | 375,298    | 388,216    | 401,300    | 410,657    | 423,955    | 441,579    | 455,334    | 469,252    | 483,331    |
| Therms Per Residential Customer       | 744        | 741        | 741        | 741        | 744        | 741        | 741        | 741        | 744        | 741        |
| Therms Per Commercial Customer        | 2,919      | 2,905      | 2,903      | 2,902      | 2,915      | 2,900      | 2,899      | 2,898      | 2,910      | 2,896      |
| Therms Per Industrial Customer        | 12,381     | 12,341     | 12,340     | 12,341     | 12,390     | 12,343     | 12,343     | 12,343     | 12,389     | 12,343     |
| Residential Customers                 | 35,165     | 36,820     | 38,455     | 40,113     | 41,795     | 43,499     | 45,226     | 46,975     | 48,746     | 50,539     |
| Commercial Customers                  | 4,256      | 4,309      | 4,360      | 4,412      | 4,464      | 4,516      | 4,568      | 4,620      | 4,673      | 4,726      |
| Industrial Customers                  | 29         | 33         | 36         | 39         | 43         | 47         | 50         | 54         | 58         | 62         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 39,450     | 41,161     | 42,851     | 44,564     | 46,301     | 48,061     | 49,844     | 51,650     | 53,477     | 55,327     |
| <b>McCleary (Aberdeen/Hoquiam)</b>    | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| <b>Total Therms Pct. Growth</b>       |            | 0.22%      | 0.61%      | 0.70%      | 1.16%      | 0.21%      | 0.63%      | 0.69%      | 1.05%      | 0.26%      |
| Residential Therms                    | 2,610,934  | 2,628,412  | 2,658,732  | 2,690,013  | 2,736,508  | 2,753,815  | 2,785,485  | 2,817,275  | 2,862,263  | 2,881,167  |
| Commercial Therms                     | 2,960,317  | 2,955,954  | 2,960,637  | 2,969,695  | 2,989,894  | 2,985,397  | 2,991,058  | 3,000,122  | 3,017,488  | 3,014,839  |
| Industrial Therms                     | 279,342    | 278,865    | 279,444    | 280,156    | 282,133    | 281,643    | 282,320    | 283,032    | 284,725    | 284,421    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 5,850,593  | 5,863,231  | 5,898,814  | 5,939,865  | 6,008,535  | 6,020,855  | 6,058,864  | 6,100,429  | 6,164,475  | 6,180,428  |
| Daily BaseLoad Therms                 | 5,980      | 6,050      | 6,020      | 6,007      | 6,066      | 6,055      | 6,078      | 6,149      | 6,088      | 6,138      |
| Peak Day Therms                       | 49,926     | 50,296     | 50,649     | 51,022     | 49,431     | 49,792     | 52,109     | 52,487     | 52,847     | 53,226     |
| Therms Per Residential Customer       | 721        | 717        | 717        | 717        | 721        | 717        | 717        | 717        | 720        | 717        |
| Therms Per Commercial Customer        | 4,079      | 4,062      | 4,059      | 4,061      | 4,079      | 4,062      | 4,060      | 4,062      | 4,076      | 4,062      |
| Therms Per Industrial Customer        | 19,930     | 19,846     | 19,839     | 19,839     | 19,930     | 19,846     | 19,846     | 19,846     | 19,917     | 19,846     |
| Residential Customers                 | 3,623      | 3,666      | 3,710      | 3,754      | 3,797      | 3,842      | 3,886      | 3,930      | 3,975      | 4,020      |
| Commercial Customers                  | 726        | 729        | 729        | 731        | 733        | 735        | 737        | 739        | 740        | 742        |
| Industrial Customers                  | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 4,363      | 4,408      | 4,453      | 4,499      | 4,545      | 4,591      | 4,637      | 4,683      | 4,730      | 4,776      |
| <b>Acme</b>                           | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| <b>Total Therms Pct. Growth</b>       |            | -0.24%     | 0.25%      | 0.25%      | 0.74%      | -0.24%     | 0.26%      | 0.24%      | 0.71%      | -0.23%     |
| Residential Therms                    | 55,669     | 55,538     | 55,672     | 55,811     | 56,225     | 56,092     | 56,230     | 56,369     | 56,772     | 56,645     |
| Commercial Therms                     | 31,908     | 31,828     | 31,913     | 31,990     | 32,226     | 32,145     | 32,232     | 32,310     | 32,540     | 32,462     |
| Industrial Therms                     | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 87,576     | 87,366     | 87,585     | 87,801     | 88,451     | 88,237     | 88,463     | 88,678     | 89,312     | 89,107     |
| Daily BaseLoad Therms                 | 64         | 64         | 64         | 64         | 64         | 64         | 64         | 64         | 64         | 64         |
| Peak Day Therms                       | 731        | 733        | 735        | 737        | 732        | 733        | 742        | 744        | 746        | 748        |
| Therms Per Residential Customer       | 818        | 814        | 814        | 814        | 818        | 814        | 814        | 814        | 818        | 814        |
| Therms Per Industrial Customer        | 3,541      | 3,524      | 3,524      | 3,524      | 3,541      | 3,524      | 3,524      | 3,524      | 3,541      | 3,524      |
| Therms Per Commercial Customer        | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Residential Customers                 | 68         | 68         | 68         | 69         | 69         | 69         | 69         | 69         | 69         | 70         |
| Commercial Customers                  | 9          | 9          | 9          | 9          | 9          | 9          | 9          | 9          | 9          | 9          |
| Industrial Customers                  | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 77         | 77         | 77         | 78         | 78         | 78         | 78         | 78         | 79         | 79         |
| <b>Arlington</b>                      | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| <b>Total Therms Pct. Growth</b>       |            | 1.59%      | 1.94%      | 1.94%      | 2.44%      | 1.44%      | 1.90%      | 1.88%      | 2.31%      | 1.42%      |
| Residential Therms                    | 3,336,652  | 3,348,690  | 3,374,943  | 3,401,981  | 3,446,441  | 3,457,122  | 3,484,388  | 3,511,724  | 3,554,763  | 3,566,704  |
| Commercial Therms                     | 1,992,800  | 2,036,873  | 2,087,182  | 2,138,356  | 2,200,680  | 2,242,691  | 2,295,111  | 2,347,943  | 2,411,316  | 2,455,021  |
| Industrial Therms                     | 455,301    | 491,014    | 528,167    | 566,291    | 608,210    | 645,509    | 686,257    | 727,816    | 773,324    | 813,472    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 5,784,753  | 5,876,577  | 5,990,292  | 6,106,629  | 6,255,331  | 6,345,322  | 6,465,756  | 6,587,483  | 6,739,402  | 6,835,197  |
| Daily BaseLoad Therms                 | 5,522      | 5,641      | 5,684      | 5,763      | 5,879      | 5,916      | 5,995      | 6,116      | 6,156      | 6,280      |
| Peak Day Therms                       | 45,004     | 45,852     | 46,712     | 47,580     | 47,109     | 47,972     | 50,263     | 51,159     | 52,083     | 53,009     |
| Therms Per Residential Customer       | 695        | 691        | 691        | 691        | 695        | 691        | 691        | 691        | 694        | 691        |
| Therms Per Commercial Customer        | 3,166      | 3,154      | 3,153      | 3,153      | 3,168      | 3,153      | 3,153      | 3,153      | 3,166      | 3,153      |
| Therms Per Industrial Customer        | 13,958     | 13,917     | 13,913     | 13,913     | 13,976     | 13,915     | 13,915     | 13,915     | 13,969     | 13,914     |
| Residential Customers                 | 4,804      | 4,844      | 4,883      | 4,922      | 4,961      | 5,001      | 5,040      | 5,080      | 5,120      | 5,159      |
| Commercial Customers                  | 629        | 646        | 662        | 678        | 695        | 711        | 728        | 745        | 762        | 779        |
| Industrial Customers                  | 33         | 35         | 38         | 41         | 44         | 46         | 49         | 52         | 55         | 58         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 5,466      | 5,525      | 5,583      | 5,641      | 5,700      | 5,758      | 5,817      | 5,877      | 5,936      | 5,996      |
| <b>Bremerton (Shelton)</b>            | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
| <b>Total Therms Pct. Growth</b>       |            | 1.25%      | 1.59%      | 1.59%      | 2.02%      | 1.10%      | 1.54%      | 1.54%      | 1.95%      | 1.06%      |
| Residential Therms                    | 23,652,097 | 24,183,625 | 24,806,367 | 25,431,959 | 26,192,425 | 26,700,508 | 27,341,583 | 27,987,705 | 28,775,473 | 29,294,864 |
| Commercial Therms                     | 21,953,940 | 21,925,363 | 22,077,557 | 22,236,161 | 22,488,265 | 22,552,043 | 22,707,750 | 22,868,344 | 23,120,487 | 23,186,516 |
| Industrial Therms                     | 446,816    | 445,760    | 446,856    | 447,953    | 451,280    | 450,202    | 451,328    | 452,425    | 455,682    | 454,644    |
| Ind., Inst., & Cmcl. Interrup. Therms | 2,562,208  | 2,561,115  | 2,569,434  | 2,577,942  | 2,587,830  | 2,586,441  | 2,595,150  | 2,603,658  | 2,613,049  | 2,612,167  |
| <b>Total Core Therms</b>              | 48,515,062 | 49,119,863 | 49,900,213 | 50,694,015 | 51,719,800 | 52,289,393 | 53,095,810 | 53,912,133 | 54,964,710 | 55,548,191 |
| Daily BaseLoad Therms                 | 51,332     | 51,835     | 52,147     | 52,566     | 53,120     | 53,429     | 53,848     | 54,358     | 54,663     | 55,199     |
| Peak Day Therms                       | 381,992    | 388,711    | 395,416    | 402,235    | 405,411    | 412,273    | 422,804    | 429,818    | 436,762    | 443,871    |
| Therms Per Residential Customer       | 694        | 691        | 691        | 691        | 694        | 691        | 691        | 691        | 694        | 691        |
| Therms Per Commercial Customer        | 7,024      | 6,964      | 6,933      | 6,904      | 6,904      | 6,847      | 6,818      | 6,791      | 6,791      | 6,737      |
| Therms Per Industrial Customer        | 29,753     | 29,609     | 29,608     | 29,607     | 29,753     | 29,609     | 29,610     | 29,609     | 29,749     | 29,609     |
| Residential Customers                 | 34,092     | 35,007     | 35,906     | 36,812     | 37,725     | 38,646     | 39,574     | 40,510     | 41,453     | 42,403     |
| Commercial Customers                  | 3,111      | 3,148      | 3,184      | 3,221      | 3,257      | 3,294      | 3,331      | 3,367      | 3,404      | 3,442      |
| Industrial Customers                  | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         |
| Interruptible Customers               | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| <b>Total Core Customers</b>           | 37,221     | 38,173     | 39,108     | 40,050     | 41,000     | 41,958     | 42,923     | 43,896     | 44,876     | 45,863     |





**Appendix B  
Demand Forecast  
High Scenario**

|                                       | 2020      | 2021      | 2022      | 2023      | 2024      | 2025      | 2026      | 2027      | 2028      | 2029      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Patterson</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -         | -0.22%    | 0.97%     | -0.02%    | 0.30%     | -0.27%    | 0.97%     | 0.04%     | 0.21%     | -0.19%    |
| Residential Therms                    | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Commercial Therms                     | 256,985   | 256,425   | 258,900   | 258,841   | 259,624   | 258,911   | 261,420   | 261,517   | 262,054   | 261,545   |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 256,985   | 256,425   | 258,900   | 258,841   | 259,624   | 258,911   | 261,420   | 261,517   | 262,054   | 261,545   |
| Daily BaseLoad Therms                 | 227       | 200       | 193       | 227       | 227       | 227       | 227       | 200       | 227       | 227       |
| Peak Day Therms                       | 1,292     | 1,292     | 1,304     | 1,304     | 1,270     | 1,270     | 1,317     | 1,317     | 1,318     | 1,318     |
| Therms Per Residential Customer       | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Therms Per Commercial Customer        | 51,346    | 51,132    | 51,420    | 51,306    | 51,360    | 51,118    | 51,410    | 51,328    | 51,333    | 51,133    |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Commercial Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| <b>Prosser</b>                        |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -         | -0.20%    | 0.22%     | 0.25%     | 0.84%     | -0.31%    | 0.26%     | 0.24%     | 0.69%     | -0.21%    |
| Residential Therms                    | 261,677   | 260,702   | 261,242   | 261,891   | 264,292   | 263,300   | 263,949   | 264,598   | 266,484   | 265,897   |
| Commercial Therms                     | 494,654   | 493,290   | 494,272   | 495,503   | 499,636   | 498,202   | 499,425   | 500,655   | 504,092   | 503,117   |
| Industrial Therms                     | 228,954   | 228,343   | 228,942   | 229,475   | 231,240   | 230,618   | 231,343   | 231,877   | 233,273   | 232,894   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 985,325   | 982,336   | 984,455   | 986,868   | 995,168   | 992,120   | 994,717   | 997,130   | 1,004,049 | 1,001,908 |
| Daily BaseLoad Therms                 | 1,018     | 1,033     | 1,019     | 1,019     | 1,014     | 1,018     | 1,018     | 1,018     | 1,019     | 1,030     |
| Peak Day Therms                       | 9,566     | 9,589     | 9,615     | 9,638     | 9,186     | 9,208     | 9,711     | 9,734     | 9,757     | 9,780     |
| Therms Per Residential Customer       | 587       | 584       | 584       | 584       | 588       | 584       | 584       | 584       | 588       | 585       |
| Therms Per Commercial Customer        | 3,657     | 3,637     | 3,636     | 3,636     | 3,657     | 3,637     | 3,637     | 3,637     | 3,653     | 3,637     |
| Therms Per Industrial Customer        | 45,737    | 45,509    | 45,500    | 45,501    | 45,737    | 45,509    | 45,525    | 45,526    | 45,687    | 45,509    |
| Residential Customers                 | 446       | 447       | 448       | 449       | 450       | 451       | 452       | 453       | 454       | 455       |
| Commercial Customers                  | 135       | 136       | 136       | 136       | 137       | 137       | 137       | 138       | 138       | 138       |
| Industrial Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 586       | 587       | 589       | 590       | 591       | 593       | 594       | 596       | 597       | 598       |
| <b>Quincy</b>                         |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -         | -0.25%    | 0.51%     | 0.16%     | 0.58%     | -0.25%    | 0.52%     | 0.16%     | 0.55%     | -0.23%    |
| Residential Therms                    | 26,135    | 26,071    | 26,133    | 26,199    | 26,396    | 26,331    | 26,396    | 26,461    | 26,552    | 26,590    |
| Commercial Therms                     | 686,061   | 684,231   | 688,101   | 689,055   | 692,917   | 691,059   | 694,998   | 695,952   | 699,633   | 697,887   |
| Industrial Therms                     | 107,700   | 107,556   | 107,813   | 108,081   | 108,775   | 108,628   | 108,896   | 109,163   | 109,828   | 109,699   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 819,896   | 817,858   | 822,047   | 823,334   | 828,088   | 826,017   | 830,289   | 831,576   | 836,113   | 834,177   |
| Daily BaseLoad Therms                 | 1,381     | 1,384     | 1,381     | 1,381     | 1,380     | 1,381     | 1,381     | 1,384     | 1,381     | 1,383     |
| Peak Day Therms                       | 6,117     | 6,129     | 6,155     | 6,166     | 6,096     | 6,107     | 6,216     | 6,227     | 6,240     | 6,251     |
| Therms Per Residential Customer       | 428       | 426       | 426       | 426       | 428       | 426       | 426       | 426       | 428       | 426       |
| Therms Per Commercial Customer        | 9,260     | 9,213     | 9,241     | 9,232     | 9,260     | 9,214     | 9,242     | 9,233     | 9,259     | 9,214     |
| Therms Per Industrial Customer        | 26,891    | 26,789    | 26,786    | 26,786    | 26,891    | 26,789    | 26,789    | 26,789    | 26,886    | 26,789    |
| Residential Customers                 | 61        | 61        | 61        | 62        | 62        | 62        | 62        | 62        | 62        | 62        |
| Commercial Customers                  | 74        | 74        | 74        | 75        | 75        | 75        | 75        | 75        | 76        | 76        |
| Industrial Customers                  | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 139       | 140       | 140       | 140       | 141       | 141       | 141       | 142       | 142       | 142       |
| <b>Sunnyside</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -         | 0.05%     | 0.48%     | 0.51%     | 0.99%     | 0.03%     | 0.49%     | 0.51%     | 0.93%     | 0.06%     |
| Residential Therms                    | 1,084,445 | 1,081,337 | 1,083,842 | 1,086,533 | 1,095,276 | 1,092,110 | 1,094,805 | 1,097,498 | 1,105,723 | 1,102,884 |
| Commercial Therms                     | 1,720,290 | 1,725,806 | 1,738,083 | 1,751,465 | 1,773,171 | 1,777,925 | 1,790,667 | 1,804,198 | 1,825,277 | 1,830,586 |
| Industrial Therms                     | 587,163   | 586,556   | 587,901   | 589,384   | 593,027   | 592,399   | 593,883   | 595,367   | 598,612   | 598,243   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 3,391,897 | 3,393,699 | 3,409,826 | 3,427,382 | 3,461,474 | 3,462,435 | 3,479,355 | 3,497,063 | 3,529,611 | 3,531,713 |
| Daily BaseLoad Therms                 | 2,361     | 2,104     | 2,063     | 2,419     | 2,422     | 2,435     | 2,413     | 2,150     | 2,464     | 2,483     |
| Peak Day Therms                       | 34,093    | 34,273    | 34,444    | 34,628    | 34,145    | 34,323    | 35,158    | 35,342    | 35,516    | 35,700    |
| Therms Per Residential Customer       | 562       | 560       | 561       | 562       | 567       | 565       | 566       | 567       | 571       | 570       |
| Therms Per Commercial Customer        | 3,277     | 3,260     | 3,258     | 3,257     | 3,271     | 3,254     | 3,252     | 3,251     | 3,264     | 3,248     |
| Therms Per Industrial Customer        | 34,500    | 34,379    | 34,370    | 34,371    | 34,500    | 34,379    | 34,378    | 34,379    | 34,484    | 34,378    |
| Residential Customers                 | 1,931     | 1,932     | 1,933     | 1,933     | 1,934     | 1,934     | 1,934     | 1,935     | 1,935     | 1,935     |
| Commercial Customers                  | 525       | 529       | 534       | 538       | 542       | 546       | 551       | 555       | 559       | 564       |
| Industrial Customers                  | 17        | 17        | 17        | 17        | 17        | 17        | 17        | 17        | 17        | 17        |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 2,473     | 2,478     | 2,483     | 2,488     | 2,492     | 2,497     | 2,502     | 2,507     | 2,512     | 2,516     |
| <b>Moses Lake</b>                     |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | -         | 0.81%     | 1.24%     | 1.25%     | 1.76%     | 0.73%     | 1.23%     | 1.22%     | 1.68%     | 0.73%     |
| Residential Therms                    | 304,286   | 303,404   | 304,110   | 304,864   | 307,326   | 306,427   | 307,184   | 307,938   | 310,262   | 309,450   |
| Commercial Therms                     | 2,604,730 | 2,630,294 | 2,667,145 | 2,704,715 | 2,756,878 | 2,781,116 | 2,819,493 | 2,858,122 | 2,910,554 | 2,936,096 |
| Industrial Therms                     | 131,277   | 131,155   | 131,505   | 131,826   | 132,588   | 132,461   | 132,830   | 133,151   | 133,863   | 133,768   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 3,040,294 | 3,064,853 | 3,102,760 | 3,141,406 | 3,196,792 | 3,220,004 | 3,259,507 | 3,299,211 | 3,354,679 | 3,379,313 |
| Daily BaseLoad Therms                 | 3,731     | 3,774     | 3,790     | 3,823     | 3,855     | 3,892     | 3,924     | 3,968     | 3,984     | 4,031     |
| Peak Day Therms                       | 29,983    | 30,357    | 30,735    | 31,116    | 30,943    | 31,320    | 32,271    | 32,662    | 33,056    | 33,449    |
| Therms Per Residential Customer       | 424       | 422       | 422       | 423       | 426       | 424       | 425       | 425       | 428       | 427       |
| Therms Per Commercial Customer        | 6,747     | 6,652     | 6,594     | 6,538     | 6,518     | 6,433     | 6,383     | 6,335     | 6,318     | 6,243     |
| Therms Per Industrial Customer        | 18,734    | 18,670    | 18,669    | 18,670    | 18,734    | 18,670    | 18,671    | 18,673    | 18,729    | 18,670    |
| Residential Customers                 | 718       | 719       | 720       | 721       | 722       | 722       | 723       | 724       | 725       | 726       |
| Commercial Customers                  | 386       | 395       | 405       | 414       | 423       | 432       | 442       | 451       | 461       | 470       |
| Industrial Customers                  | 7         | 7         | 7         | 7         | 7         | 7         | 7         | 7         | 7         | 7         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 1,111     | 1,122     | 1,132     | 1,142     | 1,152     | 1,162     | 1,172     | 1,182     | 1,193     | 1,203     |





**Appendix B  
Demand Forecast  
High Scenario**

| 7th Day School                        | 2020              | 2021              | 2022              | 2023              | 2024              | 2025              | 2026              | 2027              | 2028              | 2029              |
|---------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| <b>Total Therms Pct. Growth</b>       |                   | 0.09%             | 0.32%             | -0.16%            | 0.25%             | -0.25%            | 0.30%             | 0.14%             | 0.10%             | -0.26%            |
| Residential Therms                    | 8,800             | 8,798             | 8,820             | 8,842             | 8,887             | 8,886             | 8,908             | 8,930             | 8,975             | 8,973             |
| Commercial Therms                     | 11,689            | 11,686            | 11,663            | 11,639            | 11,655            | 11,594            | 11,566            | 11,540            | 11,557            | 11,494            |
| Industrial Therms                     | 9,634             | 9,666             | 9,763             | 9,717             | 9,730             | 9,717             | 9,813             | 9,859             | 9,827             | 9,812             |
| Ind., Inst., & Cmcl. Interrup. Therms | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Therms</b>              | <b>30,122</b>     | <b>30,150</b>     | <b>30,246</b>     | <b>30,197</b>     | <b>30,272</b>     | <b>30,197</b>     | <b>30,286</b>     | <b>30,328</b>     | <b>30,359</b>     | <b>30,280</b>     |
| Daily BaseLoad Therms                 | 28                | 28                | 28                | 28                | 28                | 28                | 28                | 28                | 28                | 28                |
| Peak Day Therms                       | 131               | 131               | 131               | 131               | 132               | 132               | 132               | 132               | 131               | 131               |
| Therms Per Residential Customer       | 1,099             | 1,096             | 1,096             | 1,096             | 1,099             | 1,096             | 1,096             | 1,096             | 1,099             | 1,096             |
| Therms Per Commercial Customer        | 2,232             | 2,228             | 2,227             | 2,227             | 2,235             | 2,228             | 2,228             | 2,227             | 2,228             | 2,227             |
| Therms Per Industrial Customer        | 9,634             | 9,666             | 9,666             | 9,621             | 9,634             | 9,621             | 9,621             | 9,666             | 9,634             | 9,620             |
| Residential Customers                 | 8                 | 8                 | 8                 | 8                 | 8                 | 8                 | 8                 | 8                 | 8                 | 8                 |
| Commercial Customers                  | 5                 | 5                 | 5                 | 5                 | 5                 | 5                 | 5                 | 5                 | 5                 | 5                 |
| Industrial Customers                  | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 |
| Interruptible Customers               | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Customers</b>           | <b>14</b>         | <b>14</b>         | <b>14</b>         | <b>14</b>         | <b>14</b>         | <b>14</b>         | <b>14</b>         | <b>14</b>         | <b>14</b>         | <b>14</b>         |
| <b>Yakima Training Center</b>         | <b>2020</b>       | <b>2021</b>       | <b>2022</b>       | <b>2023</b>       | <b>2024</b>       | <b>2025</b>       | <b>2026</b>       | <b>2027</b>       | <b>2028</b>       | <b>2029</b>       |
| <b>Total Therms Pct. Growth</b>       |                   | 1.04%             | 1.46%             | 1.45%             | 1.94%             | 0.92%             | 1.42%             | 1.40%             | 1.91%             | 0.97%             |
| Residential Therms                    | 19,710            | 20,822            | 21,937            | 23,072            | 24,341            | 25,401            | 26,593            | 27,803            | 29,149            | 30,278            |
| Commercial Therms                     | 364,671           | 367,559           | 372,121           | 376,698           | 383,203           | 385,901           | 390,535           | 395,112           | 401,896           | 404,541           |
| Industrial Therms                     | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| Ind., Inst., & Cmcl. Interrup. Therms | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Therms</b>              | <b>384,382</b>    | <b>388,381</b>    | <b>394,058</b>    | <b>399,770</b>    | <b>407,544</b>    | <b>411,302</b>    | <b>417,128</b>    | <b>422,975</b>    | <b>431,065</b>    | <b>434,819</b>    |
| Daily BaseLoad Therms                 | 230               | 232               | 234               | 237               | 239               | 241               | 244               | 246               | 248               | 251               |
| Peak Day Therms                       | 4,402             | 4,466             | 4,530             | 4,594             | 4,673             | 4,738             | 4,790             | 4,856             | 4,923             | 4,990             |
| Therms Per Residential Customer       | 800               | 799               | 799               | 798               | 802               | 798               | 798               | 798               | 802               | 798               |
| Therms Per Commercial Customer        | 3,333             | 3,317             | 3,318             | 3,318             | 3,334             | 3,317             | 3,317             | 3,317             | 3,334             | 3,317             |
| Therms Per Industrial Customer        | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| Residential Customers                 | 25                | 26                | 27                | 29                | 30                | 32                | 33                | 35                | 36                | 38                |
| Commercial Customers                  | 109               | 111               | 112               | 114               | 115               | 116               | 118               | 119               | 121               | 122               |
| Industrial Customers                  | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| Interruptible Customers               | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Customers</b>           | <b>134</b>        | <b>137</b>        | <b>140</b>        | <b>142</b>        | <b>145</b>        | <b>148</b>        | <b>151</b>        | <b>154</b>        | <b>157</b>        | <b>160</b>        |
| <b>Burbank Heights Loop</b>           | <b>2020</b>       | <b>2021</b>       | <b>2022</b>       | <b>2023</b>       | <b>2024</b>       | <b>2025</b>       | <b>2026</b>       | <b>2027</b>       | <b>2028</b>       | <b>2029</b>       |
| <b>Total Therms Pct. Growth</b>       |                   | 4.79%             | 4.92%             | 4.80%             | 5.37%             | 3.82%             | 4.39%             | 4.27%             | 4.80%             | 3.40%             |
| Residential Therms                    | 6,554,803         | 6,938,487         | 7,344,411         | 7,759,502         | 8,239,487         | 8,614,210         | 9,051,773         | 9,496,531         | 10,011,679        | 10,407,010        |
| Commercial Therms                     | 4,786,990         | 4,959,888         | 5,152,528         | 5,349,272         | 5,586,327         | 5,751,343         | 5,955,357         | 6,162,274         | 6,410,738         | 6,582,876         |
| Industrial Therms                     | 272,994           | 272,612           | 273,228           | 273,906           | 275,720           | 275,328           | 276,007           | 276,687           | 278,318           | 278,044           |
| Ind., Inst., & Cmcl. Interrup. Therms | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Therms</b>              | <b>11,614,786</b> | <b>12,170,988</b> | <b>12,770,167</b> | <b>13,382,680</b> | <b>14,101,535</b> | <b>14,640,881</b> | <b>15,283,137</b> | <b>15,935,491</b> | <b>16,700,736</b> | <b>17,269,930</b> |
| Daily BaseLoad Therms                 | 10,434            | 10,822            | 11,089            | 11,347            | 11,739            | 12,167            | 12,514            | 12,917            | 13,058            | 13,180            |
| Peak Day Therms                       | 138,906           | 145,933           | 153,077           | 160,349           | 164,643           | 172,012           | 182,852           | 190,587           | 198,426           | 206,382           |
| Therms Per Residential Customer       | 551               | 548               | 548               | 548               | 552               | 548               | 548               | 548               | 552               | 548               |
| Therms Per Commercial Customer        | 4,042             | 4,012             | 4,002             | 3,994             | 4,013             | 3,980             | 3,973             | 3,966             | 3,984             | 3,954             |
| Therms Per Industrial Customer        | 22,726            | 22,638            | 22,632            | 22,632            | 22,726            | 22,637            | 22,637            | 22,637            | 22,715            | 22,637            |
| Residential Customers                 | 11,907            | 12,656            | 13,399            | 14,157            | 14,909            | 15,714            | 16,512            | 17,324            | 18,148            | 18,965            |
| Commercial Customers                  | 1,184             | 1,236             | 1,287             | 1,339             | 1,392             | 1,445             | 1,499             | 1,554             | 1,609             | 1,665             |
| Industrial Customers                  | 12                | 12                | 12                | 12                | 12                | 12                | 12                | 12                | 12                | 12                |
| Interruptible Customers               | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 | -                 |
| <b>Total Core Customers</b>           | <b>13,103</b>     | <b>13,904</b>     | <b>14,699</b>     | <b>15,509</b>     | <b>16,333</b>     | <b>17,171</b>     | <b>18,023</b>     | <b>18,890</b>     | <b>19,769</b>     | <b>20,662</b>     |
| <b>East Stanwood Loop</b>             | <b>2020</b>       | <b>2021</b>       | <b>2022</b>       | <b>2023</b>       | <b>2024</b>       | <b>2025</b>       | <b>2026</b>       | <b>2027</b>       | <b>2028</b>       | <b>2029</b>       |
| <b>Total Therms Pct. Growth</b>       |                   | 0.91%             | 1.33%             | 1.30%             | 1.78%             | 0.82%             | 1.30%             | 1.26%             | 1.72%             | 0.79%             |
| Residential Therms                    | 5,594,320         | 5,662,459         | 5,752,553         | 5,843,540         | 5,964,668         | 6,027,724         | 6,120,146         | 6,213,035         | 6,336,485         | 6,400,522         |
| Commercial Therms                     | 4,864,109         | 4,897,054         | 4,953,050         | 5,007,241         | 5,086,256         | 5,118,952         | 5,176,391         | 5,231,620         | 5,311,496         | 5,344,993         |
| Industrial Therms                     | 449,339           | 448,979           | 449,934           | 451,428           | 453,837           | 453,463           | 454,447           | 455,942           | 458,278           | 457,948           |
| Ind., Inst., & Cmcl. Interrup. Therms | 95,526            | 95,276            | 96,219            | 96,219            | 96,482            | 96,229            | 97,181            | 97,181            | 97,418            | 97,181            |
| <b>Total Core Therms</b>              | <b>11,003,294</b> | <b>11,103,768</b> | <b>11,251,756</b> | <b>11,398,429</b> | <b>11,601,242</b> | <b>11,696,368</b> | <b>11,848,165</b> | <b>11,991,778</b> | <b>12,203,676</b> | <b>12,300,644</b> |
| Daily BaseLoad Therms                 | 11,394            | 11,502            | 11,564            | 11,651            | 11,730            | 11,829            | 11,916            | 12,026            | 12,086            | 12,202            |
| Peak Day Therms                       | 81,638            | 82,758            | 83,911            | 85,071            | 85,362            | 86,494            | 88,562            | 89,746            | 90,941            | 92,106            |
| Therms Per Residential Customer       | 459               | 456               | 456               | 456               | 459               | 456               | 456               | 456               | 459               | 456               |
| Therms Per Commercial Customer        | 4,961             | 4,917             | 4,897             | 4,876             | 4,879             | 4,837             | 4,819             | 4,800             | 4,803             | 4,764             |
| Therms Per Industrial Customer        | 150,280           | 150,160           | 150,479           | 150,979           | 151,785           | 151,660           | 151,989           | 152,489           | 153,270           | 153,160           |
| Residential Customers                 | 8,489             | 8,630             | 8,768             | 8,907             | 9,046             | 9,187             | 9,327             | 9,469             | 9,612             | 9,755             |
| Commercial Customers                  | 980               | 996               | 1,011             | 1,027             | 1,043             | 1,058             | 1,074             | 1,090             | 1,106             | 1,122             |
| Industrial Customers                  | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 |
| Interruptible Customers               | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 |
| <b>Total Core Customers</b>           | <b>9,473</b>      | <b>9,630</b>      | <b>9,783</b>      | <b>9,938</b>      | <b>10,093</b>     | <b>10,249</b>     | <b>10,406</b>     | <b>10,563</b>     | <b>10,722</b>     | <b>10,881</b>     |
| <b>Kennewick Loop</b>                 | <b>2020</b>       | <b>2021</b>       | <b>2022</b>       | <b>2023</b>       | <b>2024</b>       | <b>2025</b>       | <b>2026</b>       | <b>2027</b>       | <b>2028</b>       | <b>2029</b>       |
| <b>Total Therms Pct. Growth</b>       |                   | 3.88%             | 4.09%             | 4.00%             | 4.54%             | 3.18%             | 3.72%             | 3.63%             | 4.14%             | 2.88%             |
| Residential Therms                    | 10,495,552        | 11,022,780        | 11,605,311        | 12,188,969        | 12,866,564        | 13,386,404        | 13,996,515        | 14,619,515        | 15,344,079        | 15,888,093        |
| Commercial Therms                     | 11,115,776        | 11,458,390        | 11,843,143        | 12,234,110        | 12,703,318        | 13,021,444        | 13,435,882        | 13,844,707        | 14,334,965        | 14,675,115        |
| Industrial Therms                     | 778,381           | 777,156           | 779,028           | 780,891           | 786,156           | 788,900           | 786,909           | 788,773           | 792,654           | 792,643           |
| Ind., Inst., & Cmcl. Interrup. Therms | 208,356           | 207,373           | 209,412           | 209,412           | 210,440           | 209,447           | 211,521           | 211,521           | 212,653           | 212,521           |
| <b>Total Core Therms</b>              | <b>22,598,066</b> | <b>23,475,699</b> | <b>24,436,916</b> | <b>25,413,382</b> | <b>26,566,478</b> | <b>27,412,395</b> | <b>28,432,827</b> | <b>29,464,515</b> | <b>30,685,151</b> | <b>31,567,372</b> |
| Daily BaseLoad Therms                 | 24,068            | 24,731            | 25,245            | 25,751            | 26,402            | 27,114            | 27,738            | 28,418            | 28,787            | 29,129            |
| Peak Day Therms                       | 245,265           | 255,878           | 266,668           | 277,603           | 284,954           | 296,058           | 311,348           | 322,895           | 334,590           | 346,427           |
| Therms Per Residential Customer       | 603               | 601               | 601               | 601               | 605               | 601               | 601               | 601               | 605               | 601               |
| Therms Per Commercial Customer        | 4,259             | 4,228             | 4,216             | 4,205             | 4,219             | 4,186             | 4,177             | 4,168             | 4,183             | 4,152             |
| Therms Per Industrial Customer        | 70,682            | 70,395            | 70,384            | 70,382            | 70,682            | 70,395            | 70,396            | 70,395            | 70,657            | 70,395            |
| Residential Customers                 | 17,396            | 18,361            | 19,317            | 20,289            | 21,277            | 22,281            | 23,300            | 24,334            | 25,383            | 26,446            |
| Commercial Customers                  | 2,610             | 2,710             | 2,809             | 2,909             | 3,011             | 3,113             | 3,217             | 3,321             | 3,427             | 3,534             |
| Industrial Customers                  | 11                | 11                | 11                | 11                | 11                | 11                | 11                | 11                | 11                | 11                |
| Interruptible Customers               | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 |
| <b>Total Core Customers</b>           | <b>20,018</b>     | <b>21,083</b>     | <b>22,138</b>     | <b>23,211</b>     | <b>24,300</b>     | <b>25,406</b>     | <b>26,529</b>     | <b>27,667</b>     | <b>28,822</b>     | <b>29,993</b>     |

**Appendix B  
Demand Forecast  
High Scenario**

|                                       | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Longview South Loop</b>            |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 0.40%      | 0.86%      | 0.87%      | 1.44%      | 0.35%      | 0.91%      | 0.89%      | 1.35%      | 0.43%      |
| Residential Therms                    | 1,099,891  | 1,142,963  | 1,189,632  | 1,237,295  | 1,292,843  | 1,334,953  | 1,384,484  | 1,434,616  | 1,492,185  | 1,536,613  |
| Commercial Therms                     | 4,145,344  | 4,125,413  | 4,125,313  | 4,126,113  | 4,150,138  | 4,129,288  | 4,130,583  | 4,131,389  | 4,151,272  | 4,133,181  |
| Industrial Therms                     | 192,375    | 191,912    | 192,331    | 192,808    | 194,297    | 193,824    | 194,303    | 194,783    | 196,097    | 195,736    |
| Ind., Inst., & Cmcl. Interrup. Therms | 95,555     | 95,085     | 96,006     | 96,006     | 96,511     | 96,035     | 96,986     | 96,986     | 97,426     | 96,986     |
| Total Core Therms                     | 5,533,146  | 5,555,393  | 5,603,282  | 5,652,222  | 5,733,788  | 5,754,101  | 5,806,356  | 5,857,772  | 5,936,961  | 5,962,516  |
| Daily BaseLoad Therms                 | 4,455      | 4,545      | 4,527      | 4,558      | 4,601      | 4,609      | 4,640      | 4,731      | 4,711      | 4,804      |
| Peak Day Therms                       | 46,922     | 47,366     | 47,832     | 48,288     | 48,836     | 47,286     | 49,716     | 50,195     | 50,690     | 51,179     |
| Therms Per Residential Customer       | 524        | 522        | 522        | 522        | 525        | 522        | 522        | 522        | 524        | 522        |
| Therms Per Commercial Customer        | 4,582      | 4,560      | 4,559      | 4,560      | 4,587      | 4,564      | 4,566      | 4,567      | 4,589      | 4,569      |
| Therms Per Industrial Customer        | 14,781     | 14,709     | 14,704     | 14,704     | 14,781     | 14,709     | 14,709     | 14,709     | 14,772     | 14,709     |
| Residential Customers                 | 2,099      | 2,190      | 2,281      | 2,372      | 2,465      | 2,559      | 2,654      | 2,750      | 2,847      | 2,945      |
| Commercial Customers                  | 905        | 905        | 905        | 905        | 905        | 905        | 905        | 905        | 905        | 905        |
| Industrial Customers                  | 13         | 13         | 13         | 13         | 13         | 13         | 13         | 13         | 13         | 13         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 3,017      | 3,109      | 3,199      | 3,291      | 3,384      | 3,478      | 3,573      | 3,669      | 3,766      | 3,865      |
| <b>Sedro-Woolley Loop</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 1.41%      | 1.79%      | 1.78%      | 2.28%      | 1.22%      | 1.72%      | 1.70%      | 2.18%      | 1.17%      |
| Residential Therms                    | 18,217,046 | 18,489,192 | 18,834,796 | 19,184,340 | 19,638,623 | 19,891,990 | 20,248,144 | 20,606,446 | 21,070,851 | 21,329,358 |
| Commercial Therms                     | 10,173,451 | 10,319,783 | 10,506,853 | 10,696,806 | 10,943,483 | 11,080,887 | 11,273,971 | 11,468,892 | 11,721,063 | 11,861,715 |
| Industrial Therms                     | 1,184,213  | 1,182,124  | 1,184,921  | 1,187,858  | 1,196,032  | 1,193,895  | 1,196,844  | 1,199,775  | 1,207,590  | 1,205,673  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 29,574,710 | 29,991,099 | 30,526,570 | 31,069,024 | 31,778,138 | 32,166,773 | 32,718,959 | 33,275,114 | 33,999,495 | 34,396,746 |
| Daily BaseLoad Therms                 | 29,147     | 29,565     | 29,831     | 30,174     | 30,600     | 30,855     | 31,202     | 31,627     | 31,886     | 32,321     |
| Peak Day Therms                       | 243,657    | 248,127    | 252,615    | 257,144    | 258,603    | 263,135    | 270,879    | 275,520    | 280,179    | 284,877    |
| Therms Per Residential Customer       | 685        | 682        | 682        | 682        | 685        | 682        | 682        | 682        | 685        | 682        |
| Therms Per Commercial Customer        | 2,983      | 2,962      | 2,955      | 2,949      | 2,958      | 2,937      | 2,931      | 2,925      | 2,934      | 2,915      |
| Therms Per Industrial Customer        | 13,562     | 13,504     | 13,502     | 13,501     | 13,560     | 13,502     | 13,502     | 13,502     | 13,556     | 13,501     |
| Residential Customers                 | 26,593     | 27,114     | 27,625     | 28,139     | 28,657     | 29,177     | 29,701     | 30,228     | 30,758     | 31,292     |
| Commercial Customers                  | 3,411      | 3,484      | 3,555      | 3,627      | 3,700      | 3,773      | 3,846      | 3,920      | 3,995      | 4,070      |
| Industrial Customers                  | 87         | 88         | 88         | 88         | 88         | 88         | 89         | 89         | 89         | 89         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 30,091     | 30,686     | 31,268     | 31,855     | 32,445     | 33,039     | 33,636     | 34,237     | 34,842     | 35,451     |
| <b>Sumas SPE Loop</b>                 |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 1.75%      | 2.09%      | 2.08%      | 2.57%      | 1.53%      | 2.00%      | 1.98%      | 2.43%      | 1.45%      |
| Residential Therms                    | 33,419,982 | 34,019,579 | 34,748,463 | 35,486,487 | 36,416,838 | 36,982,586 | 37,736,445 | 38,495,447 | 39,488,858 | 40,028,598 |
| Commercial Therms                     | 17,134,234 | 17,344,668 | 17,622,383 | 17,903,550 | 18,276,483 | 18,473,153 | 18,759,385 | 19,046,917 | 19,424,977 | 19,626,857 |
| Industrial Therms                     | 1,908,838  | 2,014,444  | 2,125,678  | 2,239,104  | 2,364,463  | 2,472,538  | 2,591,728  | 2,712,774  | 2,846,593  | 2,966,782  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 52,463,055 | 53,378,691 | 54,496,525 | 55,629,142 | 57,057,785 | 57,928,277 | 59,087,557 | 60,255,138 | 61,720,428 | 62,616,236 |
| Daily BaseLoad Therms                 | 60,717     | 61,540     | 62,233     | 63,096     | 64,379     | 65,074     | 66,597     | 66,794     | 67,462     | 68,508     |
| Peak Day Therms                       | 397,715    | 406,106    | 414,567    | 423,089    | 425,027    | 433,536    | 449,028    | 457,798    | 466,630    | 475,515    |
| Therms Per Residential Customer       | 729        | 726        | 726        | 726        | 729        | 726        | 726        | 726        | 729        | 726        |
| Therms Per Commercial Customer        | 3,222      | 3,203      | 3,198      | 3,193      | 3,205      | 3,185      | 3,180      | 3,176      | 3,187      | 3,168      |
| Therms Per Industrial Customer        | 24,848     | 24,764     | 24,760     | 24,759     | 24,861     | 24,762     | 24,762     | 24,762     | 24,854     | 24,761     |
| Residential Customers                 | 45,844     | 46,875     | 47,886     | 48,905     | 49,931     | 50,964     | 52,004     | 53,052     | 54,106     | 55,168     |
| Commercial Customers                  | 5,317      | 5,415      | 5,511      | 5,607      | 5,703      | 5,801      | 5,898      | 5,997      | 6,095      | 6,195      |
| Industrial Customers                  | 77         | 81         | 86         | 90         | 95         | 100        | 105        | 110        | 115        | 120        |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 51,238     | 52,372     | 53,483     | 54,602     | 55,729     | 56,864     | 58,007     | 59,158     | 60,316     | 61,482     |
| <b>Yakima Loop</b>                    |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 1.75%      | 2.12%      | 2.12%      | 2.70%      | 1.51%      | 2.04%      | 2.02%      | 2.48%      | 1.48%      |
| Residential Therms                    | 12,816,685 | 13,035,686 | 13,306,609 | 13,583,816 | 13,945,890 | 14,148,721 | 14,431,834 | 14,716,846 | 15,078,449 | 15,292,228 |
| Commercial Therms                     | 12,832,289 | 12,999,290 | 13,219,769 | 13,446,283 | 13,755,627 | 13,908,710 | 14,139,716 | 14,371,781 | 14,675,302 | 14,839,405 |
| Industrial Therms                     | 3,216,772  | 3,334,914  | 3,465,009  | 3,598,155  | 3,753,635  | 3,871,923  | 4,010,212  | 4,150,079  | 4,309,231  | 4,434,925  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 28,865,746 | 29,369,899 | 29,991,386 | 30,628,254 | 31,455,151 | 31,929,353 | 32,581,763 | 33,238,706 | 34,063,981 | 34,566,558 |
| Daily BaseLoad Therms                 | 24,287     | 24,964     | 25,058     | 25,431     | 25,726     | 26,127     | 26,499     | 27,226     | 27,291     | 27,967     |
| Peak Day Therms                       | 316,860    | 323,549    | 330,298    | 337,085    | 332,361    | 339,010    | 357,765    | 364,751    | 371,790    | 378,871    |
| Therms Per Residential Customer       | 453        | 450        | 450        | 450        | 453        | 450        | 449        | 449        | 453        | 449        |
| Therms Per Commercial Customer        | 3,606      | 3,585      | 3,580      | 3,576      | 3,594      | 3,571      | 3,568      | 3,564      | 3,579      | 3,558      |
| Therms Per Industrial Customer        | 37,611     | 37,447     | 37,431     | 37,431     | 37,634     | 37,450     | 37,450     | 37,451     | 37,603     | 37,451     |
| Residential Customers                 | 19,623     | 20,058     | 20,484     | 20,914     | 21,346     | 21,782     | 22,220     | 22,662     | 23,106     | 23,553     |
| Commercial Customers                  | 3,558      | 3,626      | 3,693      | 3,760      | 3,827      | 3,895      | 3,963      | 4,032      | 4,101      | 4,170      |
| Industrial Customers                  | 86         | 89         | 93         | 96         | 100        | 103        | 107        | 111        | 115        | 118        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 23,268     | 23,774     | 24,271     | 24,771     | 25,274     | 25,781     | 26,292     | 26,805     | 27,323     | 27,843     |
| <b>Zone 10</b>                        |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | -0.23%     | 0.35%      | 0.30%      | 0.89%      | -0.24%     | 0.41%      | 0.30%      | 0.70%      | -0.11%     |
| Residential Therms                    | 3,169,666  | 3,158,425  | 3,164,116  | 3,171,447  | 3,199,158  | 3,187,751  | 3,195,073  | 3,202,412  | 3,225,315  | 3,217,068  |
| Commercial Therms                     | 5,688,947  | 5,679,234  | 5,706,283  | 5,726,583  | 5,781,332  | 5,770,573  | 5,801,738  | 5,822,196  | 5,865,088  | 5,882,450  |
| Industrial Therms                     | 1,602,020  | 1,599,017  | 1,602,216  | 1,606,075  | 1,617,979  | 1,614,937  | 1,619,112  | 1,622,180  | 1,631,802  | 1,630,863  |
| Ind., Inst., & Cmcl. Interrup. Therms | 59,902     | 59,926     | 60,475     | 60,475     | 60,501     | 60,525     | 61,124     | 61,124     | 60,997     | 61,124     |
| Total Core Therms                     | 10,520,535 | 10,496,612 | 10,533,900 | 10,564,579 | 10,658,970 | 10,633,787 | 10,677,047 | 10,708,913 | 10,783,402 | 10,771,505 |
| Daily BaseLoad Therms                 | 8,804      | 7,756      | 7,562      | 8,694      | 9,020      | 8,969      | 8,698      | 7,638      | 8,607      | 8,801      |
| Peak Day Therms                       | 99,002     | 99,331     | 99,703     | 100,031    | 93,602     | 93,916     | 101,057    | 101,389    | 101,694    | 102,025    |
| Therms Per Residential Customer       | 114,046    | 112,613    | 112,619    | 112,094    | 113,001    | 111,584    | 111,592    | 111,078    | 111,970    | 110,577    |
| Therms Per Commercial Customer        | 21,534     | 21,468     | 21,550     | 21,593     | 21,763     | 21,698     | 21,800     | 21,849     | 21,985     | 21,953     |
| Therms Per Industrial Customer        | 126,922    | 126,424    | 126,367    | 126,323    | 126,913    | 126,373    | 126,383    | 126,435    | 126,770    | 126,368    |
| Residential Customers                 | 5,291      | 5,282      | 5,273      | 5,263      | 5,254      | 5,245      | 5,236      | 5,227      | 5,218      | 5,209      |
| Commercial Customers                  | 1,358      | 1,357      | 1,355      | 1,354      | 1,353      | 1,351      | 1,349      | 1,348      | 1,348      | 1,347      |
| Industrial Customers                  | 54         | 54         | 55         | 55         | 55         | 55         | 55         | 55         | 55         | 56         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 6,704      | 6,694      | 6,684      | 6,673      | 6,663      | 6,653      | 6,643      | 6,633      | 6,622      | 6,612      |

**Appendix B  
Demand Forecast  
High Scenario**

| Zone 11                               | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>       |            | 1.41%      | 1.81%      | 1.81%      | 2.39%      | 1.22%      | 1.77%      | 1.74%      | 2.21%      | 1.22%      |
| Residential Therms                    | 14,071,166 | 14,306,299 | 14,598,876 | 14,898,245 | 15,290,678 | 15,508,508 | 15,814,420 | 16,122,434 | 16,514,774 | 16,744,504 |
| Commercial Therms                     | 17,846,931 | 17,996,472 | 18,225,636 | 18,459,312 | 18,802,365 | 18,937,238 | 19,178,214 | 19,417,529 | 19,751,412 | 19,899,614 |
| Industrial Therms                     | 3,748,914  | 3,866,001  | 3,997,146  | 4,131,499  | 4,290,529  | 4,407,751  | 4,547,201  | 4,688,274  | 4,850,655  | 4,975,472  |
| Ind., Inst., & Cmcl. Interrup. Therms |            |            |            |            |            |            |            |            |            |            |
| <b>Total Core Therms</b>              | 35,667,011 | 36,168,773 | 36,821,658 | 37,489,056 | 38,383,572 | 38,853,497 | 39,539,835 | 40,228,237 | 41,116,842 | 41,619,589 |
| Daily BaseLoad Therms                 | 32,365     | 33,077     | 33,143     | 33,545     | 33,879     | 34,287     | 34,659     | 35,401     | 35,456     | 36,188     |
| Peak Day Therms                       | 376,099    | 383,115    | 390,203    | 397,328    | 391,338    | 398,318    | 419,037    | 426,371    | 433,761    | 441,190    |
| Therms Per Residential Customer       | 2,908      | 2,897      | 2,897      | 2,898      | 2,914      | 2,900      | 2,901      | 2,902      | 2,917      | 2,903      |
| Therms Per Commercial Customer        | 28,841     | 28,702     | 28,721     | 28,714     | 28,838     | 28,696     | 28,720     | 28,713     | 28,824     | 28,692     |
| Therms Per Industrial Customer        | 95,388     | 94,976     | 94,933     | 94,917     | 95,347     | 94,917     | 94,900     | 94,888     | 95,235     | 94,856     |
| Residential Customers                 | 22,111     | 22,581     | 23,043     | 23,507     | 23,975     | 24,447     | 24,922     | 25,400     | 25,881     | 26,366     |
| Commercial Customers                  | 4,485      | 4,554      | 4,623      | 4,691      | 4,761      | 4,830      | 4,900      | 4,970      | 5,041      | 5,112      |
| Industrial Customers                  | 116        | 119        | 123        | 127        | 130        | 134        | 138        | 142        | 145        | 149        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 26,712     | 27,256     | 27,789     | 28,236     | 28,867     | 29,412     | 29,961     | 30,513     | 31,069     | 31,628     |
| <b>Zone 20</b>                        |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       |            | 3.67%      | 3.90%      | 3.82%      | 4.38%      | 3.03%      | 3.58%      | 3.50%      | 4.02%      | 2.76%      |
| Residential Therms                    | 18,000,100 | 18,916,057 | 19,896,199 | 20,894,675 | 22,058,705 | 22,948,554 | 23,998,758 | 25,065,240 | 26,311,294 | 27,245,794 |
| Commercial Therms                     | 19,837,284 | 20,373,275 | 20,987,528 | 21,615,535 | 22,379,275 | 22,892,411 | 23,539,214 | 24,192,854 | 24,991,145 | 25,524,624 |
| Industrial Therms                     | 1,384,242  | 1,382,298  | 1,383,675  | 1,389,044  | 1,398,057  | 1,396,071  | 1,399,640  | 1,403,030  | 1,411,463  | 1,409,832  |
| Ind., Inst., & Cmcl. Interrup. Therms | 302,069    | 300,649    | 303,621    | 303,621    | 305,089    | 303,656    | 306,662    | 306,662    | 308,041    | 306,662    |
| <b>Total Core Therms</b>              | 39,523,695 | 40,972,280 | 42,572,023 | 44,202,875 | 46,141,126 | 47,540,692 | 49,244,295 | 50,967,787 | 53,021,942 | 54,488,911 |
| Daily BaseLoad Therms                 | 37,250     | 38,731     | 39,160     | 39,937     | 41,011     | 42,189     | 43,193     | 44,706     | 44,847     | 45,358     |
| Peak Day Therms                       | 433,591    | 451,606    | 469,931    | 488,520    | 500,026    | 518,878    | 545,946    | 565,620    | 585,556    | 605,745    |
| Therms Per Residential Customer       | 2,723      | 2,710      | 2,710      | 2,729      | 2,712      | 2,712      | 2,712      | 2,713      | 2,730      | 2,714      |
| Therms Per Commercial Customer        | 23,856     | 23,653     | 23,571     | 23,505     | 23,568     | 23,369     | 23,302     | 23,236     | 23,307     | 23,123     |
| Therms Per Industrial Customer        | 134,513    | 133,996    | 133,981    | 133,982    | 134,512    | 133,996    | 134,000    | 134,001    | 134,011    | 133,995    |
| Residential Customers                 | 31,144     | 32,859     | 34,560     | 36,290     | 38,051     | 39,840     | 41,658     | 43,505     | 45,379     | 47,280     |
| Commercial Customers                  | 4,501      | 4,663      | 4,822      | 4,984      | 5,147      | 5,312      | 5,479      | 5,648      | 5,818      | 5,991      |
| Industrial Customers                  | 39         | 39         | 39         | 39         | 39         | 40         | 40         | 40         | 40         | 40         |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| <b>Total Core Customers</b>           | 35,686     | 37,563     | 39,423     | 41,315     | 43,239     | 45,194     | 47,179     | 49,194     | 51,239     | 53,313     |
| <b>Zone 24</b>                        |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       |            | 0.65%      | 1.26%      | 1.17%      | 1.77%      | 0.54%      | 1.23%      | 1.14%      | 1.73%      | 0.52%      |
| Residential Therms                    | 4,421,920  | 4,475,416  | 4,552,773  | 4,630,678  | 4,740,034  | 4,787,935  | 4,867,175  | 4,946,853  | 5,059,726  | 5,107,517  |
| Commercial Therms                     | 4,217,579  | 4,233,947  | 4,272,552  | 4,312,483  | 4,378,387  | 4,392,102  | 4,431,563  | 4,472,146  | 4,539,015  | 4,552,817  |
| Industrial Therms                     | 340,277    | 340,130    | 340,440    | 340,626    | 341,287    | 341,040    | 341,343    | 341,541    | 342,148    | 341,904    |
| Ind., Inst., & Cmcl. Interrup. Therms | 942,310    | 937,558    | 946,840    | 946,840    | 951,733    | 946,934    | 956,309    | 956,309    | 960,968    | 956,309    |
| <b>Total Core Therms</b>              | 9,922,086  | 9,987,052  | 10,112,606 | 10,230,627 | 10,411,441 | 10,468,011 | 10,596,391 | 10,716,849 | 10,901,857 | 10,958,546 |
| Daily BaseLoad Therms                 | 5,303      | 5,406      | 5,376      | 5,435      | 5,465      | 5,488      | 5,549      | 5,653      | 5,640      | 5,700      |
| Peak Day Therms                       | 112,174    | 113,583    | 115,097    | 116,522    | 117,533    | 118,967    | 120,938    | 122,393    | 123,858    | 125,326    |
| Therms Per Residential Customer       | 1,696      | 1,686      | 1,686      | 1,686      | 1,697      | 1,686      | 1,686      | 1,686      | 1,697      | 1,686      |
| Therms Per Commercial Customer        | 7,799      | 7,749      | 7,746      | 7,744      | 7,739      | 7,739      | 7,736      | 7,734      | 7,781      | 7,730      |
| Therms Per Industrial Customer        | 53,337     | 53,211     | 53,212     | 53,214     | 53,237     | 53,212     | 53,210     | 53,213     | 53,340     | 53,211     |
| Residential Customers                 | 7,384      | 7,496      | 7,626      | 7,756      | 7,887      | 8,019      | 8,151      | 8,285      | 8,419      | 8,554      |
| Commercial Customers                  | 1,466      | 1,482      | 1,496      | 1,511      | 1,526      | 1,541      | 1,556      | 1,571      | 1,586      | 1,602      |
| Industrial Customers                  | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 8,854      | 9,001      | 9,146      | 9,291      | 9,437      | 9,584      | 9,731      | 9,880      | 10,029     | 10,179     |
| <b>Zone 26</b>                        |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       |            | 0.40%      | 0.89%      | 0.85%      | 1.40%      | 0.35%      | 0.93%      | 0.86%      | 1.32%      | 0.42%      |
| Residential Therms                    | 1,282,363  | 1,329,556  | 1,380,908  | 1,433,316  | 1,494,751  | 1,540,634  | 1,595,056  | 1,650,126  | 1,713,880  | 1,762,155  |
| Commercial Therms                     | 4,617,096  | 4,595,916  | 4,598,973  | 4,599,717  | 4,625,406  | 4,603,008  | 4,607,524  | 4,608,433  | 4,629,635  | 4,610,257  |
| Industrial Therms                     | 229,378    | 228,792    | 229,179    | 229,656    | 231,299    | 230,704    | 231,182    | 231,660    | 233,038    | 232,616    |
| Ind., Inst., & Cmcl. Interrup. Therms | 95,555     | 95,085     | 96,006     | 96,006     | 96,511     | 96,035     | 96,986     | 96,986     | 97,406     | 96,986     |
| <b>Total Core Therms</b>              | 6,224,392  | 6,249,348  | 6,305,066  | 6,358,696  | 6,447,967  | 6,470,382  | 6,530,749  | 6,587,205  | 6,673,959  | 6,702,014  |
| Daily BaseLoad Therms                 | 7,215      | 7,275      | 7,251      | 7,325      | 7,370      | 7,370      | 7,413      | 7,475      | 7,490      | 7,588      |
| Peak Day Therms                       | 51,276     | 51,756     | 52,275     | 52,749     | 51,260     | 51,748     | 54,328     | 54,845     | 55,380     | 55,909     |
| Therms Per Residential Customer       | 1,773      | 1,765      | 1,765      | 1,765      | 1,774      | 1,765      | 1,765      | 1,765      | 1,773      | 1,765      |
| Therms Per Commercial Customer        | 59,158     | 58,902     | 59,185     | 59,044     | 59,149     | 58,865     | 59,154     | 59,064     | 59,098     | 58,860     |
| Therms Per Industrial Customer        | 16,955     | 16,870     | 16,858     | 16,853     | 16,934     | 16,849     | 16,844     | 16,838     | 16,900     | 16,828     |
| Residential Customers                 | 3,138      | 3,280      | 3,420      | 3,563      | 3,707      | 3,854      | 4,002      | 4,153      | 4,305      | 4,459      |
| Commercial Customers                  | 1,222      | 1,228      | 1,234      | 1,240      | 1,246      | 1,252      | 1,259      | 1,265      | 1,271      | 1,278      |
| Industrial Customers                  | 32         | 32         | 32         | 32         | 32         | 32         | 33         | 33         | 33         | 33         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 4,393      | 4,541      | 4,687      | 4,836      | 4,987      | 5,140      | 5,294      | 5,451      | 5,610      | 5,771      |
| <b>Zone 30-S</b>                      |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       |            | 1.14%      | 1.48%      | 1.50%      | 1.93%      | 1.01%      | 1.45%      | 1.45%      | 1.86%      | 0.98%      |
| Residential Therms                    | 26,263,031 | 26,816,037 | 27,465,099 | 28,121,972 | 28,928,933 | 29,454,323 | 30,127,068 | 30,804,969 | 31,637,736 | 32,176,032 |
| Commercial Therms                     | 21,674,257 | 24,881,317 | 25,038,194 | 25,205,856 | 25,478,159 | 25,537,440 | 25,698,808 | 25,866,466 | 26,137,974 | 26,201,355 |
| Industrial Therms                     | 726,158    | 724,625    | 726,300    | 728,109    | 733,412    | 731,845    | 733,648    | 735,458    | 740,407    | 739,065    |
| Ind., Inst., & Cmcl. Interrup. Therms | 2,562,208  | 2,561,115  | 2,569,434  | 2,577,942  | 2,587,830  | 2,586,441  | 2,595,150  | 2,603,658  | 2,613,049  | 2,612,167  |
| <b>Total Core Therms</b>              | 54,365,655 | 54,983,093 | 55,799,027 | 56,633,880 | 57,728,335 | 58,310,249 | 59,154,673 | 60,012,562 | 61,129,186 | 61,728,419 |
| Daily BaseLoad Therms                 | 57,312     | 57,885     | 58,167     | 58,573     | 59,186     | 59,484     | 59,926     | 60,507     | 60,752     | 61,336     |
| Peak Day Therms                       | 431,918    | 439,007    | 446,065    | 453,257    | 454,842    | 462,065    | 474,913    | 482,304    | 489,608    | 497,097    |
| Therms Per Residential Customer       | 1,414      | 1,408      | 1,408      | 1,408      | 1,415      | 1,408      | 1,408      | 1,408      | 1,414      | 1,408      |
| Therms Per Commercial Customer        | 11,103     | 11,027     | 10,992     | 10,965     | 10,983     | 10,909     | 10,878     | 10,853     | 10,867     | 10,800     |
| Therms Per Industrial Customer        | 49,684     | 49,454     | 49,446     | 49,446     | 49,684     | 49,454     | 49,455     | 49,455     | 49,666     | 49,454     |
| Residential Customers                 | 37,714     | 38,673     | 39,615     | 40,565     | 41,522     | 42,488     | 43,460     | 44,440     | 45,428     | 46,423     |
| Commercial Customers                  | 3,837      | 3,876      | 3,914      | 3,952      | 3,990      | 4,029      | 4,067      | 4,106      | 4,145      | 4,184      |
| Industrial Customers                  | 29         | 29         | 29         | 29         | 29         | 29         | 29         | 30         | 30         | 30         |
| Interruptible Customers               | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| <b>Total Core Customers</b>           | 41,583     | 42,581     | 43,561     | 44,549     | 45,545     | 46,549     | 47,560     | 48,579     | 49,605     | 50,639     |

Appendix B  
Demand Forecast  
High Scenario

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| Zone 30-W                             | 2020       | 2021        | 2022        | 2023        | 2024        | 2025        | 2026        | 2027        | 2028        | 2029        |
|---------------------------------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Total Therms Pct. Growth              |            | 1.54%       | 1.90%       | 1.89%       | 2.38%       | 1.35%       | 1.83%       | 1.81%       | 2.27%       | 1.29%       |
| Residential Therms                    | 60,694,089 | 61,645,732  | 62,836,868  | 64,042,785  | 65,593,918  | 66,486,478  | 67,716,490  | 68,954,345  | 70,539,540  | 71,453,490  |
| Commercial Therms                     | 34,325,607 | 34,756,742  | 35,330,740  | 35,907,435  | 36,669,531  | 37,077,652  | 37,667,808  | 38,256,527  | 39,032,917  | 39,452,154  |
| Industrial Therms                     | 3,996,285  | 4,137,154   | 4,289,298   | 4,445,281   | 4,623,143   | 4,766,024   | 4,929,880   | 5,096,911   | 5,286,391   | 5,438,478   |
| Ind., Inst., & Cmcl. Interrup. Therms | 95,526     | 95,276      | 96,219      | 96,219      | 96,482      | 96,229      | 97,181      | 97,181      | 97,181      | 97,181      |
| Total Core Therms                     | 99,113,507 | 100,636,904 | 102,553,125 | 104,491,720 | 106,983,072 | 108,426,362 | 110,411,360 | 112,406,964 | 114,956,266 | 116,441,304 |
| Daily BaseLoad Therms                 | 106,962    | 108,433     | 109,494     | 110,865     | 112,773     | 113,856     | 115,252     | 116,748     | 117,772     | 119,496     |
| Peak Day Therms                       | 770,439    | 785,273     | 800,245     | 815,330     | 830,457     | 843,498     | 861,187     | 876,692     | 892,307     | 907,985     |
| Therms Per Residential Customer       | 6,126      | 6,103       | 6,102       | 6,099       | 6,127       | 6,100       | 6,100       | 6,102       | 6,125       | 6,100       |
| Therms Per Commercial Customer        | 32,329     | 32,145      | 32,150      | 32,106      | 32,210      | 32,026      | 32,035      | 31,994      | 32,088      | 31,918      |
| Therms Per Industrial Customer        | 203,242    | 202,938     | 203,247     | 203,746     | 204,776     | 204,433     | 204,761     | 205,259     | 206,243     | 205,929     |
| Residential Customers                 | 85,893     | 87,627      | 89,326      | 91,037      | 92,760      | 94,494      | 96,239      | 97,995      | 99,762      | 101,540     |
| Commercial Customers                  | 10,379     | 10,582      | 10,781      | 10,981      | 11,182      | 11,385      | 11,588      | 11,793      | 12,000      | 12,207      |
| Industrial Customers                  | 201        | 208         | 216         | 223         | 231         | 239         | 247         | 255         | 263         | 271         |
| Interruptible Customers               | 1          | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| Total Core Customers                  | 96,474     | 98,418      | 100,324     | 102,242     | 104,174     | 106,118     | 108,075     | 110,044     | 112,026     | 114,020     |

| Zone GTN                              | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Total Therms Pct. Growth              |            | 3.12%      | 3.35%      | 3.20%      | 2.74%      | 2.69%      | 3.13%      | 3.07%      | 3.48%      | 2.50%      |
| Residential Therms                    | 37,584,794 | 39,207,507 | 40,937,281 | 42,698,097 | 44,704,551 | 46,304,137 | 48,142,831 | 50,006,585 | 52,132,611 | 53,807,952 |
| Commercial Therms                     | 21,432,803 | 21,630,859 | 21,913,359 | 22,201,351 | 22,598,960 | 22,784,911 | 23,077,956 | 23,373,175 | 23,773,178 | 23,967,630 |
| Industrial Therms                     | 2,342,216  | 2,446,024  | 2,560,305  | 2,678,399  | 2,812,591  | 2,924,360  | 3,051,318  | 3,181,138  | 3,327,127  | 3,449,340  |
| Ind., Inst., & Cmcl. Interrup. Therms | 280,483    | 279,229    | 281,952    | 283,288    | 283,288    | 282,021    | 284,814    | 285,952    | 284,814    | 284,814    |
| Total Core Therms                     | 61,640,296 | 63,563,619 | 65,692,897 | 67,859,799 | 70,399,300 | 72,295,430 | 74,556,919 | 76,845,712 | 79,518,867 | 81,509,735 |
| Daily BaseLoad Therms                 | 52,834     | 53,040     | 51,940     | 56,199     | 57,635     | 58,481     | 59,611     | 60,972     | 61,845     | 63,285     |
| Peak Day Therms                       | 579,816    | 599,628    | 619,745    | 640,139    | 651,487    | 672,124    | 703,015    | 724,519    | 746,286    | 768,322    |
| Therms Per Residential Customer       | 8,526      | 8,497      | 8,496      | 8,499      | 8,537      | 8,500      | 8,501      | 8,499      | 8,536      | 8,502      |
| Therms Per Commercial Customer        | 38,050     | 37,845     | 37,807     | 37,772     | 37,904     | 37,713     | 37,689     | 37,664     | 37,797     | 37,621     |
| Therms Per Industrial Customer        | 131,139    | 130,598    | 130,611    | 130,611    | 131,191    | 130,624    | 130,624    | 130,614    | 131,170    | 130,656    |
| Residential Customers                 | 50,086     | 52,459     | 54,805     | 57,187     | 59,605     | 62,057     | 64,544     | 67,064     | 69,619     | 72,206     |
| Commercial Customers                  | 6,941      | 7,045      | 7,147      | 7,250      | 7,353      | 7,457      | 7,562      | 7,668      | 7,774      | 7,881      |
| Industrial Customers                  | 102        | 107        | 113        | 118        | 124        | 129        | 135        | 141        | 147        | 154        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 57,130     | 59,612     | 62,066     | 64,556     | 67,083     | 69,645     | 72,243     | 74,875     | 77,542     | 80,242     |

| Zone ME-OR                            | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Total Therms Pct. Growth              |            | 1.06%      | 1.56%      | 1.47%      | 2.02%      | 0.92%      | 1.55%      | 1.45%      | 1.95%      | 0.93%      |
| Residential Therms                    | 6,296,500  | 6,467,115  | 6,662,774  | 6,862,051  | 7,106,570  | 7,269,458  | 7,476,320  | 7,685,622  | 7,941,176  | 8,111,361  |
| Commercial Therms                     | 7,410,085  | 7,401,494  | 7,433,567  | 7,458,245  | 7,521,857  | 7,509,348  | 7,542,937  | 7,567,917  | 7,628,432  | 7,618,264  |
| Industrial Therms                     | 541,671    | 540,148    | 541,284    | 542,813    | 547,076    | 545,542    | 546,702    | 548,271    | 552,349    | 550,925    |
| Ind., Inst., & Cmcl. Interrup. Therms | 692,517    | 689,957    | 696,759    | 696,759    | 699,442    | 696,857    | 703,757    | 703,757    | 706,149    | 703,756    |
| Total Core Therms                     | 14,940,773 | 15,098,714 | 15,334,384 | 15,559,867 | 15,874,945 | 16,021,205 | 16,269,716 | 16,505,567 | 16,828,127 | 16,984,307 |
| Daily BaseLoad Therms                 | 14,643     | 14,076     | 14,024     | 14,919     | 15,098     | 15,247     | 15,340     | 14,751     | 15,494     | 15,485     |
| Peak Day Therms                       | 152,486    | 154,978    | 157,582    | 160,134    | 160,144    | 162,713    | 168,052    | 170,718    | 173,418    | 176,140    |
| Therms Per Residential Customer       | 3,169      | 3,155      | 3,154      | 3,154      | 3,172      | 3,154      | 3,154      | 3,154      | 3,171      | 3,154      |
| Therms Per Commercial Customer        | 28,996     | 28,855     | 28,906     | 28,904     | 29,044     | 28,903     | 28,996     | 28,954     | 29,088     | 28,951     |
| Therms Per Industrial Customer        | 88,272     | 87,806     | 87,786     | 87,810     | 88,295     | 87,833     | 87,813     | 87,845     | 88,295     | 87,856     |
| Residential Customers                 | 11,413     | 11,789     | 12,140     | 12,536     | 12,917     | 13,304     | 13,695     | 14,090     | 14,491     | 14,896     |
| Commercial Customers                  | 1,874      | 1,882      | 1,889      | 1,896      | 1,903      | 1,910      | 1,917      | 1,924      | 1,931      | 1,938      |
| Industrial Customers                  | 27         | 27         | 27         | 27         | 27         | 27         | 27         | 27         | 27         | 27         |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Total Core Customers                  | 13,316     | 13,699     | 14,078     | 14,461     | 14,849     | 15,243     | 15,641     | 16,044     | 16,451     | 16,864     |

| Zone ME-WA                            | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Total Therms Pct. Growth              |            | 1.06%      | 1.49%      | 1.56%      | 2.11%      | 0.93%      | 1.46%      | 1.52%      | 2.03%      | 0.91%      |
| Residential Therms                    | 7,095,397  | 7,257,254  | 7,451,539  | 7,648,482  | 7,898,335  | 8,048,563  | 8,250,633  | 8,454,371  | 8,712,853  | 8,866,720  |
| Commercial Therms                     | 6,319,152  | 6,291,846  | 6,290,742  | 6,299,749  | 6,336,283  | 6,309,719  | 6,309,528  | 6,318,537  | 6,352,436  | 6,327,599  |
| Industrial Therms                     | 201,783    | 212,185    | 223,390    | 234,809    | 247,692    | 258,297    | 270,286    | 282,468    | 296,153    | 307,373    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 13,616,331 | 13,761,284 | 13,965,671 | 14,183,040 | 14,482,309 | 14,616,579 | 14,838,447 | 15,055,376 | 15,361,442 | 15,501,691 |
| Daily BaseLoad Therms                 | 13,137     | 13,284     | 13,357     | 13,368     | 13,543     | 13,681     | 13,791     | 13,941     | 14,106     | 13,878     |
| Peak Day Therms                       | 144,468    | 146,874    | 149,238    | 151,688    | 152,129    | 154,592    | 159,042    | 161,576    | 164,072    | 166,648    |
| Therms Per Residential Customer       | 599        | 596        | 596        | 596        | 600        | 596        | 596        | 596        | 599        | 596        |
| Therms Per Commercial Customer        | 4,856      | 4,836      | 4,836      | 4,842      | 4,870      | 4,850      | 4,850      | 4,857      | 4,883      | 4,864      |
| Therms Per Industrial Customer        | 10,586     | 10,542     | 10,540     | 10,540     | 10,592     | 10,541     | 10,541     | 10,541     | 10,588     | 10,540     |
| Residential Customers                 | 11,843     | 12,178     | 12,506     | 12,838     | 13,172     | 13,509     | 13,849     | 14,192     | 14,537     | 14,885     |
| Commercial Customers                  | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      |
| Industrial Customers                  | 19         | 20         | 21         | 22         | 23         | 25         | 26         | 27         | 28         | 29         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 13,164     | 13,499     | 13,829     | 14,161     | 14,496     | 14,834     | 15,175     | 15,519     | 15,866     | 16,215     |

| Bellingham District                   | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Total Therms Pct. Growth              |            | 1.73%      | 2.09%      | 2.07%      | 2.56%      | 1.52%      | 1.99%      | 1.97%      | 2.42%      | 1.44%      |
| Residential Therms                    | 33,541,372 | 34,140,678 | 34,869,851 | 35,608,178 | 36,539,440 | 37,104,892 | 37,859,062 | 38,618,357 | 39,572,648 | 40,152,110 |
| Commercial Therms                     | 17,289,823 | 17,499,616 | 17,778,179 | 18,059,555 | 18,433,632 | 18,629,651 | 18,916,809 | 19,204,547 | 19,583,514 | 19,784,899 |
| Industrial Therms                     | 1,909,432  | 2,015,037  | 2,126,277  | 2,239,703  | 2,365,063  | 2,473,137  | 2,592,333  | 2,713,379  | 2,847,199  | 2,961,386  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 52,740,627 | 53,655,331 | 54,774,307 | 55,907,436 | 57,338,136 | 58,207,680 | 59,368,193 | 60,536,283 | 62,003,361 | 62,898,396 |
| Daily BaseLoad Therms                 | 60,894     | 61,720     | 62,410     | 63,273     | 64,559     | 65,251     | 66,134     | 66,974     | 67,639     | 68,689     |
| Peak Day Therms                       | 400,116    | 408,512    | 416,983    | 425,510    | 427,359    | 435,873    | 451,469    | 460,242    | 469,079    | 477,968    |
| Therms Per Residential Customer       | 2,914      | 2,900      | 2,899      | 2,899      | 2,914      | 2,899      | 2,899      | 2,913      | 2,913      | 2,899      |
| Therms Per Commercial Customer        | 15,795     | 15,697     | 15,723     | 15,707     | 15,781     | 15,682     | 15,715     | 15,700     | 15,754     | 15,670     |
| Therms Per Industrial Customer        | 25,442     | 25,356     | 25,353     | 25,352     | 25,455     | 25,355     | 25,355     | 25,354     | 25,354     | 25,348     |
| Residential Customers                 | 46,003     | 47,035     | 48,046     | 49,065     | 50,092     | 51,125     | 52,166     | 53,214     | 54,269     | 55,331     |
| Commercial Customers                  | 5,357      | 5,455      | 5,551      | 5,647      | 5,744      | 5,841      | 5,939      | 6,037      | 6,136      | 6,236      |
| Industrial Customers                  | 78         | 82         | 87         | 91         | 96         | 101        | 106        | 111        | 116        | 121        |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 51,438     | 52,572     | 53,684     | 54,804     | 55,932     | 57,067     | 58,211     | 59,362     | 60,521     | 61,687     |

Appendix B  
Demand Forecast  
High Scenario

|                                       | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Mount Vernon District</b>          |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       |            | 1.31%      | 1.70%      | 1.69%      | 2.18%      | 1.16%      | 1.64%      | 1.62%      | 2.09%      | 1.11%      |
| Residential Therms                    | 27,152,717 | 27,505,054 | 27,967,017 | 28,434,607 | 29,054,477 | 29,381,586 | 29,857,439 | 30,335,988 | 30,966,892 | 31,301,380 |
| Commercial Therms                     | 17,035,784 | 17,259,129 | 17,552,261 | 17,847,880 | 18,235,898 | 18,448,000 | 18,750,999 | 19,053,960 | 19,449,403 | 19,667,254 |
| Industrial Therms                     | 2,088,853  | 2,122,117  | 2,163,021  | 2,205,578  | 2,258,080  | 2,292,807  | 2,337,548  | 2,383,532  | 2,439,192  | 2,477,092  |
| Ind., Inst., & Cmcl. Interrup. Therms | 95,526     | 95,276     | 96,219     | 96,219     | 96,462     | 96,229     | 97,181     | 97,181     | 97,181     | 97,181     |
| <b>Total Core Therms</b>              | 46,372,880 | 46,981,573 | 47,778,818 | 48,584,284 | 49,644,937 | 50,218,682 | 51,043,167 | 51,870,682 | 52,952,905 | 53,542,908 |
| Daily BaseLoad Therms                 | 46,068     | 46,713     | 47,083     | 47,592     | 48,214     | 48,605     | 49,118     | 49,774     | 50,133     | 50,807     |
| Peak Day Therms                       | 370,323    | 376,762    | 383,262    | 389,820    | 391,098    | 397,625    | 409,718    | 416,450    | 423,228    | 430,017    |
| Therms Per Residential Customer       | 3,212      | 3,203      | 3,203      | 3,200      | 3,213      | 3,200      | 3,200      | 3,203      | 3,212      | 3,200      |
| Therms Per Commercial Customer        | 16,535     | 16,449     | 16,426     | 16,399     | 16,429     | 16,344     | 16,320     | 16,294     | 16,249     | 16,249     |
| Therms Per Industrial Customer        | 177,801    | 177,581    | 177,894    | 178,394    | 179,321    | 179,078    | 179,406    | 179,905    | 180,795    | 180,575    |
| Residential Customers                 | 39,890     | 40,592     | 41,280     | 41,972     | 42,668     | 43,369     | 44,073     | 44,781     | 45,494     | 46,210     |
| Commercial Customers                  | 5,022      | 5,127      | 5,230      | 5,334      | 5,438      | 5,543      | 5,649      | 5,756      | 5,863      | 5,971      |
| Industrial Customers                  | 123        | 126        | 129        | 132        | 135        | 138        | 141        | 144        | 147        | 151        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 45,036     | 45,846     | 46,640     | 47,438     | 48,242     | 49,051     | 49,864     | 50,682     | 51,505     | 52,333     |
|                                       |            |            |            |            |            |            |            |            |            |            |
| <b>Bremerton District</b>             |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       |            | 1.25%      | 1.59%      | 1.59%      | 2.02%      | 1.10%      | 1.54%      | 1.54%      | 1.95%      | 1.06%      |
| Residential Therms                    | 23,452,097 | 24,187,625 | 24,806,367 | 25,431,959 | 26,192,425 | 26,700,508 | 27,341,583 | 27,987,705 | 28,735,473 | 29,294,864 |
| Commercial Therms                     | 21,853,940 | 21,925,363 | 22,077,557 | 22,236,161 | 22,488,265 | 22,552,043 | 22,707,750 | 22,868,344 | 23,120,487 | 23,188,516 |
| Industrial Therms                     | 446,816    | 445,760    | 446,856    | 447,953    | 451,280    | 450,202    | 451,328    | 452,425    | 455,682    | 454,644    |
| Ind., Inst., & Cmcl. Interrup. Therms | 2,562,208  | 2,561,115  | 2,569,434  | 2,577,942  | 2,587,830  | 2,586,641  | 2,595,150  | 2,603,658  | 2,613,049  | 2,612,167  |
| <b>Total Core Therms</b>              | 48,515,062 | 49,119,863 | 49,900,213 | 50,694,015 | 51,719,800 | 52,289,393 | 53,095,810 | 53,912,133 | 54,964,710 | 55,548,191 |
| Daily BaseLoad Therms                 | 51,332     | 51,835     | 52,147     | 52,566     | 53,120     | 53,429     | 53,848     | 54,358     | 54,663     | 55,199     |
| Peak Day Therms                       | 381,992    | 388,711    | 395,416    | 402,235    | 405,411    | 412,273    | 422,804    | 429,818    | 436,762    | 443,871    |
| Therms Per Residential Customer       | 694        | 691        | 691        | 691        | 694        | 691        | 691        | 691        | 691        | 691        |
| Therms Per Commercial Customer        | 7,024      | 6,964      | 6,933      | 6,904      | 6,904      | 6,847      | 6,818      | 6,791      | 6,791      | 6,737      |
| Therms Per Industrial Customer        | 29,753     | 29,609     | 29,608     | 29,607     | 29,753     | 29,609     | 29,610     | 29,609     | 29,749     | 29,609     |
| Residential Customers                 | 34,092     | 35,007     | 35,906     | 36,812     | 37,725     | 38,646     | 39,574     | 40,510     | 41,453     | 42,403     |
| Commercial Customers                  | 3,111      | 3,148      | 3,184      | 3,221      | 3,257      | 3,294      | 3,331      | 3,367      | 3,404      | 3,442      |
| Industrial Customers                  | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         | 15         |
| Interruptible Customers               | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| <b>Total Core Customers</b>           | 37,221     | 38,173     | 39,108     | 40,050     | 41,000     | 41,958     | 42,923     | 43,896     | 44,876     | 45,863     |
|                                       |            |            |            |            |            |            |            |            |            |            |
| <b>Longview District</b>              |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       |            | 0.43%      | 0.89%      | 0.89%      | 1.45%      | 0.37%      | 0.93%      | 0.90%      | 1.36%      | 0.45%      |
| Residential Therms                    | 1,282,363  | 1,329,556  | 1,380,908  | 1,433,316  | 1,494,751  | 1,540,634  | 1,595,056  | 1,650,126  | 1,713,880  | 1,762,155  |
| Commercial Therms                     | 4,360,112  | 4,339,491  | 4,340,073  | 4,340,877  | 4,365,782  | 4,344,097  | 4,346,103  | 4,346,916  | 4,367,581  | 4,348,713  |
| Industrial Therms                     | 229,378    | 228,792    | 229,179    | 229,656    | 231,299    | 230,704    | 231,182    | 231,660    | 233,038    | 232,616    |
| Ind., Inst., & Cmcl. Interrup. Therms | 95,555     | 95,085     | 96,006     | 96,006     | 96,511     | 96,035     | 96,986     | 96,986     | 97,006     | 96,986     |
| <b>Total Core Therms</b>              | 5,967,407  | 5,992,923  | 6,046,166  | 6,099,855  | 6,188,343  | 6,211,470  | 6,269,328  | 6,325,688  | 6,411,905  | 6,440,469  |
| Daily BaseLoad Therms                 | 6,988      | 7,075      | 7,058      | 7,098      | 7,143      | 7,153      | 7,186      | 7,276      | 7,263      | 7,361      |
| Peak Day Therms                       | 49,984     | 50,464     | 50,971     | 51,464     | 49,990     | 50,478     | 53,010     | 53,528     | 54,062     | 54,591     |
| Therms Per Residential Customer       | 1,773      | 1,765      | 1,765      | 1,765      | 1,774      | 1,765      | 1,765      | 1,765      | 1,773      | 1,765      |
| Therms Per Commercial Customer        | 7,813      | 7,770      | 7,765      | 7,758      | 7,789      | 7,747      | 7,744      | 7,738      | 7,766      | 7,727      |
| Therms Per Industrial Customer        | 16,955     | 16,870     | 16,858     | 16,853     | 16,934     | 16,849     | 16,844     | 16,838     | 16,900     | 16,828     |
| Residential Customers                 | 3,138      | 3,280      | 3,420      | 3,563      | 3,707      | 3,854      | 4,002      | 4,153      | 4,305      | 4,459      |
| Commercial Customers                  | 1,217      | 1,223      | 1,229      | 1,235      | 1,241      | 1,247      | 1,254      | 1,260      | 1,266      | 1,273      |
| Industrial Customers                  | 32         | 32         | 32         | 32         | 32         | 32         | 33         | 33         | 33         | 33         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 4,388      | 4,536      | 4,682      | 4,831      | 4,982      | 5,135      | 5,289      | 5,446      | 5,605      | 5,766      |
|                                       |            |            |            |            |            |            |            |            |            |            |
| <b>Aberdeen District</b>              |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       |            | 0.22%      | 0.61%      | 0.70%      | 1.16%      | 0.21%      | 0.63%      | 0.69%      | 1.05%      | 0.26%      |
| Residential Therms                    | 2,610,934  | 2,628,412  | 2,658,732  | 2,690,013  | 2,736,508  | 2,753,815  | 2,785,485  | 2,817,275  | 2,862,263  | 2,881,167  |
| Commercial Therms                     | 2,960,317  | 2,955,954  | 2,960,673  | 2,969,695  | 2,989,894  | 2,985,397  | 2,991,058  | 3,000,122  | 3,017,488  | 3,014,839  |
| Industrial Therms                     | 279,342    | 278,865    | 279,444    | 280,156    | 282,133    | 281,643    | 282,320    | 283,032    | 284,725    | 284,421    |
| Ind., Inst., & Cmcl. Interrup. Therms | 5,850,593  | 5,863,231  | 5,898,814  | 5,939,865  | 6,008,535  | 6,020,855  | 6,058,864  | 6,100,429  | 6,144,475  | 6,180,428  |
| <b>Total Core Therms</b>              | 9,801,186  | 9,826,462  | 9,977,663  | 10,060,661 | 10,317,936 | 10,362,610 | 10,445,727 | 10,521,664 | 10,614,975 | 10,686,859 |
| Daily BaseLoad Therms                 | 5,980      | 6,050      | 6,020      | 6,007      | 6,066      | 6,055      | 6,078      | 6,149      | 6,088      | 6,138      |
| Peak Day Therms                       | 49,926     | 50,294     | 50,649     | 51,022     | 49,431     | 49,792     | 52,109     | 52,487     | 52,847     | 53,226     |
| Therms Per Residential Customer       | 721        | 717        | 717        | 717        | 721        | 717        | 717        | 717        | 720        | 717        |
| Therms Per Commercial Customer        | 4,079      | 4,062      | 4,059      | 4,061      | 4,079      | 4,062      | 4,060      | 4,062      | 4,076      | 4,062      |
| Therms Per Industrial Customer        | 19,930     | 19,846     | 19,839     | 19,839     | 19,930     | 19,846     | 19,846     | 19,846     | 19,917     | 19,846     |
| Residential Customers                 | 3,623      | 3,666      | 3,710      | 3,754      | 3,797      | 3,842      | 3,886      | 3,930      | 3,975      | 4,020      |
| Commercial Customers                  | 726        | 728        | 729        | 731        | 733        | 735        | 737        | 739        | 740        | 742        |
| Industrial Customers                  | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 4,363      | 4,408      | 4,453      | 4,499      | 4,545      | 4,591      | 4,637      | 4,683      | 4,730      | 4,776      |
|                                       |            |            |            |            |            |            |            |            |            |            |
| <b>Kennewick District</b>             |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       |            | 4.15%      | 4.34%      | 4.23%      | 4.79%      | 3.38%      | 3.93%      | 3.82%      | 4.34%      | 3.04%      |
| Residential Therms                    | 17,066,437 | 17,987,267 | 18,946,719 | 19,964,466 | 21,122,149 | 22,016,803 | 22,066,275 | 24,132,029 | 25,371,847 | 26,311,082 |
| Commercial Therms                     | 16,220,284 | 16,734,915 | 17,314,952 | 17,902,734 | 18,610,388 | 19,102,510 | 19,713,621 | 20,325,611 | 21,049,477 | 21,580,947 |
| Industrial Therms                     | 1,051,374  | 1,049,768  | 1,052,256  | 1,054,798  | 1,061,876  | 1,060,228  | 1,062,916  | 1,065,459  | 1,071,973  | 1,070,688  |
| Ind., Inst., & Cmcl. Interrup. Therms | 208,356    | 207,373    | 209,412    | 209,412    | 210,440    | 209,447    | 211,521    | 211,521    | 212,453    | 212,453    |
| <b>Total Core Therms</b>              | 34,546,432 | 35,979,323 | 37,544,340 | 39,131,410 | 41,004,853 | 42,388,988 | 44,054,334 | 45,738,620 | 47,750,750 | 49,174,237 |
| Daily BaseLoad Therms                 | 34,783     | 35,807     | 36,581     | 37,379     | 38,422     | 39,562     | 40,533     | 41,588     | 42,127     | 42,590     |
| Peak Day Therms                       | 386,483    | 404,124    | 422,073    | 440,282    | 451,893    | 470,369    | 496,549    | 515,833    | 535,369    | 555,164    |
| Therms Per Residential Customer       | 1,724      | 1,716      | 1,715      | 1,727      | 1,727      | 1,716      | 1,716      | 1,716      | 1,727      | 1,715      |
| Therms Per Commercial Customer        | 64,297     | 63,987     | 64,253     | 64,120     | 64,242     | 63,898     | 64,174     | 64,077     | 64,149     | 63,854     |
| Therms Per Industrial Customer        | 93,407     | 93,032     | 93,016     | 93,015     | 93,407     | 93,032     | 93,033     | 93,032     | 93,372     | 93,032     |
| Residential Customers                 | 29,332     | 31,047     | 32,747     | 34,477     | 36,236     | 38,025     | 39,842     | 41,688     | 43,561     | 45,462     |
| Commercial Customers                  | 3,815      | 3,968      | 4,118      | 4,270      | 4,424      | 4,580      | 4,737      | 4,897      | 5,058      | 5,221      |
| Industrial Customers                  | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 24         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 33,172     | 35,039     | 36,889     | 38,771     | 40,684     | 42,629     | 44,604     | 46,609     | 48,643     | 50,707     |

**Appendix B  
Demand Forecast  
High Scenario**

|                                       | 2020       | 2021       | 2022       | 2023       | 2024       | 2025       | 2026       | 2027       | 2028       | 2029       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Walla Walla District</b>           |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 1.06%      | 1.49%      | 1.56%      | 2.11%      | 0.93%      | 1.46%      | 1.52%      | 2.03%      | 0.91%      |
| Residential Therms                    | 7,095,397  | 7,257,254  | 7,451,539  | 7,648,482  | 7,898,335  | 8,048,563  | 8,250,633  | 8,454,371  | 8,712,853  | 8,866,720  |
| Commercial Therms                     | 6,319,152  | 6,291,846  | 6,290,742  | 6,299,749  | 6,336,283  | 6,309,719  | 6,350,528  | 6,318,537  | 6,352,436  | 6,327,599  |
| Industrial Therms                     | 201,783    | 212,185    | 223,390    | 234,809    | 247,692    | 258,297    | 270,286    | 282,468    | 296,153    | 307,373    |
| Ind., Inst., & Cmcl. Interrup. Therms |            |            |            |            |            |            |            |            |            |            |
| Total Core Therms                     | 13,616,331 | 13,761,284 | 13,965,671 | 14,183,040 | 14,482,309 | 14,616,579 | 14,830,447 | 15,055,376 | 15,361,442 | 15,501,691 |
| Daily BaseLoad Therms                 | 13,137     | 13,284     | 13,357     | 13,368     | 13,543     | 13,681     | 13,791     | 13,941     | 13,908     | 13,878     |
| Peak Day Therms                       | 144,468    | 146,874    | 149,238    | 151,688    | 152,129    | 154,592    | 159,024    | 161,576    | 164,072    | 166,648    |
| Therms Per Residential Customer       | 599        | 596        | 596        | 596        | 600        | 596        | 596        | 596        | 599        | 596        |
| Therms Per Commercial Customer        | 4,856      | 4,836      | 4,835      | 4,842      | 4,870      | 4,850      | 4,850      | 4,857      | 4,883      | 4,864      |
| Therms Per Industrial Customer        | 10,586     | 10,542     | 10,540     | 10,540     | 10,592     | 10,541     | 10,541     | 10,541     | 10,588     | 10,540     |
| Residential Customers                 | 11,843     | 12,178     | 12,506     | 12,838     | 13,172     | 13,509     | 13,849     | 14,192     | 14,537     | 14,885     |
| Commercial Customers                  | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      |
| Industrial Customers                  | 19         | 20         | 21         | 22         | 23         | 25         | 26         | 27         | 28         | 29         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 13,164     | 13,499     | 13,829     | 14,161     | 14,496     | 14,834     | 15,175     | 15,519     | 15,866     | 16,215     |
| <b>Wenatchee District</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | -0.07%     | 0.43%      | 0.43%      | 0.93%      | -0.08%     | 0.45%      | 0.40%      | 0.89%      | -0.04%     |
| Residential Therms                    | 1,557,218  | 1,550,307  | 1,552,372  | 1,554,649  | 1,566,340  | 1,559,462  | 1,561,741  | 1,564,019  | 1,575,108  | 1,568,615  |
| Commercial Therms                     | 8,064,757  | 8,065,788  | 8,105,843  | 8,147,142  | 8,228,237  | 8,228,253  | 8,309,959  | 8,309,867  | 8,389,686  | 8,393,131  |
| Industrial Therms                     | 809,610    | 808,246    | 810,196    | 812,232    | 817,686    | 816,298    | 818,360    | 820,396    | 825,558    | 824,339    |
| Ind., Inst., & Cmcl. Interrup. Therms | 93,712     | 93,276     | 94,209     | 94,209     | 94,649     | 94,209     | 95,141     | 95,141     | 95,587     | 95,141     |
| Total Core Therms                     | 10,525,298 | 10,517,617 | 10,562,620 | 10,608,232 | 10,706,912 | 10,698,221 | 10,746,201 | 10,789,424 | 10,885,939 | 10,881,227 |
| Daily BaseLoad Therms                 | 9,375      | 9,848      | 9,459      | 9,471      | 9,498      | 9,529      | 9,561      | 10,034     | 9,626      | 9,714      |
| Peak Day Therms                       | 93,092     | 93,496     | 93,933     | 94,350     | 92,855     | 93,262     | 95,645     | 96,073     | 96,517     | 96,941     |
| Therms Per Residential Customer       | 1,865      | 1,856      | 1,858      | 1,859      | 1,871      | 1,862      | 1,864      | 1,865      | 1,877      | 1,869      |
| Therms Per Commercial Customer        | 25,307     | 25,126     | 25,093     | 25,037     | 25,091     | 24,920     | 24,899     | 24,838     | 24,894     | 24,737     |
| Therms Per Industrial Customer        | 94,329     | 93,955     | 93,944     | 93,944     | 94,320     | 93,949     | 93,948     | 93,950     | 94,293     | 93,941     |
| Residential Customers                 | 3,236      | 3,238      | 3,239      | 3,240      | 3,242      | 3,243      | 3,244      | 3,246      | 3,247      | 3,248      |
| Commercial Customers                  | 1,447      | 1,456      | 1,466      | 1,475      | 1,485      | 1,494      | 1,504      | 1,513      | 1,523      | 1,533      |
| Industrial Customers                  | 34         | 34         | 34         | 34         | 34         | 34         | 35         | 35         | 35         | 35         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 4,719      | 4,729      | 4,740      | 4,751      | 4,762      | 4,773      | 4,784      | 4,795      | 4,806      | 4,817      |
| <b>Yakima District</b>                |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 1.22%      | 1.65%      | 1.65%      | 2.23%      | 1.07%      | 1.63%      | 1.59%      | 2.05%      | 1.10%      |
| Residential Therms                    | 16,617,278 | 16,843,217 | 17,140,100 | 17,445,252 | 17,860,052 | 18,068,549 | 18,380,235 | 18,694,039 | 19,104,427 | 19,327,668 |
| Commercial Therms                     | 19,345,125 | 19,504,703 | 19,757,552 | 20,010,394 | 20,383,971 | 20,528,371 | 20,796,006 | 21,054,617 | 21,410,936 | 21,574,154 |
| Industrial Therms                     | 4,874,192  | 4,989,303  | 5,122,584  | 5,259,589  | 5,427,002  | 5,542,233  | 5,684,697  | 5,828,628  | 5,996,391  | 6,121,140  |
| Ind., Inst., & Cmcl. Interrup. Therms | 59,902     | 59,926     | 60,475     | 60,475     | 60,501     | 60,525     | 61,124     | 61,124     | 60,997     | 61,124     |
| Total Core Therms                     | 40,896,496 | 41,397,149 | 42,080,711 | 42,775,709 | 43,731,527 | 44,199,678 | 44,922,062 | 45,638,409 | 46,572,751 | 47,084,086 |
| Daily BaseLoad Therms                 | 34,488     | 34,109     | 34,017     | 35,553     | 36,217     | 36,581     | 36,684     | 36,322     | 37,384     | 38,269     |
| Peak Day Therms                       | 430,410    | 437,724    | 445,136    | 452,552    | 441,487    | 448,752    | 475,162    | 482,791    | 490,443    | 498,173    |
| Therms Per Residential Customer       | 116,088    | 114,648    | 114,653    | 114,128    | 115,045    | 113,618    | 113,625    | 113,111    | 114,013    | 112,610    |
| Therms Per Commercial Customer        | 35,974     | 35,842     | 35,915     | 35,960     | 36,196     | 36,063     | 36,158     | 36,210     | 36,405     | 36,311     |
| Therms Per Industrial Customer        | 169,087    | 168,409    | 168,321    | 168,263    | 169,045    | 168,306    | 168,302    | 168,341    | 168,813    | 168,245    |
| Residential Customers                 | 25,916     | 26,437     | 26,889     | 27,344     | 27,883     | 28,204     | 28,229     | 28,311     | 29,010     | 30,145     |
| Commercial Customers                  | 5,087      | 5,155      | 5,222      | 5,289      | 5,357      | 5,425      | 5,494      | 5,563      | 5,632      | 5,702      |
| Industrial Customers                  | 152        | 156        | 159        | 163        | 167        | 171        | 175        | 178        | 182        | 186        |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Total Core Customers                  | 31,217     | 31,750     | 32,272     | 32,799     | 33,329     | 33,862     | 34,400     | 34,941     | 35,486     | 36,035     |
| <b>Central Oregon (Bend) District</b> |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 3.12%      | 3.35%      | 3.30%      | 3.74%      | 2.69%      | 3.13%      | 3.07%      | 3.48%      | 2.50%      |
| Residential Therms                    | 37,584,794 | 39,207,507 | 40,937,281 | 42,698,097 | 44,704,551 | 46,304,137 | 48,148,831 | 50,006,585 | 52,132,611 | 53,807,932 |
| Commercial Therms                     | 21,432,803 | 21,630,859 | 21,913,359 | 22,201,351 | 22,598,960 | 22,784,911 | 23,077,956 | 23,373,175 | 23,773,178 | 23,967,650 |
| Industrial Therms                     | 2,342,216  | 2,446,024  | 2,560,305  | 2,678,399  | 2,812,591  | 2,924,360  | 3,051,318  | 3,181,138  | 3,327,127  | 3,449,340  |
| Ind., Inst., & Cmcl. Interrup. Therms | 280,483    | 279,229    | 281,952    | 281,952    | 283,288    | 282,021    | 284,814    | 285,952    | 284,814    | 284,814    |
| Total Core Therms                     | 61,640,296 | 63,563,619 | 65,692,897 | 67,859,799 | 70,399,390 | 72,296,430 | 74,556,619 | 76,845,712 | 79,518,867 | 81,509,735 |
| Daily BaseLoad Therms                 | 52,834     | 53,040     | 51,940     | 56,199     | 57,655     | 58,491     | 59,611     | 60,972     | 61,845     | 63,285     |
| Peak Day Therms                       | 579,816    | 599,628    | 619,745    | 640,139    | 651,487    | 672,124    | 703,015    | 724,519    | 746,286    | 768,322    |
| Therms Per Residential Customer       | 8,526      | 8,497      | 8,496      | 8,499      | 8,537      | 8,500      | 8,501      | 8,499      | 8,526      | 8,502      |
| Therms Per Commercial Customer        | 38,050     | 37,845     | 37,807     | 37,712     | 37,904     | 37,713     | 37,689     | 37,664     | 37,797     | 37,621     |
| Therms Per Industrial Customer        | 131,139    | 130,598    | 130,573    | 130,611    | 131,191    | 130,624    | 130,623    | 130,614    | 131,170    | 130,656    |
| Residential Customers                 | 50,086     | 52,459     | 54,805     | 57,187     | 59,605     | 62,057     | 64,544     | 67,064     | 69,619     | 72,206     |
| Commercial Customers                  | 6,941      | 7,045      | 7,147      | 7,250      | 7,353      | 7,457      | 7,562      | 7,668      | 7,774      | 7,881      |
| Industrial Customers                  | 102        | 107        | 113        | 118        | 124        | 129        | 135        | 141        | 147        | 154        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 57,130     | 59,612     | 62,066     | 64,556     | 67,083     | 69,645     | 72,243     | 74,875     | 77,542     | 80,242     |
| <b>Pendleton District</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              |            | 1.06%      | 1.56%      | 1.47%      | 2.02%      | 0.92%      | 1.55%      | 1.45%      | 1.95%      | 0.93%      |
| Residential Therms                    | 6,296,500  | 6,461,115  | 6,662,774  | 6,862,051  | 7,106,570  | 7,269,458  | 7,476,320  | 7,685,622  | 7,941,376  | 8,111,361  |
| Commercial Therms                     | 7,410,085  | 7,401,494  | 7,433,567  | 7,458,245  | 7,531,857  | 7,509,348  | 7,542,937  | 7,567,917  | 7,626,432  | 7,618,244  |
| Industrial Therms                     | 541,671    | 540,148    | 541,284    | 542,813    | 547,016    | 545,542    | 546,702    | 548,271    | 552,249    | 550,925    |
| Ind., Inst., & Cmcl. Interrup. Therms | 692,517    | 689,957    | 696,759    | 696,759    | 699,442    | 696,857    | 703,757    | 703,757    | 706,149    | 703,756    |
| Total Core Therms                     | 14,940,773 | 15,098,714 | 15,334,384 | 15,559,867 | 15,874,945 | 16,021,205 | 16,269,716 | 16,505,567 | 16,828,127 | 16,984,307 |
| Daily BaseLoad Therms                 | 14,643     | 14,076     | 14,024     | 14,919     | 15,098     | 15,247     | 15,340     | 14,751     | 15,494     | 15,485     |
| Peak Day Therms                       | 152,486    | 154,978    | 157,582    | 160,134    | 160,144    | 162,713    | 168,052    | 170,718    | 173,418    | 176,140    |
| Therms Per Residential Customer       | 3,169      | 3,155      | 3,154      | 3,172      | 3,172      | 3,154      | 3,154      | 3,154      | 3,174      | 3,154      |
| Therms Per Commercial Customer        | 28,296     | 28,855     | 28,906     | 28,904     | 29,044     | 28,903     | 28,956     | 28,954     | 29,088     | 28,951     |
| Therms Per Industrial Customer        | 88,272     | 87,806     | 87,786     | 87,810     | 88,295     | 87,833     | 87,813     | 87,845     | 88,295     | 87,856     |
| Residential Customers                 | 11,413     | 11,789     | 12,160     | 12,536     | 12,917     | 13,304     | 13,695     | 14,090     | 14,491     | 14,896     |
| Commercial Customers                  | 1,877      | 1,885      | 1,892      | 1,899      | 1,906      | 1,913      | 1,920      | 1,927      | 1,934      | 1,941      |
| Industrial Customers                  | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 28         |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Total Core Customers                  | 13,320     | 13,703     | 14,082     | 14,465     | 14,853     | 15,247     | 15,645     | 16,048     | 16,456     | 16,868     |

**Appendix B  
Demand Forecast  
High Scenario**

|  | 2020        | 2021        | 2022        | 2023        | 2024        | 2025        | 2026        | 2027        | 2028        | 2029        |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Eastern Oregon (Ontario) District</b> |             |             |             |             |             |             |             |             |             |             |
| <b>Total Therms Pct. Growth</b>          |             | 0.65%       | 1.26%       | 1.17%       | 1.77%       | 0.54%       | 1.23%       | 1.14%       | 1.73%       | 0.52%       |
| Residential Therms                       | 4,421,920   | 4,475,416   | 4,552,773   | 4,630,678   | 4,740,034   | 4,787,935   | 4,867,175   | 4,946,853   | 5,099,726   | 5,107,517   |
| Commercial Therms                        | 4,217,579   | 4,233,947   | 4,272,552   | 4,312,483   | 4,378,387   | 4,392,102   | 4,431,563   | 4,472,146   | 4,539,015   | 4,552,817   |
| Industrial Therms                        | 340,277     | 340,130     | 340,440     | 340,626     | 341,287     | 341,040     | 341,343     | 341,541     | 342,148     | 341,904     |
| Ind., Inst., & Cmcl. Interrup. Therms    | 942,310     | 937,558     | 946,840     | 946,840     | 951,733     | 946,934     | 956,309     | 956,309     | 960,948     | 956,309     |
| <b>Total Core Therms</b>                 | 9,922,086   | 9,987,052   | 10,112,606  | 10,230,627  | 10,411,441  | 10,468,011  | 10,596,391  | 10,716,849  | 10,901,857  | 10,959,544  |
| Daily BaseLoad Therms                    | 5,303       | 5,406       | 5,376       | 5,435       | 5,465       | 5,488       | 5,549       | 5,653       | 5,640       | 5,700       |
| Peak Day Therms                          | 112,174     | 113,583     | 115,097     | 116,522     | 117,533     | 118,967     | 120,938     | 122,393     | 123,858     | 125,326     |
| Therms Per Residential Customer          | 1,696       | 1,686       | 1,686       | 1,686       | 1,697       | 1,686       | 1,686       | 1,686       | 1,697       | 1,686       |
| Therms Per Commercial Customer           | 7,799       | 7,749       | 7,746       | 7,744       | 7,791       | 7,739       | 7,736       | 7,734       | 7,730       | 7,730       |
| Therms Per Industrial Customer           | 53,337      | 53,211      | 53,212      | 53,214      | 53,337      | 53,212      | 53,210      | 53,213      | 53,340      | 53,211      |
| Residential Customers                    | 7,364       | 7,496       | 7,626       | 7,756       | 7,887       | 8,019       | 8,151       | 8,285       | 8,419       | 8,554       |
| Commercial Customers                     | 1,466       | 1,482       | 1,496       | 1,511       | 1,526       | 1,541       | 1,556       | 1,571       | 1,586       | 1,602       |
| Industrial Customers                     | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          |
| Interruptible Customers                  | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| <b>Total Core Customers</b>              | 8,854       | 9,001       | 9,146       | 9,291       | 9,437       | 9,584       | 9,731       | 9,880       | 10,029      | 10,179      |
| <b>Oregon</b>                            |             |             |             |             |             |             |             |             |             |             |
| <b>Total Therms Pct. Growth</b>          |             | 2.48%       | 2.81%       | 2.75%       | 2.24%       | 2.17%       | 2.67%       | 2.61%       | 3.06%       | 2.05%       |
| Residential Therms                       | 48,303,214  | 50,150,038  | 52,152,828  | 54,190,825  | 56,551,155  | 58,361,530  | 60,486,327  | 62,639,061  | 65,133,512  | 67,026,809  |
| Commercial Therms                        | 33,060,467  | 33,266,300  | 33,619,477  | 33,972,078  | 34,499,204  | 34,686,362  | 35,052,456  | 35,413,238  | 35,940,425  | 36,138,731  |
| Industrial Therms                        | 3,224,144   | 3,326,302   | 3,442,030   | 3,561,838   | 3,700,953   | 3,810,942   | 3,939,364   | 4,070,951   | 4,221,424   | 4,342,169   |
| Ind., Inst., & Cmcl. Interrup. Therms    | 1,915,310   | 1,908,744   | 1,925,551   | 1,925,551   | 1,934,463   | 1,925,812   | 1,944,879   | 1,944,879   | 1,953,090   | 1,944,879   |
| <b>Total Core Therms</b>                 | 86,503,155  | 88,649,385  | 91,139,887  | 93,650,293  | 96,685,775  | 98,784,645  | 101,423,026 | 104,068,129 | 107,248,851 | 109,452,588 |
| Daily BaseLoad Therms                    | 72,781      | 72,522      | 71,341      | 76,553      | 78,199      | 79,216      | 80,500      | 81,376      | 82,979      | 84,470      |
| Peak Day Therms                          | 844,476     | 868,189     | 892,424     | 916,795     | 929,164     | 953,803     | 992,005     | 1,017,631   | 1,043,563   | 1,069,788   |
| Therms Per Residential Customer          | 13,391      | 13,338      | 13,337      | 13,339      | 13,407      | 13,341      | 13,341      | 13,339      | 13,340      | 13,342      |
| Therms Per Commercial Customer           | 74,845      | 74,449      | 74,459      | 74,420      | 74,738      | 74,355      | 74,381      | 74,353      | 74,666      | 74,302      |
| Therms Per Industrial Customer           | 272,747     | 271,615     | 271,570     | 271,635     | 272,822     | 271,668     | 271,647     | 271,671     | 272,805     | 271,724     |
| Residential Customers                    | 68,862      | 71,744      | 74,591      | 77,479      | 80,409      | 83,380      | 86,390      | 89,440      | 92,528      | 95,655      |
| Commercial Customers                     | 10,285      | 10,411      | 10,535      | 10,660      | 10,785      | 10,911      | 11,038      | 11,166      | 11,295      | 11,424      |
| Industrial Customers                     | 152         | 158         | 163         | 169         | 174         | 180         | 186         | 192         | 198         | 205         |
| Interruptible Customers                  | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           |
| <b>Total Core Customers</b>              | 79,303      | 82,317      | 85,293      | 88,312      | 91,373      | 94,475      | 97,619      | 100,802     | 104,026     | 107,288     |
| <b>Washington</b>                        |             |             |             |             |             |             |             |             |             |             |
| <b>Total Therms Pct. Growth</b>          |             | 1.64%       | 2.01%       | 2.00%       | 2.52%       | 1.43%       | 1.94%       | 1.92%       | 2.39%       | 1.39%       |
| Residential Therms                       | 130,575,812 | 133,429,369 | 136,792,605 | 140,210,923 | 144,464,479 | 147,174,811 | 150,697,499 | 154,253,909 | 158,655,392 | 161,465,761 |
| Commercial Therms                        | 113,449,275 | 114,576,802 | 116,178,096 | 117,814,188 | 120,072,349 | 121,128,042 | 122,802,834 | 124,486,541 | 126,761,007 | 127,878,052 |
| Industrial Therms                        | 11,890,780  | 12,150,072  | 12,453,204  | 12,764,473  | 13,142,111  | 13,405,608  | 13,730,970  | 14,060,981  | 14,449,909  | 14,733,699  |
| Ind., Inst., & Cmcl. Interrup. Therms    | 3,115,260   | 3,112,050   | 3,125,755   | 3,134,263   | 3,146,412   | 3,143,086   | 3,157,104   | 3,165,612   | 3,176,930   | 3,174,121   |
| <b>Total Core Therms</b>                 | 259,031,127 | 263,268,293 | 268,549,659 | 273,923,846 | 280,825,351 | 284,851,548 | 290,388,406 | 296,967,043 | 303,043,239 | 307,251,633 |
| Daily BaseLoad Therms                    | 263,405     | 266,440     | 268,133     | 272,307     | 276,781     | 279,845     | 282,932     | 286,416     | 288,831     | 292,645     |
| Peak Day Therms                          | 2,306,793   | 2,356,963   | 2,407,661   | 2,458,922   | 2,461,654   | 2,513,015   | 2,615,509   | 2,668,798   | 2,722,379   | 2,776,598   |
| Therms Per Residential Customer          | 129,590     | 128,091     | 128,096     | 127,570     | 128,559     | 127,064     | 127,073     | 126,563     | 127,528     | 126,061     |
| Therms Per Commercial Customer           | 181,678     | 180,733     | 181,003     | 180,789     | 181,383     | 180,413     | 180,738     | 180,569     | 181,051     | 180,211     |
| Therms Per Industrial Customer           | 637,290     | 635,200     | 635,373     | 635,806     | 638,758     | 636,563     | 636,884     | 637,416     | 639,875     | 637,970     |
| Residential Customers                    | 197,134     | 202,480     | 207,743     | 213,064     | 218,442     | 223,876     | 229,364     | 234,910     | 240,510     | 246,162     |
| Commercial Customers                     | 27,063      | 27,561      | 28,030      | 28,503      | 28,980      | 29,461      | 29,945      | 30,432      | 30,924      | 31,419      |
| Industrial Customers                     | 490         | 502         | 515         | 528         | 540         | 553         | 567         | 580         | 594         | 608         |
| Interruptible Customers                  | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           |
| <b>Total Core Customers</b>              | 224,716     | 230,553     | 236,297     | 242,104     | 247,972     | 253,900     | 259,887     | 265,932     | 272,037     | 278,199     |
| <b>System</b>                            |             |             |             |             |             |             |             |             |             |             |
| <b>Total Therms Pct. Growth</b>          |             | 1.85%       | 2.21%       | 2.19%       | 2.70%       | 1.62%       | 2.13%       | 2.10%       | 2.56%       | 1.56%       |
| Residential Therms                       | 178,879,026 | 183,579,407 | 188,945,433 | 194,401,748 | 201,015,633 | 205,536,341 | 211,183,826 | 216,892,970 | 223,788,904 | 228,492,571 |
| Commercial Therms                        | 146,509,742 | 147,843,102 | 149,797,573 | 151,786,266 | 154,571,554 | 155,814,404 | 157,855,290 | 159,899,779 | 162,701,633 | 164,016,783 |
| Industrial Therms                        | 15,114,945  | 15,476,374  | 15,895,234  | 16,326,311  | 16,843,064  | 17,216,550  | 17,670,333  | 18,133,932  | 18,671,533  | 19,075,867  |
| Ind., Inst., & Cmcl. Interrup. Therms    | 5,030,570   | 5,018,795   | 5,051,306   | 5,059,814   | 5,069,875   | 5,068,896   | 5,101,983   | 5,110,492   | 5,130,020   | 5,119,000   |
| <b>Total Core Therms</b>                 | 345,534,282 | 351,917,678 | 359,689,546 | 367,574,140 | 377,511,126 | 383,636,193 | 391,811,433 | 400,035,173 | 410,292,089 | 416,704,221 |
| Daily BaseLoad Therms                    | 335,826     | 338,961     | 339,474     | 340,860     | 354,980     | 359,042     | 363,452     | 367,792     | 371,811     | 377,115     |
| Peak Day Therms                          | 3,151,269   | 3,225,151   | 3,300,085   | 3,375,718   | 3,390,018   | 3,446,018   | 3,607,514   | 3,686,429   | 3,765,942   | 3,845,367   |
| Therms Per Residential Customer          | 142,981     | 141,429     | 141,433     | 140,809     | 141,966     | 140,405     | 140,414     | 139,901     | 140,923     | 139,404     |
| Therms Per Commercial Customer           | 256,523     | 255,181     | 255,461     | 255,209     | 256,121     | 254,768     | 255,120     | 254,922     | 255,718     | 254,513     |
| Therms Per Industrial Customer           | 910,038     | 906,815     | 906,942     | 907,440     | 911,580     | 908,232     | 908,531     | 909,087     | 912,840     | 909,694     |
| Residential Customers                    | 265,996     | 274,224     | 282,334     | 290,543     | 298,852     | 307,256     | 315,756     | 324,350     | 333,038     | 341,817     |
| Commercial Customers                     | 37,368      | 37,972      | 38,565      | 39,163      | 39,765      | 40,372      | 40,983      | 41,599      | 42,219      | 42,844      |
| Industrial Customers                     | 642         | 660         | 678         | 696         | 715         | 734         | 753         | 772         | 792         | 812         |
| Interruptible Customers                  | 13          | 13          | 13          | 13          | 13          | 13          | 13          | 13          | 13          | 13          |
| <b>Total Core Customers</b>              | 304,019     | 312,869     | 321,590     | 330,415     | 339,345     | 348,375     | 357,505     | 366,735     | 376,063     | 385,487     |

**Appendix B  
Demand Forecast  
High Scenario**

| Athena                                | 2030      | 2031      | 2032      | 2033      | 2034      | 2035      | 2036      | 2037      | 2038      | 2039      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Total Therms Pct. Growth</b>       | 1.35%     | 1.32%     | 1.74%     | 0.87%     | 1.30%     | 1.29%     | 1.70%     | 0.84%     | 1.27%     | 1.24%     |
| Residential Therms                    | 363,169   | 369,536   | 377,515   | 382,371   | 388,845   | 395,370   | 403,603   | 408,505   | 415,126   | 421,769   |
| Commercial Therms                     | 136,806   | 137,139   | 138,061   | 137,800   | 138,135   | 138,472   | 139,400   | 139,136   | 139,472   | 139,806   |
| Industrial Therms                     | 6,572     | 6,572     | 6,601     | 6,571     | 6,635     | 6,636     | 6,665     | 6,636     | 6,700     | 6,699     |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Therms</b>              | 506,547   | 513,247   | 522,177   | 526,742   | 533,615   | 540,478   | 549,668   | 554,277   | 561,298   | 568,274   |
| Daily BaseLoad Therms                 | 310       | 313       | 314       | 305       | 322       | 325       | 338       | 331       | 331       | 321       |
| Peak Day Therms                       | 5,704     | 5,777     | 5,866     | 5,866     | 5,940     | 6,015     | 6,090     | 6,149     | 6,241     | 6,394     |
| Therms Per Residential Customer       | 570       | 570       | 572       | 569       | 569       | 569       | 572       | 569       | 569       | 569       |
| Therms Per Commercial Customer        | 2,051     | 2,051     | 2,060     | 2,051     | 2,051     | 2,051     | 2,060     | 2,051     | 2,051     | 2,051     |
| Therms Per Industrial Customer        | 6,381     | 6,381     | 6,409     | 6,380     | 6,380     | 6,381     | 6,409     | 6,381     | 6,381     | 6,380     |
| Residential Customers                 | 638       | 649       | 660       | 671       | 683       | 694       | 706       | 717       | 729       | 741       |
| Commercial Customers                  | 67        | 67        | 67        | 67        | 67        | 68        | 68        | 68        | 68        | 68        |
| Industrial Customers                  | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Customers</b>           | 705       | 717       | 728       | 740       | 751       | 763       | 774       | 786       | 798       | 810       |
| <b>Baker</b>                          | 2030      | 2031      | 2032      | 2033      | 2034      | 2035      | 2036      | 2037      | 2038      | 2039      |
| <b>Total Therms Pct. Growth</b>       | 1.09%     | 1.08%     | 1.71%     | 0.43%     | 1.06%     | 1.05%     | 1.69%     | 0.40%     | 1.04%     | 1.04%     |
| Residential Therms                    | 2,675,977 | 2,719,125 | 2,780,527 | 2,804,240 | 2,850,083 | 2,893,998 | 2,957,454 | 2,982,785 | 3,027,515 | 3,072,420 |
| Commercial Therms                     | 1,578,091 | 1,581,925 | 1,595,763 | 1,589,700 | 1,593,543 | 1,597,313 | 1,611,239 | 1,605,004 | 1,608,847 | 1,612,825 |
| Industrial Therms                     | 130,581   | 130,873   | 131,525   | 131,437   | 131,861   | 132,145   | 132,800   | 132,701   | 133,125   | 133,424   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Therms</b>              | 4,384,649 | 4,431,922 | 4,507,815 | 4,527,385 | 4,575,487 | 4,623,456 | 4,701,496 | 4,720,490 | 4,749,888 | 4,818,870 |
| Daily BaseLoad Therms                 | 2,415     | 2,425     | 2,438     | 2,443     | 2,454     | 2,465     | 2,480     | 2,491     | 2,220     | 2,225     |
| Peak Day Therms                       | 48,923    | 49,471    | 49,798    | 50,347    | 50,900    | 51,456    | 52,246    | 52,573    | 53,137    | 53,706    |
| Therms Per Residential Customer       | 660       | 660       | 664       | 660       | 660       | 660       | 664       | 660       | 660       | 660       |
| Therms Per Commercial Customer        | 3,001     | 3,002     | 3,021     | 3,002     | 3,002     | 3,002     | 3,021     | 3,003     | 3,003     | 3,003     |
| Therms Per Industrial Customer        | 42,397    | 42,399    | 42,519    | 42,399    | 42,399    | 42,399    | 42,519    | 42,397    | 42,397    | 42,402    |
| Residential Customers                 | 4,055     | 4,120     | 4,186     | 4,252     | 4,319     | 4,386     | 4,453     | 4,521     | 4,589     | 4,657     |
| Commercial Customers                  | 526       | 527       | 528       | 530       | 531       | 532       | 533       | 535       | 536       | 537       |
| Industrial Customers                  | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Customers</b>           | 4,584     | 4,650     | 4,718     | 4,785     | 4,853     | 4,921     | 4,990     | 5,058     | 5,128     | 5,197     |
| <b>Umatilla</b>                       | 2030      | 2031      | 2032      | 2033      | 2034      | 2035      | 2036      | 2037      | 2038      | 2039      |
| <b>Total Therms Pct. Growth</b>       | 2.39%     | 2.03%     | 2.49%     | 1.55%     | 2.33%     | 1.99%     | 2.46%     | 1.49%     | 2.26%     | 1.95%     |
| Residential Therms                    | 844,132   | 890,359   | 942,684   | 985,284   | 1,033,918 | 1,083,283 | 1,139,851 | 1,184,370 | 1,236,031 | 1,288,474 |
| Commercial Therms                     | 1,298,248 | 1,298,231 | 1,303,569 | 1,298,246 | 1,306,299 | 1,306,241 | 1,311,610 | 1,306,223 | 1,314,280 | 1,314,291 |
| Industrial Therms                     | 162,908   | 163,404   | 164,211   | 164,200   | 164,498   | 164,991   | 165,804   | 165,785   | 166,083   | 166,581   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Therms</b>              | 2,305,289 | 2,351,994 | 2,410,464 | 2,447,730 | 2,504,715 | 2,554,515 | 2,617,265 | 2,656,378 | 2,716,394 | 2,769,347 |
| Daily BaseLoad Therms                 | 2,928     | 2,948     | 2,968     | 2,988     | 3,007     | 3,027     | 3,047     | 3,067     | 3,087     | 3,107     |
| Peak Day Therms                       | 19,278    | 19,775    | 20,274    | 20,776    | 21,271    | 21,799    | 22,416    | 22,877    | 23,463    | 24,022    |
| Therms Per Residential Customer       | 461       | 461       | 463       | 461       | 461       | 461       | 463       | 461       | 461       | 461       |
| Therms Per Commercial Customer        | 8,853     | 8,853     | 8,889     | 8,853     | 8,908     | 8,908     | 8,945     | 8,908     | 8,963     | 8,964     |
| Therms Per Industrial Customer        | 26,460    | 26,469    | 26,543    | 26,470    | 26,461    | 26,469    | 26,543    | 26,469    | 26,460    | 26,469    |
| Residential Customers                 | 1,832     | 1,933     | 2,035     | 2,139     | 2,244     | 2,351     | 2,460     | 2,571     | 2,683     | 2,797     |
| Commercial Customers                  | 147       | 147       | 147       | 147       | 147       | 147       | 147       | 147       | 147       | 147       |
| Industrial Customers                  | 6         | 6         | 6         | 6         | 6         | 6         | 6         | 6         | 6         | 6         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Customers</b>           | 1,985     | 2,085     | 2,188     | 2,291     | 2,397     | 2,504     | 2,613     | 2,724     | 2,836     | 2,949     |
| <b>Chemult</b>                        | 2030      | 2031      | 2032      | 2033      | 2034      | 2035      | 2036      | 2037      | 2038      | 2039      |
| <b>Total Therms Pct. Growth</b>       | 0.24%     | 0.25%     | 0.69%     | -0.21%    | 0.24%     | 0.25%     | 0.69%     | -0.20%    | 0.24%     | 0.24%     |
| Residential Therms                    | 14,063    | 14,098    | 14,195    | 14,165    | 14,200    | 14,235    | 14,333    | 14,303    | 14,337    | 14,371    |
| Commercial Therms                     | 41,245    | 41,345    | 41,630    | 41,544    | 41,645    | 41,747    | 42,034    | 41,948    | 42,048    | 42,147    |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Therms</b>              | 55,307    | 55,443    | 55,825    | 55,710    | 55,845    | 55,982    | 56,367    | 56,251    | 56,386    | 56,519    |
| Daily BaseLoad Therms                 | 56        | 56        | 56        | 56        | 56        | 56        | 56        | 56        | 56        | 56        |
| Peak Day Therms                       | 462       | 463       | 466       | 467       | 469       | 470       | 469       | 472       | 473       | 474       |
| Therms Per Residential Customer       | 540       | 540       | 542       | 540       | 540       | 540       | 543       | 541       | 541       | 541       |
| Therms Per Commercial Customer        | 2,010     | 2,010     | 2,019     | 2,010     | 2,010     | 2,010     | 2,019     | 2,010     | 2,010     | 2,010     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 26        | 26        | 26        | 26        | 26        | 26        | 26        | 26        | 27        | 27        |
| Commercial Customers                  | 21        | 21        | 21        | 21        | 21        | 21        | 21        | 21        | 21        | 21        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Customers</b>           | 47        | 47        | 47        | 47        | 47        | 47        | 47        | 47        | 47        | 48        |
| <b>Gilchrist</b>                      | 2030      | 2031      | 2032      | 2033      | 2034      | 2035      | 2036      | 2037      | 2038      | 2039      |
| <b>Total Therms Pct. Growth</b>       | 0.24%     | 0.25%     | 0.73%     | -0.24%    | 0.24%     | 0.24%     | 0.72%     | -0.24%    | 0.24%     | 0.24%     |
| Residential Therms                    | 117,058   | 117,343   | 118,182   | 117,912   | 118,198   | 118,484   | 119,328   | 119,054   | 119,339   | 119,628   |
| Commercial Therms                     | 141,178   | 141,528   | 142,568   | 142,211   | 142,557   | 142,905   | 143,944   | 143,587   | 143,937   | 144,282   |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Therms</b>              | 258,236   | 258,871   | 260,750   | 260,123   | 260,755   | 261,389   | 263,272   | 262,641   | 263,276   | 263,910   |
| Daily BaseLoad Therms                 | 168       | 168       | 168       | 168       | 168       | 168       | 168       | 168       | 168       | 168       |
| Peak Day Therms                       | 2,384     | 2,389     | 2,395     | 2,401     | 2,407     | 2,413     | 2,418     | 2,424     | 2,430     | 2,436     |
| Therms Per Residential Customer       | 588       | 588       | 591       | 589       | 589       | 589       | 592       | 590       | 590       | 590       |
| Therms Per Commercial Customer        | 3,545     | 3,546     | 3,564     | 3,547     | 3,547     | 3,547     | 3,565     | 3,548     | 3,549     | 3,549     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 199       | 200       | 200       | 200       | 201       | 201       | 201       | 202       | 202       | 203       |
| Commercial Customers                  | 40        | 40        | 40        | 40        | 40        | 40        | 40        | 40        | 41        | 41        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| <b>Total Core Customers</b>           | 239       | 239       | 240       | 240       | 241       | 241       | 242       | 242       | 243       | 243       |





**Appendix B  
Demand Forecast  
High Scenario**

| Mission Tap                           | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>       | 0.00%      | 0.01%      | 0.52%      | -0.51%     | 0.01%      | 0.00%      | 0.52%      | -0.51%     | 0.01%      | 0.01%      |
| Residential Therms                    | 121,555    | 121,559    | 122,255    | 121,578    | 121,582    | 121,581    | 122,277    | 121,595    | 121,599    | 121,608    |
| Commercial Therms                     | 372,044    | 372,077    | 373,960    | 372,125    | 372,158    | 372,166    | 374,044    | 372,206    | 372,239    | 372,263    |
| Industrial Therms                     | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 493,599    | 493,636    | 496,215    | 493,703    | 493,739    | 493,747    | 496,321    | 493,801    | 493,838    | 493,871    |
| Daily BaseLoad Therms                 | 546        | 546        | 546        | 546        | 546        | 546        | 546        | 546        | 546        | 546        |
| Peak Day Therms                       | 4,478      | 4,477      | 4,457      | 4,456      | 4,455      | 4,455      | 4,474      | 4,453      | 4,452      | 4,451      |
| Therms Per Residential Customer       | 559        | 559        | 563        | 559        | 559        | 559        | 563        | 559        | 559        | 559        |
| Therms Per Commercial Customer        | 8,278      | 8,278      | 8,319      | 8,278      | 8,278      | 8,278      | 8,319      | 8,278      | 8,278      | 8,278      |
| Therms Per Industrial Customer        | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Residential Customers                 | 217        | 217        | 217        | 217        | 217        | 217        | 217        | 217        | 217        | 217        |
| Commercial Customers                  | 45         | 45         | 45         | 45         | 45         | 45         | 45         | 45         | 45         | 45         |
| Industrial Customers                  | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 262        | 262        | 262        | 262        | 262        | 262        | 262        | 262        | 262        | 262        |
| <b>Nyssa-Ontario</b>                  | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 1.28%      | 1.14%      | 1.72%      | 0.52%      | 1.24%      | 1.12%      | 1.69%      | 0.50%      | 1.21%      | 1.07%      |
| Residential Therms                    | 2,448,985  | 2,487,249  | 2,542,399  | 2,564,117  | 2,602,968  | 2,642,279  | 2,699,227  | 2,720,959  | 2,760,591  | 2,800,122  |
| Commercial Therms                     | 2,984,795  | 3,022,103  | 3,076,978  | 3,095,881  | 3,132,675  | 3,170,920  | 3,227,365  | 3,246,271  | 3,283,679  | 3,321,876  |
| Industrial Therms                     | 211,653    | 211,532    | 211,515    | 211,350    | 211,252    | 211,144    | 211,171    | 211,012    | 210,862    | 210,736    |
| Ind., Inst., & Cmcl. Interrup. Therms | 965,685    | 965,685    | 970,580    | 965,590    | 974,964    | 975,060    | 980,003    | 975,060    | 984,339    | 984,339    |
| <b>Total Core Therms</b>              | 6,611,117  | 6,686,569  | 6,801,471  | 6,836,937  | 6,921,861  | 6,999,404  | 7,117,766  | 7,153,302  | 7,239,568  | 7,317,073  |
| Daily BaseLoad Therms                 | 3,282      | 3,293      | 3,406      | 3,369      | 3,417      | 3,417      | 3,443      | 3,436      | 3,435      | 3,435      |
| Peak Day Therms                       | 76,203     | 77,133     | 78,754     | 79,700     | 80,747     | 81,702     | 81,948     | 83,628     | 84,691     | 85,664     |
| Therms Per Residential Customer       | 544        | 544        | 547        | 544        | 544        | 544        | 547        | 544        | 544        | 544        |
| Therms Per Commercial Customer        | 2,775      | 2,773      | 2,788      | 2,769      | 2,767      | 2,766      | 2,780      | 2,762      | 2,760      | 2,758      |
| Therms Per Industrial Customer        | 10,814     | 10,813     | 10,813     | 10,814     | 10,813     | 10,813     | 10,813     | 10,815     | 10,813     | 10,813     |
| Residential Customers                 | 4,502      | 4,573      | 4,644      | 4,716      | 4,787      | 4,859      | 4,932      | 5,005      | 5,078      | 5,152      |
| Commercial Customers                  | 1,076      | 1,090      | 1,104      | 1,118      | 1,132      | 1,147      | 1,161      | 1,175      | 1,190      | 1,204      |
| Industrial Customers                  | 20         | 20         | 20         | 20         | 20         | 20         | 20         | 20         | 20         | 19         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 5,599      | 5,683      | 5,769      | 5,854      | 5,940      | 6,027      | 6,113      | 6,201      | 6,288      | 6,377      |
| <b>Pendleton</b>                      | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 1.00%      | 0.89%      | 1.46%      | 0.30%      | 0.99%      | 0.89%      | 1.45%      | 0.30%      | 0.97%      | 0.85%      |
| Residential Therms                    | 3,537,983  | 3,598,187  | 3,680,819  | 3,719,198  | 3,780,400  | 3,842,362  | 3,927,798  | 3,966,442  | 4,028,980  | 4,091,375  |
| Commercial Therms                     | 2,365,454  | 2,365,180  | 2,378,329  | 2,364,344  | 2,364,692  | 2,364,696  | 2,377,851  | 2,364,153  | 2,364,510  | 2,363,955  |
| Industrial Therms                     | 166,250    | 166,774    | 168,302    | 167,570    | 167,856    | 168,395    | 169,395    | 169,205    | 169,491    | 170,001    |
| Ind., Inst., & Cmcl. Interrup. Therms | 710,656    | 710,656    | 713,293    | 710,556    | 717,455    | 717,556    | 720,218    | 717,556    | 724,455    | 724,353    |
| <b>Total Core Therms</b>              | 6,780,342  | 6,840,797  | 6,940,743  | 6,961,668  | 7,030,403  | 7,093,009  | 7,195,802  | 7,217,356  | 7,289,436  | 7,349,683  |
| Daily BaseLoad Therms                 | 5,779      | 5,823      | 5,851      | 5,871      | 5,845      | 5,817      | 5,947      | 4,688      | 4,680      | 4,702      |
| Peak Day Therms                       | 71,515     | 72,208     | 73,704     | 74,411     | 75,169     | 75,884     | 75,768     | 77,322     | 78,095     | 78,825     |
| Therms Per Residential Customer       | 578        | 578        | 581        | 577        | 577        | 577        | 581        | 577        | 577        | 577        |
| Therms Per Commercial Customer        | 3,151      | 3,151      | 3,169      | 3,150      | 3,151      | 3,151      | 3,169      | 3,152      | 3,152      | 3,152      |
| Therms Per Industrial Customer        | 27,003     | 27,015     | 27,204     | 27,013     | 27,001     | 27,015     | 27,204     | 27,015     | 27,003     | 27,013     |
| Residential Customers                 | 6,125      | 6,230      | 6,335      | 6,441      | 6,548      | 6,655      | 6,763      | 6,871      | 6,980      | 7,089      |
| Commercial Customers                  | 751        | 751        | 751        | 751        | 750        | 750        | 750        | 750        | 750        | 750        |
| Industrial Customers                  | 6          | 6          | 6          | 6          | 6          | 6          | 6          | 6          | 6          | 6          |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 6,883      | 6,988      | 7,093      | 7,199      | 7,306      | 7,413      | 7,520      | 7,628      | 7,737      | 7,847      |
| <b>Prineville</b>                     | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 2.48%      | 2.47%      | 2.92%      | 1.88%      | 2.36%      | 2.37%      | 2.81%      | 1.79%      | 2.24%      | 2.21%      |
| Residential Therms                    | 2,541,827  | 2,642,661  | 2,758,555  | 2,847,571  | 2,952,208  | 3,058,798  | 3,181,854  | 3,274,382  | 3,383,993  | 3,493,993  |
| Commercial Therms                     | 1,962,196  | 1,977,083  | 2,000,786  | 2,005,588  | 2,019,661  | 2,035,175  | 2,059,314  | 2,064,450  | 2,078,665  | 2,093,355  |
| Industrial Therms                     | 199,941    | 200,419    | 201,802    | 201,345    | 201,845    | 202,367    | 203,759    | 203,338    | 203,838    | 204,282    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 4,703,964  | 4,820,163  | 4,961,144  | 5,054,504  | 5,173,714  | 5,444,927  | 5,444,927  | 5,542,170  | 5,666,497  | 5,791,628  |
| Daily BaseLoad Therms                 | 3,108      | 3,119      | 3,193      | 3,218      | 3,260      | 3,335      | 3,038      | 3,000      | 3,154      | 3,179      |
| Peak Day Therms                       | 46,623     | 47,767     | 50,094     | 51,312     | 52,534     | 53,778     | 53,761     | 56,297     | 57,570     | 58,866     |
| Therms Per Residential Customer       | 584        | 584        | 587        | 583        | 583        | 584        | 586        | 583        | 583        | 583        |
| Therms Per Commercial Customer        | 3,450      | 3,449      | 3,464      | 3,445      | 3,442      | 3,442      | 3,456      | 3,439      | 3,436      | 3,435      |
| Therms Per Industrial Customer        | 6,719      | 6,719      | 6,748      | 6,717      | 6,717      | 6,719      | 6,748      | 6,719      | 6,719      | 6,717      |
| Residential Customers                 | 4,355      | 4,528      | 4,703      | 4,881      | 5,060      | 5,242      | 5,426      | 5,612      | 5,800      | 5,990      |
| Commercial Customers                  | 569        | 573        | 578        | 582        | 587        | 591        | 596        | 600        | 605        | 610        |
| Industrial Customers                  | 30         | 30         | 30         | 30         | 30         | 30         | 30         | 30         | 30         | 30         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 4,954      | 5,131      | 5,311      | 5,493      | 5,677      | 5,863      | 6,052      | 6,242      | 6,435      | 6,630      |
| <b>Redmond</b>                        | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 3.92%      | 3.83%      | 4.25%      | 3.10%      | 3.56%      | 3.52%      | 3.92%      | 2.83%      | 3.26%      | 3.16%      |
| Residential Therms                    | 7,336,787  | 7,657,783  | 8,022,493  | 8,310,299  | 8,644,541  | 8,988,514  | 9,376,659  | 9,677,112  | 10,028,734 | 10,380,633 |
| Commercial Therms                     | 5,188,415  | 5,321,600  | 5,483,149  | 5,589,235  | 5,735,282  | 5,864,756  | 6,033,441  | 6,142,989  | 6,283,557  | 6,423,456  |
| Industrial Therms                     | 1,573,739  | 1,659,324  | 1,753,928  | 1,834,821  | 1,924,776  | 2,016,627  | 2,118,582  | 2,204,032  | 2,299,586  | 2,395,980  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 14,098,941 | 14,638,706 | 15,260,570 | 15,734,355 | 16,294,599 | 16,867,897 | 17,528,682 | 18,024,133 | 18,611,877 | 19,200,069 |
| Daily BaseLoad Therms                 | 9,696      | 9,812      | 10,176     | 10,286     | 10,531     | 8,649      | 8,708      | 8,888      | 9,199      | 9,237      |
| Peak Day Therms                       | 135,569    | 140,604    | 150,899    | 156,250    | 161,663    | 167,144    | 166,731    | 178,296    | 183,964    | 189,695    |
| Therms Per Residential Customer       | 747        | 747        | 751        | 747        | 747        | 747        | 751        | 747        | 747        | 747        |
| Therms Per Commercial Customer        | 3,207      | 3,206      | 3,221      | 3,203      | 3,202      | 3,202      | 3,218      | 3,201      | 3,200      | 3,198      |
| Therms Per Industrial Customer        | 38,788     | 38,790     | 38,953     | 38,784     | 38,784     | 38,794     | 38,958     | 38,798     | 38,798     | 38,790     |
| Residential Customers                 | 9,818      | 10,248     | 10,684     | 11,125     | 11,573     | 12,027     | 12,486     | 12,951     | 13,421     | 13,898     |
| Commercial Customers                  | 1,618      | 1,660      | 1,702      | 1,745      | 1,788      | 1,831      | 1,875      | 1,919      | 1,964      | 2,008      |
| Industrial Customers                  | 41         | 43         | 45         | 47         | 50         | 52         | 54         | 57         | 59         | 62         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 11,477     | 11,951     | 12,431     | 12,918     | 13,411     | 13,910     | 14,415     | 14,927     | 15,444     | 15,968     |

**Appendix B  
Demand Forecast  
High Scenario**

|                                       | 2030      | 2031      | 2032      | 2033      | 2034      | 2035      | 2036      | 2037      | 2038      | 2039      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Stanfield</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 1.92%     | 1.90%     | 2.38%     | 1.35%     | 1.83%     | 1.82%     | 2.30%     | 1.28%     | 1.76%     | 1.73%     |
| Residential Therms                    | 262,700   | 269,039   | 276,824   | 281,883   | 288,369   | 294,931   | 303,043   | 308,195   | 314,877   | 321,576   |
| Commercial Therms                     | 82,075    | 82,274    | 82,863    | 82,667    | 82,868    | 83,074    | 83,666    | 83,474    | 83,875    | 83,870    |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 344,776   | 351,313   | 359,687   | 364,550   | 371,237   | 378,005   | 386,710   | 391,669   | 398,552   | 405,447   |
| Daily BaseLoad Therms                 | 224       | 227       | 230       | 232       | 233       | 233       | 239       | 242       | 245       | 247       |
| Peak Day Therms                       | 3,895     | 3,970     | 4,078     | 4,155     | 4,232     | 4,310     | 4,355     | 4,468     | 4,547     | 4,627     |
| Therms Per Residential Customer       | 576       | 576       | 578       | 575       | 575       | 575       | 578       | 575       | 575       | 575       |
| Therms Per Commercial Customer        | 2,162     | 2,162     | 2,172     | 2,162     | 2,162     | 2,162     | 2,172     | 2,162     | 2,162     | 2,162     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 456       | 467       | 479       | 490       | 501       | 513       | 524       | 536       | 547       | 559       |
| Commercial Customers                  | 38        | 38        | 38        | 38        | 38        | 38        | 39        | 39        | 39        | 39        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 494       | 506       | 517       | 528       | 539       | 551       | 563       | 574       | 586       | 598       |
| <b>Stearns (Sunriver)</b>             |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 1.30%     | 1.28%     | 1.74%     | 0.81%     | 1.26%     | 1.24%     | 1.70%     | 0.77%     | 1.22%     | 1.21%     |
| Residential Therms                    | 4,414,644 | 4,483,314 | 4,574,047 | 4,622,070 | 4,691,800 | 4,761,713 | 4,855,172 | 4,903,101 | 4,974,201 | 5,045,810 |
| Commercial Therms                     | 1,101,434 | 1,104,117 | 1,110,940 | 1,109,535 | 1,112,219 | 1,114,850 | 1,121,714 | 1,120,217 | 1,122,900 | 1,125,665 |
| Industrial Therms                     | 46,047    | 46,141    | 46,415    | 46,347    | 46,496    | 46,590    | 46,865    | 46,794    | 46,944    | 47,039    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 5,562,125 | 5,633,573 | 5,731,402 | 5,777,952 | 5,850,515 | 5,923,154 | 6,023,750 | 6,070,113 | 6,144,045 | 6,218,515 |
| Daily BaseLoad Therms                 | 5,386     | 5,423     | 5,464     | 5,497     | 5,460     | 5,494     | 5,526     | 5,562     | 5,604     | 5,637     |
| Peak Day Therms                       | 47,863    | 48,515    | 48,970    | 49,626    | 50,286    | 50,949    | 51,830    | 52,286    | 52,958    | 53,635    |
| Therms Per Residential Customer       | 997       | 997       | 1,001     | 997       | 997       | 997       | 1,001     | 997       | 997       | 997       |
| Therms Per Commercial Customer        | 4,792     | 4,792     | 4,810     | 4,792     | 4,792     | 4,792     | 4,810     | 4,792     | 4,792     | 4,792     |
| Therms Per Industrial Customer        | 14,950    | 14,949    | 15,005    | 14,951    | 14,951    | 14,949    | 15,005    | 14,950    | 14,950    | 14,949    |
| Residential Customers                 | 4,430     | 4,498     | 4,568     | 4,638     | 4,707     | 4,778     | 4,849     | 4,920     | 4,991     | 5,063     |
| Commercial Customers                  | 230       | 230       | 231       | 232       | 232       | 233       | 233       | 234       | 234       | 235       |
| Industrial Customers                  | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         | 3         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 4,662     | 4,732     | 4,802     | 4,872     | 4,943     | 5,014     | 5,085     | 5,157     | 5,229     | 5,301     |
| <b>Pronghorn</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 4.79%     | 4.66%     | 5.00%     | 4.00%     | 4.32%     | 4.20%     | 4.57%     | 3.57%     | 3.92%     | 3.85%     |
| Residential Therms                    | 940,406   | 999,072   | 1,063,904 | 1,120,233 | 1,182,369 | 1,245,437 | 1,315,920 | 1,375,317 | 1,441,764 | 1,509,463 |
| Commercial Therms                     | 334,722   | 335,525   | 337,468   | 337,206   | 338,032   | 338,787   | 340,741   | 340,420   | 341,245   | 342,108   |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 1,275,127 | 1,334,598 | 1,401,373 | 1,457,439 | 1,520,401 | 1,584,225 | 1,656,662 | 1,715,737 | 1,783,009 | 1,851,572 |
| Daily BaseLoad Therms                 | 1,260     | 1,288     | 1,322     | 1,347     | 1,376     | 1,404     | 1,432     | 1,460     | 1,494     | 1,519     |
| Peak Day Therms                       | 10,896    | 11,447    | 11,810    | 12,374    | 12,948    | 13,531    | 14,365    | 14,731    | 15,344    | 15,967    |
| Therms Per Residential Customer       | 1,044     | 1,044     | 1,049     | 1,044     | 1,044     | 1,044     | 1,049     | 1,044     | 1,044     | 1,044     |
| Therms Per Commercial Customer        | 9,320     | 9,319     | 9,351     | 9,321     | 9,321     | 9,320     | 9,351     | 9,320     | 9,320     | 9,321     |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | 901       | 957       | 1,015     | 1,073     | 1,133     | 1,193     | 1,255     | 1,317     | 1,381     | 1,446     |
| Commercial Customers                  | 36        | 36        | 36        | 36        | 36        | 36        | 36        | 37        | 37        | 37        |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 937       | 993       | 1,051     | 1,109     | 1,169     | 1,229     | 1,291     | 1,354     | 1,418     | 1,482     |
| <b>North Bend</b>                     |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.61%     | 0.09%     | 0.12%     | -0.13%    | 0.87%     | -0.04%    | 0.19%     | -0.39%    | 0.65%     | 0.10%     |
| Residential Therms                    | 6,076     | 6,088     | 6,106     | 6,106     | 6,131     | 6,150     | 6,175     | 6,177     | 6,181     | 6,195     |
| Commercial Therms                     | 48,327    | 48,310    | 48,371    | 48,240    | 48,749    | 48,775    | 48,881    | 48,563    | 49,009    | 49,000    |
| Industrial Therms                     | 14,800    | 14,867    | 14,871    | 14,908    | 14,980    | 14,907    | 14,911    | 14,952    | 14,952    | 15,021    |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 69,203    | 69,265    | 69,348    | 69,255    | 69,860    | 69,832    | 69,967    | 69,692    | 70,142    | 70,216    |
| Daily BaseLoad Therms                 | 11        | 11        | 8         | (1)       | (6)       | (6)       | (6)       | (6)       | (7)       | (10)      |
| Peak Day Therms                       | 334       | 334       | 347       | 347       | 349       | 350       | 337       | 350       | 353       | 353       |
| Therms Per Residential Customer       | 1,480     | 1,479     | 1,480     | 1,477     | 1,479     | 1,480     | 1,483     | 1,479     | 1,477     | 1,477     |
| Therms Per Commercial Customer        | 320       | 304       | 291       | 277       | 267       | 256       | 246       | 235       | 228       | 219       |
| Therms Per Industrial Customer        | 7,220     | 7,217     | 7,219     | 7,202     | 7,237     | 7,167     | 7,169     | 7,154     | 7,154     | 7,153     |
| Residential Customers                 | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         |
| Commercial Customers                  | 151       | 159       | 166       | 174       | 182       | 190       | 199       | 207       | 215       | 224       |
| Industrial Customers                  | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         | 2         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 157       | 165       | 173       | 180       | 188       | 197       | 205       | 213       | 222       | 230       |

**Appendix B  
Demand Forecast  
High Scenario**

| Bend Loop                             | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>       | 2.98%      | 2.92%      | 3.36%      | 2.33%      | 2.77%      | 2.73%      | 3.16%      | 2.15%      | 2.59%      | 2.54%      |
| Residential Therms                    | 38,791,820 | 40,151,893 | 41,725,819 | 42,914,799 | 44,320,730 | 45,745,647 | 47,407,210 | 48,632,539 | 50,097,913 | 51,572,238 |
| Commercial Therms                     | 13,833,473 | 13,982,643 | 14,196,213 | 14,281,326 | 14,432,527 | 14,585,148 | 14,805,726 | 14,889,448 | 15,042,813 | 15,194,924 |
| Industrial Therms                     | 817,748    | 869,795    | 926,564    | 977,071    | 1,032,209  | 1,088,421  | 1,150,168  | 1,203,822  | 1,262,889  | 1,322,736  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 53,443,041 | 55,004,330 | 56,850,596 | 58,173,195 | 59,785,467 | 61,419,217 | 63,363,103 | 64,725,809 | 66,403,616 | 68,090,898 |
| Daily BaseLoad Therms                 | 41,372     | 41,998     | 42,829     | 43,476     | 42,121     | 42,973     | 43,575     | 44,288     | 45,090     | 45,684     |
| Peak Day Therms                       | 492,897    | 507,154    | 526,515    | 541,216    | 556,075    | 571,076    | 580,719    | 601,523    | 616,972    | 632,558    |
| Therms Per Residential Customer       | 741        | 741        | 744        | 741        | 741        | 741        | 744        | 741        | 741        | 741        |
| Therms Per Commercial Customer        | 2,895      | 2,894      | 2,906      | 2,892      | 2,891      | 2,890      | 2,902      | 2,888      | 2,887      | 2,887      |
| Therms Per Industrial Customer        | 12,344     | 12,344     | 12,392     | 12,343     | 12,343     | 12,344     | 12,392     | 12,344     | 12,345     | 12,343     |
| Residential Customers                 | 52,354     | 54,189     | 56,046     | 57,923     | 59,821     | 61,739     | 63,677     | 65,635     | 67,612     | 69,609     |
| Commercial Customers                  | 4,779      | 4,832      | 4,885      | 4,939      | 4,993      | 5,047      | 5,101      | 5,155      | 5,210      | 5,265      |
| Industrial Customers                  | 66         | 70         | 75         | 79         | 84         | 88         | 93         | 98         | 102        | 107        |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 57,199     | 59,092     | 61,006     | 62,941     | 64,897     | 66,874     | 68,871     | 70,888     | 72,925     | 74,981     |
| <b>McCleary (Aberdeen/Hoquiam)</b>    | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 0.62%      | 0.68%      | 1.11%      | 0.15%      | 0.61%      | 0.70%      | 1.10%      | 0.17%      | 0.61%      | 0.62%      |
| Residential Therms                    | 2,913,304  | 2,945,568  | 2,993,535  | 3,009,495  | 3,042,089  | 3,075,768  | 3,124,872  | 3,141,588  | 3,174,473  | 3,206,839  |
| Commercial Therms                     | 3,020,501  | 3,029,564  | 3,049,051  | 3,043,280  | 3,048,937  | 3,059,007  | 3,078,628  | 3,073,728  | 3,079,390  | 3,087,505  |
| Industrial Therms                     | 285,099    | 285,811    | 287,713    | 287,100    | 287,777    | 288,589    | 290,504    | 289,979    | 290,656    | 291,266    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 6,218,904  | 6,260,943  | 6,330,300  | 6,339,875  | 6,378,803  | 6,423,364  | 6,494,004  | 6,505,295  | 6,544,719  | 6,588,611  |
| Daily BaseLoad Therms                 | 6,165      | 6,153      | 6,231      | 6,200      | 6,186      | 6,237      | 6,234      | 6,300      | 6,330      | 6,401      |
| Peak Day Therms                       | 51,565     | 51,934     | 54,334     | 54,718     | 55,085     | 55,471     | 53,740     | 56,228     | 56,600     | 56,994     |
| Therms Per Residential Customer       | 717        | 717        | 720        | 716        | 716        | 717        | 720        | 717        | 717        | 716        |
| Therms Per Commercial Customer        | 4,060      | 4,062      | 4,079      | 4,061      | 4,059      | 4,062      | 4,079      | 4,062      | 4,060      | 4,061      |
| Therms Per Industrial Customer        | 19,846     | 19,846     | 19,931     | 19,839     | 19,839     | 19,846     | 19,930     | 19,846     | 19,846     | 19,846     |
| Residential Customers                 | 4,065      | 4,110      | 4,155      | 4,201      | 4,246      | 4,292      | 4,338      | 4,384      | 4,430      | 4,477      |
| Commercial Customers                  | 744        | 746        | 748        | 749        | 751        | 753        | 755        | 757        | 758        | 760        |
| Industrial Customers                  | 14         | 14         | 14         | 14         | 15         | 15         | 15         | 15         | 15         | 15         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 4,823      | 4,870      | 4,917      | 4,964      | 5,012      | 5,059      | 5,107      | 5,155      | 5,203      | 5,252      |
| <b>Acme</b>                           | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 0.25%      | 0.24%      | 0.73%      | -0.25%     | 0.25%      | 0.25%      | 0.73%      | -0.25%     | 0.25%      | 0.23%      |
| Residential Therms                    | 56,784     | 56,922     | 57,337     | 57,194     | 57,332     | 57,475     | 57,893     | 57,752     | 57,890     | 58,025     |
| Commercial Therms                     | 32,550     | 32,627     | 32,864     | 32,777     | 32,864     | 32,944     | 33,182     | 33,097     | 33,184     | 33,259     |
| Industrial Therms                     | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 89,333     | 89,549     | 90,201     | 89,971     | 90,197     | 90,419     | 91,075     | 90,849     | 91,074     | 91,284     |
| Daily BaseLoad Therms                 | 64         | 64         | 64         | 64         | 64         | 64         | 64         | 64         | 64         | 64         |
| Peak Day Therms                       | 743        | 744        | 753        | 755        | 757        | 759        | 753        | 762        | 764        | 766        |
| Therms Per Residential Customer       | 814        | 814        | 818        | 814        | 814        | 814        | 818        | 814        | 814        | 814        |
| Therms Per Commercial Customer        | 3,524      | 3,524      | 3,541      | 3,523      | 3,524      | 3,524      | 3,541      | 3,524      | 3,524      | 3,524      |
| Therms Per Industrial Customer        | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Residential Customers                 | 70         | 70         | 70         | 70         | 70         | 71         | 71         | 71         | 71         | 71         |
| Commercial Customers                  | 9          | 9          | 9          | 9          | 9          | 9          | 9          | 9          | 9          | 9          |
| Industrial Customers                  | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 79         | 79         | 79         | 80         | 80         | 80         | 80         | 80         | 81         | 81         |
| <b>Arlington</b>                      | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 1.84%      | 1.82%      | 2.29%      | 1.30%      | 1.77%      | 1.78%      | 2.22%      | 1.26%      | 1.71%      | 1.68%      |
| Residential Therms                    | 3,594,253  | 3,621,871  | 3,667,242  | 3,676,645  | 3,704,463  | 3,733,148  | 3,779,338  | 3,789,268  | 3,817,379  | 3,844,733  |
| Commercial Therms                     | 2,509,036  | 2,563,431  | 2,630,461  | 2,673,075  | 2,728,609  | 2,785,155  | 2,854,732  | 2,896,438  | 2,955,505  | 3,012,264  |
| Industrial Therms                     | 857,438    | 902,168    | 951,865    | 993,763    | 1,040,668  | 1,088,549  | 1,141,942  | 1,186,117  | 1,235,859  | 1,285,971  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 6,960,728  | 7,087,470  | 7,249,568  | 7,343,482  | 7,473,740  | 7,606,853  | 7,776,012  | 7,873,823  | 8,008,743  | 8,142,968  |
| Daily BaseLoad Therms                 | 6,355      | 6,309      | 6,513      | 6,550      | 6,629      | 6,755      | 6,782      | 6,861      | 6,034      | 6,089      |
| Peak Day Therms                       | 52,425     | 53,340     | 55,844     | 56,806     | 57,716     | 58,753     | 58,067     | 60,741     | 61,743     | 62,753     |
| Therms Per Residential Customer       | 691        | 691        | 695        | 691        | 691        | 691        | 695        | 691        | 691        | 691        |
| Therms Per Commercial Customer        | 3,153      | 3,153      | 3,167      | 3,152      | 3,152      | 3,153      | 3,167      | 3,153      | 3,153      | 3,152      |
| Therms Per Industrial Customer        | 13,914     | 13,914     | 13,975     | 13,911     | 13,910     | 13,913     | 13,974     | 13,913     | 13,913     | 13,910     |
| Residential Customers                 | 5,199      | 5,239      | 5,279      | 5,319      | 5,360      | 5,400      | 5,441      | 5,481      | 5,522      | 5,563      |
| Commercial Customers                  | 796        | 813        | 830        | 848        | 866        | 883        | 901        | 919        | 937        | 956        |
| Industrial Customers                  | 62         | 65         | 68         | 71         | 75         | 78         | 82         | 85         | 89         | 92         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 6,057      | 6,117      | 6,178      | 6,239      | 6,300      | 6,362      | 6,424      | 6,486      | 6,548      | 6,611      |
| <b>Bremerton (Shelton)</b>            | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 1.49%      | 1.49%      | 1.92%      | 0.99%      | 1.44%      | 1.45%      | 1.87%      | 0.95%      | 1.40%      | 1.39%      |
| Residential Therms                    | 29,955,903 | 30,621,841 | 31,446,315 | 31,966,083 | 32,646,418 | 33,333,805 | 34,190,843 | 34,718,335 | 35,417,614 | 36,119,023 |
| Commercial Therms                     | 23,344,138 | 23,506,657 | 23,746,861 | 23,827,049 | 23,986,541 | 24,152,400 | 24,478,429 | 24,478,429 | 24,839,833 | 25,084,376 |
| Industrial Therms                     | 455,770    | 456,867    | 460,207    | 459,054    | 460,180    | 461,309    | 464,671    | 463,527    | 464,653    | 465,719    |
| Ind., Inst., & Cmcl. Interrup. Therms | 2,620,676  | 2,629,184  | 2,639,074  | 2,637,499  | 2,646,007  | 2,654,710  | 2,664,696  | 2,663,219  | 2,671,728  | 2,680,339  |
| <b>Total Core Therms</b>              | 56,376,487 | 57,214,549 | 58,312,457 | 58,889,685 | 59,739,146 | 60,602,425 | 61,737,831 | 62,323,510 | 63,193,829 | 64,069,157 |
| Daily BaseLoad Therms                 | 55,642     | 55,945     | 56,460     | 56,760     | 57,179     | 57,937     | 56,782     | 54,682     | 55,198     | 55,081     |
| Peak Day Therms                       | 447,053    | 454,198    | 465,298    | 472,594    | 479,871    | 487,258    | 490,315    | 502,050    | 509,508    | 517,074    |
| Therms Per Residential Customer       | 691        | 691        | 694        | 691        | 691        | 691        | 694        | 691        | 691        | 691        |
| Therms Per Commercial Customer        | 6,710      | 6,685      | 6,688      | 6,634      | 6,609      | 6,586      | 6,590      | 6,539      | 6,515      | 6,493      |
| Therms Per Industrial Customer        | 29,610     | 29,609     | 29,753     | 29,607     | 29,608     | 29,609     | 29,753     | 29,609     | 29,610     | 29,607     |
| Residential Customers                 | 43,360     | 44,324     | 45,296     | 46,274     | 47,259     | 48,252     | 49,251     | 50,256     | 51,269     | 52,288     |
| Commercial Customers                  | 3,479      | 3,516      | 3,554      | 3,591      | 3,629      | 3,667      | 3,705      | 3,744      | 3,782      | 3,820      |
| Industrial Customers                  | 15         | 15         | 15         | 16         | 16         | 16         | 16         | 16         | 16         | 16         |
| Interruptible Customers               | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| <b>Total Core Customers</b>           | 46,857     | 47,859     | 48,868     | 49,884     | 50,907     | 51,938     | 52,975     | 54,019     | 55,070     | 56,128     |





**Appendix B  
Demand Forecast  
High Scenario**

|                                       | 2030      | 2031      | 2032      | 2033      | 2034      | 2035      | 2036      | 2037      | 2038      | 2039      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Patterson</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.96%     | -0.02%    | 0.29%     | -0.26%    | 0.92%     | 0.05%     | 0.24%     | -0.25%    | 0.97%     | -0.01%    |
| Residential Therms                    | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Commercial Therms                     | 264,055   | 264,002   | 264,773   | 264,081   | 266,511   | 266,636   | 267,264   | 266,601   | 269,191   | 269,173   |
| Industrial Therms                     | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 264,055   | 264,002   | 264,773   | 264,081   | 266,511   | 266,636   | 267,264   | 266,601   | 269,191   | 269,173   |
| Daily BaseLoad Therms                 | 227       | 227       | 200       | 193       | 227       | 227       | 227       | 227       | 200       | 193       |
| Peak Day Therms                       | 1,295     | 1,295     | 1,331     | 1,331     | 1,343     | 1,343     | 1,308     | 1,344     | 1,356     | 1,356     |
| Therms Per Residential Customer       | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Therms Per Commercial Customer        | 51,422    | 51,312    | 51,362    | 51,129    | 51,400    | 51,326    | 51,348    | 51,122    | 51,421    | 51,320    |
| Therms Per Industrial Customer        | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Residential Customers                 | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Commercial Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| Industrial Customers                  | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| <b>Prosser</b>                        |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.26%     | 0.24%     | 0.79%     | -0.36%    | 0.26%     | 0.29%     | 0.79%     | -0.31%    | 0.26%     | 0.19%     |
| Residential Therms                    | 266,546   | 267,197   | 269,519   | 268,382   | 269,031   | 269,794   | 272,133   | 271,092   | 271,743   | 272,289   |
| Commercial Therms                     | 504,348   | 505,568   | 509,515   | 507,788   | 509,015   | 510,483   | 514,456   | 512,945   | 514,177   | 515,172   |
| Industrial Therms                     | 233,618   | 234,152   | 235,815   | 235,041   | 235,765   | 236,428   | 238,101   | 237,446   | 238,170   | 238,573   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 1,004,513 | 1,006,917 | 1,014,849 | 1,011,212 | 1,013,811 | 1,016,705 | 1,024,690 | 1,021,483 | 1,024,091 | 1,026,033 |
| Daily BaseLoad Therms                 | 1,014     | 1,018     | 1,033     | 1,019     | 1,019     | 1,030     | 1,018     | 1,018     | 1,033     | 756       |
| Peak Day Therms                       | 9,324     | 9,346     | 9,852     | 9,875     | 9,902     | 9,925     | 9,458     | 9,971     | 9,997     | 10,022    |
| Therms Per Residential Customer       | 585       | 585       | 589       | 585       | 585       | 585       | 589       | 585       | 585       | 585       |
| Therms Per Commercial Customer        | 3,637     | 3,637     | 3,656     | 3,635     | 3,635     | 3,637     | 3,656     | 3,637     | 3,637     | 3,635     |
| Therms Per Industrial Customer        | 45,525    | 45,525    | 45,737    | 45,484    | 45,500    | 45,525    | 45,737    | 45,509    | 45,525    | 45,500    |
| Residential Customers                 | 456       | 457       | 458       | 459       | 460       | 461       | 462       | 463       | 464       | 465       |
| Commercial Customers                  | 139       | 139       | 139       | 140       | 140       | 140       | 141       | 141       | 141       | 142       |
| Industrial Customers                  | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         | 5         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 600       | 601       | 602       | 604       | 605       | 607       | 608       | 609       | 611       | 612       |
| <b>Quincy</b>                         |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.51%     | 0.15%     | 0.56%     | -0.26%    | 0.51%     | 0.16%     | 0.56%     | -0.25%    | 0.50%     | 0.14%     |
| Residential Therms                    | 26,655    | 26,721    | 26,918    | 26,848    | 26,913    | 26,980    | 27,179    | 27,110    | 27,175    | 27,238    |
| Commercial Therms                     | 701,826   | 702,780   | 706,629   | 704,644   | 708,583   | 709,608   | 713,485   | 711,543   | 715,482   | 716,382   |
| Industrial Therms                     | 109,967   | 110,235   | 110,926   | 110,759   | 111,027   | 111,306   | 112,002   | 111,842   | 112,110   | 112,366   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 838,448   | 839,735   | 844,473   | 842,251   | 846,523   | 847,894   | 852,665   | 850,495   | 854,767   | 856,987   |
| Daily BaseLoad Therms                 | 1,380     | 1,381     | 1,384     | 1,381     | 1,381     | 1,383     | 1,381     | 1,381     | 1,384     | 1,381     |
| Peak Day Therms                       | 6,193     | 6,204     | 6,301     | 6,312     | 6,338     | 6,350     | 6,276     | 6,373     | 6,399     | 6,412     |
| Therms Per Residential Customer       | 426       | 426       | 428       | 426       | 426       | 426       | 428       | 426       | 426       | 426       |
| Therms Per Commercial Customer        | 9,242     | 9,233     | 9,261     | 9,213     | 9,241     | 9,232     | 9,261     | 9,214     | 9,242     | 9,232     |
| Therms Per Industrial Customer        | 26,789    | 26,789    | 26,891    | 26,786    | 26,786    | 26,788    | 26,891    | 26,788    | 26,788    | 26,786    |
| Residential Customers                 | 63        | 63        | 63        | 63        | 63        | 63        | 64        | 64        | 64        | 64        |
| Commercial Customers                  | 76        | 76        | 76        | 76        | 77        | 77        | 77        | 77        | 77        | 78        |
| Industrial Customers                  | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         | 4         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 143       | 143       | 143       | 144       | 144       | 144       | 145       | 145       | 145       | 146       |
| <b>Sunnyside</b>                      |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 0.48%     | 0.50%     | 0.96%     | 0.00%     | 0.48%     | 0.52%     | 0.96%     | 0.01%     | 0.47%     | 0.47%     |
| Residential Therms                    | 1,105,579 | 1,108,271 | 1,116,940 | 1,113,463 | 1,116,157 | 1,119,045 | 1,127,772 | 1,124,432 | 1,127,127 | 1,129,669 |
| Commercial Therms                     | 1,843,462 | 1,857,125 | 1,879,290 | 1,883,435 | 1,896,432 | 1,910,571 | 1,933,133 | 1,937,507 | 1,950,656 | 1,964,201 |
| Industrial Therms                     | 599,727   | 601,211   | 604,756   | 603,946   | 605,429   | 607,054   | 610,620   | 609,931   | 611,415   | 612,754   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 3,548,768 | 3,566,606 | 3,600,986 | 3,600,844 | 3,618,018 | 3,636,670 | 3,671,525 | 3,671,870 | 3,689,198 | 3,706,625 |
| Daily BaseLoad Therms                 | 2,476     | 2,490     | 2,189     | 2,147     | 2,518     | 2,537     | 2,535     | 2,508     | 2,070     | 2,193     |
| Peak Day Therms                       | 35,199    | 35,381    | 36,236    | 36,421    | 36,598    | 36,784    | 36,266    | 37,148    | 37,326    | 37,517    |
| Therms Per Residential Customer       | 571       | 572       | 577       | 575       | 576       | 577       | 582       | 580       | 581       | 582       |
| Therms Per Commercial Customer        | 3,246     | 3,245     | 3,259     | 3,241     | 3,239     | 3,239     | 3,253     | 3,236     | 3,235     | 3,233     |
| Therms Per Industrial Customer        | 34,378    | 34,379    | 34,500    | 34,370    | 34,370    | 34,379    | 34,500    | 34,378    | 34,378    | 34,371    |
| Residential Customers                 | 1,936     | 1,936     | 1,937     | 1,937     | 1,938     | 1,939     | 1,939     | 1,939     | 1,940     | 1,940     |
| Commercial Customers                  | 568       | 572       | 577       | 581       | 585       | 590       | 594       | 599       | 603       | 608       |
| Industrial Customers                  | 17        | 17        | 18        | 18        | 18        | 18        | 18        | 18        | 18        | 18        |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 2,521     | 2,526     | 2,531     | 2,536     | 2,541     | 2,546     | 2,551     | 2,556     | 2,561     | 2,565     |
| <b>Moses Lake</b>                     |           |           |           |           |           |           |           |           |           |           |
| Total Therms Pct. Growth              | 1.20%     | 1.19%     | 1.69%     | 0.66%     | 1.17%     | 1.18%     | 1.66%     | 0.65%     | 1.14%     | 1.12%     |
| Residential Therms                    | 310,207   | 310,961   | 313,404   | 312,420   | 313,177   | 313,994   | 316,443   | 315,495   | 316,253   | 316,967   |
| Commercial Therms                     | 2,975,447 | 3,015,082 | 3,070,305 | 3,094,535 | 3,134,880 | 3,176,022 | 3,232,963 | 3,257,931 | 3,299,260 | 3,340,226 |
| Industrial Therms                     | 134,136   | 134,458   | 135,211   | 135,056   | 135,424   | 135,764   | 136,522   | 136,381   | 136,749   | 137,052   |
| Ind., Inst., & Cmcl. Interrup. Therms | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Therms                     | 3,419,810 | 3,460,500 | 3,518,920 | 3,542,012 | 3,583,482 | 3,625,770 | 3,685,928 | 3,709,807 | 3,752,262 | 3,794,245 |
| Daily BaseLoad Therms                 | 4,048     | 4,085     | 4,130     | 4,145     | 4,177     | 4,225     | 4,246     | 4,278     | 4,324     | 4,291     |
| Peak Day Therms                       | 33,250    | 33,644    | 34,651    | 35,055    | 35,463    | 35,873    | 35,645    | 36,698    | 37,115    | 37,535    |
| Therms Per Residential Customer       | 427       | 428       | 431       | 429       | 429       | 430       | 433       | 431       | 432       | 432       |
| Therms Per Commercial Customer        | 6,199     | 6,157     | 6,147     | 6,075     | 6,037     | 6,001     | 5,994     | 5,929     | 5,895     | 5,861     |
| Therms Per Industrial Customer        | 18,671    | 18,673    | 18,734    | 18,667    | 18,668    | 18,672    | 18,734    | 18,670    | 18,671    | 18,670    |
| Residential Customers                 | 726       | 727       | 728       | 729       | 730       | 730       | 731       | 732       | 733       | 734       |
| Commercial Customers                  | 480       | 490       | 500       | 509       | 519       | 529       | 539       | 549       | 560       | 570       |
| Industrial Customers                  | 7         | 7         | 7         | 7         | 7         | 7         | 7         | 7         | 7         | 7         |
| Interruptible Customers               | -         | -         | -         | -         | -         | -         | -         | -         | -         | -         |
| Total Core Customers                  | 1,213     | 1,224     | 1,235     | 1,245     | 1,256     | 1,267     | 1,278     | 1,289     | 1,300     | 1,311     |





**Appendix B  
Demand Forecast  
High Scenario**

| 7th Day School                        | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>       | 0.31%      | 0.00%      | 0.41%      | -0.26%     | 0.14%      | 0.00%      | 0.26%      | -0.26%     | 0.47%      | 0.00%      |
| Residential Therms                    | 8,995      | 9,017      | 9,063      | 9,061      | 9,083      | 9,105      | 9,151      | 9,149      | 9,171      | 9,193      |
| Commercial Therms                     | 11,470     | 11,448     | 11,467     | 11,402     | 11,373     | 11,350     | 11,369     | 11,307     | 11,284     | 11,262     |
| Industrial Therms                     | 9,909      | 9,909      | 9,969      | 9,955      | 10,005     | 10,005     | 10,019     | 10,005     | 10,148     | 10,148     |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 30,374     | 30,374     | 30,499     | 30,418     | 30,461     | 30,460     | 30,539     | 30,460     | 30,603     | 30,603     |
| Daily BaseLoad Therms                 | 28         | 28         | 28         | 28         | 28         | 28         | 28         | 26         | 28         | 28         |
| Peak Day Therms                       | 132        | 132        | 132        | 132        | 132        | 132        | 132        | 132        | 132        | 132        |
| Therms Per Residential Customer       | 1,096      | 1,096      | 1,099      | 1,096      | 1,096      | 1,096      | 1,099      | 1,096      | 1,096      | 1,096      |
| Therms Per Commercial Customer        | 2,228      | 2,228      | 2,235      | 2,228      | 2,227      | 2,227      | 2,235      | 2,228      | 2,228      | 2,228      |
| Therms Per Industrial Customer        | 9,620      | 9,620      | 9,679      | 9,665      | 9,620      | 9,620      | 9,634      | 9,620      | 9,665      | 9,665      |
| Residential Customers                 | 8          | 8          | 8          | 8          | 8          | 8          | 8          | 8          | 8          | 8          |
| Commercial Customers                  | 5          | 5          | 5          | 5          | 5          | 5          | 5          | 5          | 5          | 5          |
| Industrial Customers                  | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         | 14         |
| <b>Yakima Training Center</b>         | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 1.37%      | 1.36%      | 1.86%      | 0.84%      | 1.23%      | 1.32%      | 1.82%      | 0.80%      | 1.29%      | 1.28%      |
| Residential Therms                    | 31,540     | 32,820     | 34,279     | 35,434     | 36,740     | 38,105     | 39,654     | 40,846     | 42,242     | 43,648     |
| Commercial Therms                     | 409,248    | 413,975    | 420,825    | 423,493    | 428,268    | 433,050    | 440,064    | 442,698    | 447,552    | 452,422    |
| Industrial Therms                     | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 440,788    | 446,795    | 455,104    | 458,927    | 465,027    | 471,156    | 479,718    | 483,544    | 489,793    | 496,070    |
| Daily BaseLoad Therms                 | 253        | 255        | 258        | 262        | 265        | 267        | 269        | 271        | 274        | 274        |
| Peak Day Therms                       | 5,072      | 5,140      | 5,193      | 5,261      | 5,330      | 5,399      | 5,485      | 5,538      | 5,609      | 5,679      |
| Therms Per Residential Customer       | 798        | 798        | 801        | 798        | 798        | 797        | 801        | 797        | 797        | 797        |
| Therms Per Commercial Customer        | 3,317      | 3,317      | 3,334      | 3,317      | 3,317      | 3,317      | 3,334      | 3,317      | 3,317      | 3,317      |
| Therms Per Industrial Customer        | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Residential Customers                 | 40         | 41         | 43         | 44         | 46         | 48         | 50         | 51         | 53         | 55         |
| Commercial Customers                  | 123        | 125        | 126        | 128        | 129        | 131        | 132        | 133        | 135        | 136        |
| Industrial Customers                  | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 163        | 166        | 169        | 172        | 175        | 178        | 181        | 185        | 188        | 191        |
| <b>Burbank Heights Loop</b>           | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 3.94%      | 3.84%      | 4.44%      | 2.95%      | 3.57%      | 3.51%      | 4.11%      | 2.65%      | 3.27%      | 3.18%      |
| Residential Therms                    | 10,872,645 | 11,345,040 | 11,904,657 | 12,307,107 | 12,799,041 | 13,300,255 | 13,899,225 | 14,316,187 | 14,833,437 | 15,353,434 |
| Commercial Therms                     | 6,796,625  | 7,013,151  | 7,279,671  | 7,451,124  | 7,674,055  | 7,901,433  | 8,183,017  | 8,359,193  | 8,591,172  | 8,823,760  |
| Industrial Therms                     | 278,724    | 279,403    | 281,174    | 280,696    | 281,374    | 282,119    | 283,901    | 283,477    | 284,156    | 284,769    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 17,947,994 | 18,637,594 | 19,465,502 | 20,038,927 | 20,754,471 | 21,483,807 | 22,366,142 | 22,958,858 | 23,708,765 | 24,461,963 |
| Daily BaseLoad Therms                 | 13,813     | 14,246     | 14,662     | 14,902     | 15,112     | 15,200     | 15,979     | 16,326     | 16,756     | 16,433     |
| Peak Day Therms                       | 210,498    | 218,520    | 230,880    | 239,260    | 247,737    | 256,322    | 260,137    | 273,785    | 282,661    | 291,641    |
| Therms Per Residential Customer       | 548        | 548        | 552        | 548        | 548        | 548        | 552        | 548        | 548        | 548        |
| Therms Per Commercial Customer        | 3,948      | 3,943      | 3,964      | 3,932      | 3,928      | 3,924      | 3,946      | 3,916      | 3,913      | 3,908      |
| Therms Per Industrial Customer        | 22,637     | 22,637     | 22,726     | 22,632     | 22,632     | 22,634     | 22,721     | 22,633     | 22,633     | 22,628     |
| Residential Customers                 | 19,835     | 20,697     | 21,571     | 22,457     | 23,355     | 24,265     | 25,191     | 26,136     | 27,062     | 28,017     |
| Commercial Customers                  | 1,721      | 1,779      | 1,836      | 1,895      | 1,954      | 2,013      | 2,074      | 2,134      | 2,196      | 2,258      |
| Industrial Customers                  | 12         | 12         | 12         | 12         | 12         | 12         | 12         | 13         | 13         | 13         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 21,569     | 22,488     | 23,420     | 24,364     | 25,321     | 26,291     | 27,272     | 28,265     | 29,271     | 30,288     |
| <b>East Stanwood Loop</b>             | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 1.26%      | 1.22%      | 1.69%      | 0.73%      | 1.22%      | 1.20%      | 1.66%      | 0.71%      | 1.18%      | 1.15%      |
| Residential Therms                    | 6,494,803  | 6,589,539  | 6,717,632  | 6,780,215  | 6,876,302  | 6,973,359  | 7,105,146  | 7,168,149  | 7,266,039  | 7,363,820  |
| Commercial Therms                     | 5,403,439  | 5,459,689  | 5,542,486  | 5,574,647  | 5,634,096  | 5,691,776  | 5,776,657  | 5,809,158  | 5,869,602  | 5,927,354  |
| Industrial Therms                     | 458,931    | 460,426    | 462,834    | 462,403    | 463,387    | 464,911    | 467,332    | 466,917    | 467,901    | 469,366    |
| Ind., Inst., & Cmcl. Interrup. Therms | 98,134     | 98,134     | 98,392     | 98,124     | 99,077     | 99,087     | 99,347     | 99,087     | 100,040    | 100,030    |
| <b>Total Core Therms</b>              | 12,455,307 | 12,607,789 | 12,821,344 | 12,915,390 | 13,072,862 | 13,229,133 | 13,448,482 | 13,543,311 | 13,703,581 | 13,860,570 |
| Daily BaseLoad Therms                 | 12,254     | 12,351     | 12,462     | 12,521     | 12,608     | 12,726     | 12,786     | 12,742     | 12,854     | 12,051     |
| Peak Day Therms                       | 92,355     | 93,550     | 95,726     | 96,916     | 98,117     | 99,345     | 99,585     | 101,814    | 103,056    | 104,306    |
| Therms Per Residential Customer       | 656        | 656        | 659        | 656        | 656        | 656        | 659        | 656        | 656        | 656        |
| Therms Per Commercial Customer        | 4,748      | 4,730      | 4,735      | 4,697      | 4,683      | 4,667      | 4,673      | 4,637      | 4,624      | 4,608      |
| Therms Per Industrial Customer        | 153,489    | 153,989    | 154,794    | 154,650    | 155,455    | 156,010    | 156,823    | 156,684    | 157,014    | 157,505    |
| Residential Customers                 | 9,898      | 10,043     | 10,188     | 10,334     | 10,481     | 10,628     | 10,776     | 10,925     | 11,074     | 11,224     |
| Commercial Customers                  | 1,138      | 1,154      | 1,170      | 1,187      | 1,203      | 1,220      | 1,236      | 1,253      | 1,269      | 1,286      |
| Industrial Customers                  | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 11,040     | 11,201     | 11,363     | 11,525     | 11,688     | 11,851     | 12,016     | 12,181     | 12,347     | 12,514     |
| <b>Kennewick Loop</b>                 | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
| <b>Total Therms Pct. Growth</b>       | 3.40%      | 3.32%      | 3.88%      | 2.55%      | 3.13%      | 3.07%      | 3.63%      | 2.32%      | 2.89%      | 2.82%      |
| Residential Therms                    | 16,535,562 | 17,191,617 | 17,971,975 | 18,526,574 | 19,207,568 | 19,899,425 | 20,730,561 | 21,302,246 | 22,015,523 | 22,733,504 |
| Commercial Therms                     | 15,096,754 | 15,522,573 | 16,043,543 | 16,384,261 | 16,822,278 | 17,266,797 | 17,814,090 | 18,163,116 | 18,617,164 | 19,072,244 |
| Industrial Therms                     | 794,652    | 796,516    | 801,707    | 800,247    | 802,265    | 804,259    | 809,462    | 808,131    | 810,140    | 811,861    |
| Ind., Inst., & Cmcl. Interrup. Therms | 213,595    | 213,595    | 214,607    | 213,559    | 215,633    | 215,668    | 216,691    | 215,668    | 217,746    | 217,706    |
| <b>Total Core Therms</b>              | 32,640,563 | 33,724,301 | 35,031,832 | 35,924,641 | 37,047,735 | 38,186,150 | 39,570,824 | 40,489,161 | 41,640,549 | 42,835,416 |
| Daily BaseLoad Therms                 | 30,067     | 30,791     | 31,489     | 31,973     | 32,431     | 32,738     | 33,855     | 32,412     | 34,845     | 32,322     |
| Peak Day Therms                       | 353,831    | 365,809    | 382,820    | 395,224    | 407,783    | 420,462    | 427,765    | 446,221    | 459,315    | 472,524    |
| Therms Per Residential Customer       | 601        | 601        | 605        | 601        | 601        | 601        | 605        | 601        | 601        | 601        |
| Therms Per Commercial Customer        | 4,145      | 4,138      | 4,155      | 4,124      | 4,118      | 4,113      | 4,131      | 4,102      | 4,097      | 4,091      |
| Therms Per Industrial Customer        | 70,396     | 70,395     | 70,682     | 70,382     | 70,384     | 70,395     | 70,682     | 70,395     | 70,396     | 70,382     |
| Residential Customers                 | 27,525     | 28,617     | 29,724     | 30,844     | 31,978     | 33,126     | 34,287     | 35,462     | 36,650     | 37,851     |
| Commercial Customers                  | 3,642      | 3,751      | 3,862      | 3,973      | 4,085      | 4,198      | 4,313      | 4,428      | 4,545      | 4,662      |
| Industrial Customers                  | 11         | 11         | 11         | 11         | 11         | 11         | 11         | 11         | 12         | 12         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 31,179     | 32,381     | 33,597     | 34,829     | 36,076     | 37,337     | 38,613     | 39,903     | 41,207     | 42,525     |

Appendix B  
Demand Forecast  
High Scenario

|                                       | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Longview South Loop</b>            |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.92%      | 0.89%      | 1.43%      | 0.33%      | 0.92%      | 0.93%      | 1.43%      | 0.37%      | 0.92%      | 0.86%      |
| Residential Therms                    | 1,588,496  | 1,640,946  | 1,702,957  | 1,746,939  | 1,801,034  | 1,856,321  | 1,921,694  | 1,967,297  | 2,023,586  | 2,079,681  |
| Commercial Therms                     | 4,131,468  | 4,135,264  | 4,157,966  | 4,135,664  | 4,136,964  | 4,139,161  | 4,161,860  | 4,140,957  | 4,142,242  | 4,141,643  |
| Industrial Therms                     | 196,215    | 196,492    | 198,140    | 197,587    | 198,866    | 198,605    | 200,862    | 199,561    | 200,040    | 200,455    |
| Ind., Inst., & Cmcl. Interrup. Therms | 97,937     | 97,937     | 98,422     | 97,907     | 98,657     | 98,888     | 99,377     | 98,888     | 99,839     | 99,808     |
| Total Core Therms                     | 6,017,117  | 6,070,839  | 6,157,485  | 6,178,097  | 6,234,921  | 6,292,974  | 6,382,993  | 6,406,704  | 6,465,707  | 6,521,586  |
| Daily BaseLoad Therms                 | 4,787      | 4,794      | 4,887      | 4,865      | 4,894      | 4,991      | 4,948      | 4,945      | 7,038      | 7,016      |
| Peak Day Therms                       | 49,658     | 50,140     | 52,706     | 53,216     | 53,747     | 54,269     | 52,660     | 55,336     | 55,887     | 56,428     |
| Therms Per Residential Customer       | 522        | 522        | 524        | 521        | 521        | 522        | 524        | 522        | 522        | 521        |
| Therms Per Commercial Customer        | 4,570      | 4,571      | 4,596      | 4,572      | 4,573      | 4,576      | 4,601      | 4,578      | 4,579      | 4,579      |
| Therms Per Industrial Customer        | 14,709     | 14,709     | 14,781     | 14,704     | 14,704     | 14,709     | 14,781     | 14,709     | 14,709     | 14,704     |
| Residential Customers                 | 3,045      | 3,146      | 3,247      | 3,350      | 3,454      | 3,559      | 3,665      | 3,772      | 3,880      | 3,989      |
| Commercial Customers                  | 905        | 905        | 905        | 905        | 905        | 905        | 905        | 905        | 905        | 905        |
| Industrial Customers                  | 13         | 13         | 13         | 13         | 13         | 14         | 14         | 14         | 14         | 14         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 3,964      | 4,065      | 4,166      | 4,269      | 4,373      | 4,478      | 4,584      | 4,691      | 4,799      | 4,908      |
| <b>Sedro-Woolley Loop</b>             |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 1.64%      | 1.63%      | 2.13%      | 1.07%      | 1.58%      | 1.57%      | 2.06%      | 1.02%      | 1.52%      | 1.49%      |
| Residential Therms                    | 21,693,998 | 22,060,730 | 22,545,104 | 22,798,244 | 23,171,104 | 23,548,258 | 24,048,530 | 24,304,274 | 24,685,299 | 25,065,899 |
| Commercial Therms                     | 12,059,611 | 12,259,309 | 12,522,600 | 12,460,431 | 12,863,047 | 13,068,722 | 13,340,747 | 13,480,357 | 13,685,621 | 13,895,233 |
| Industrial Therms                     | 1,208,615  | 1,211,564  | 1,219,684  | 1,217,306  | 1,220,255  | 1,223,343  | 1,231,523  | 1,229,215  | 1,232,164  | 1,235,007  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 34,962,224 | 35,531,603 | 36,287,388 | 36,475,982 | 37,254,407 | 37,840,322 | 38,620,803 | 39,013,846 | 39,605,805 | 40,196,140 |
| Daily BaseLoad Therms                 | 32,661     | 32,910     | 33,445     | 33,599     | 33,941     | 34,383     | 34,623     | 33,813     | 33,452     | 33,700     |
| Peak Day Therms                       | 286,179    | 290,876    | 299,112    | 303,918    | 308,741    | 313,601    | 314,728    | 323,389    | 328,317    | 333,284    |
| Therms Per Residential Customer       | 682        | 682        | 685        | 681        | 681        | 681        | 685        | 681        | 681        | 681        |
| Therms Per Commercial Customer        | 2,909      | 2,904      | 2,914      | 2,895      | 2,890      | 2,886      | 2,896      | 2,877      | 2,873      | 2,869      |
| Therms Per Industrial Customer        | 13,501     | 13,500     | 13,557     | 13,498     | 13,499     | 13,499     | 13,556     | 13,498     | 13,498     | 13,498     |
| Residential Customers                 | 31,828     | 32,368     | 32,910     | 33,456     | 34,005     | 34,557     | 35,112     | 35,670     | 36,230     | 36,794     |
| Commercial Customers                  | 4,145      | 4,221      | 4,297      | 4,374      | 4,451      | 4,529      | 4,607      | 4,685      | 4,764      | 4,843      |
| Industrial Customers                  | 90         | 90         | 90         | 90         | 90         | 91         | 91         | 91         | 91         | 92         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 36,063     | 36,678     | 37,297     | 37,920     | 38,546     | 39,176     | 39,809     | 40,446     | 41,086     | 41,729     |
| <b>Sumas SPE Loop</b>                 |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 1.91%      | 1.88%      | 2.36%      | 1.33%      | 1.82%      | 1.81%      | 2.28%      | 1.26%      | 1.74%      | 1.71%      |
| Residential Therms                    | 40,802,799 | 41,581,999 | 42,580,177 | 43,150,401 | 43,944,250 | 44,748,056 | 45,781,885 | 46,360,331 | 47,173,644 | 47,986,223 |
| Commercial Therms                     | 19,919,289 | 20,212,976 | 20,607,722 | 20,802,692 | 21,101,165 | 21,403,453 | 21,810,134 | 22,007,678 | 22,312,156 | 22,615,083 |
| Industrial Therms                     | 3,087,262  | 3,215,545  | 3,359,212  | 3,477,097  | 3,610,460  | 3,745,964  | 3,898,495  | 4,021,324  | 4,161,275  | 4,302,212  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 63,809,349 | 65,010,521 | 66,547,111 | 67,430,190 | 68,655,875 | 69,897,473 | 71,490,514 | 72,389,333 | 73,647,075 | 74,903,517 |
| Daily BaseLoad Therms                 | 69,629     | 70,312     | 71,172     | 71,839     | 72,702     | 73,761     | 74,677     | 75,563     | 76,427     | 76,823     |
| Peak Day Therms                       | 476,997    | 485,865    | 502,542    | 511,662    | 520,845    | 530,085    | 531,065    | 548,734    | 558,144    | 567,610    |
| Therms Per Residential Customer       | 726        | 726        | 729        | 725        | 725        | 725        | 729        | 725        | 725        | 725        |
| Therms Per Commercial Customer        | 3,164      | 3,161      | 3,172      | 3,153      | 3,150      | 3,146      | 3,158      | 3,140      | 3,137      | 3,133      |
| Therms Per Industrial Customer        | 24,761     | 24,761     | 24,859     | 24,757     | 24,757     | 24,760     | 24,859     | 24,760     | 24,759     | 24,756     |
| Residential Customers                 | 56,237     | 57,312     | 58,394     | 59,484     | 60,580     | 61,682     | 62,792     | 63,908     | 65,031     | 66,160     |
| Commercial Customers                  | 6,295      | 6,395      | 6,496      | 6,598      | 6,700      | 6,802      | 6,905      | 7,009      | 7,113      | 7,218      |
| Industrial Customers                  | 125        | 130        | 135        | 140        | 146        | 151        | 157        | 162        | 168        | 174        |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Customers                  | 62,656     | 63,837     | 65,026     | 66,222     | 67,425     | 68,636     | 69,854     | 71,079     | 72,312     | 73,551     |
| <b>Yakima Loop</b>                    |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 1.94%      | 1.92%      | 2.46%      | 1.27%      | 1.85%      | 1.87%      | 2.37%      | 1.23%      | 1.77%      | 1.71%      |
| Residential Therms                    | 15,582,754 | 15,875,098 | 16,260,736 | 16,459,870 | 16,757,521 | 17,062,622 | 17,462,070 | 17,667,131 | 17,972,072 | 18,272,579 |
| Commercial Therms                     | 15,075,597 | 15,312,823 | 15,638,178 | 15,785,065 | 16,026,143 | 16,274,453 | 16,610,208 | 16,762,851 | 17,009,195 | 17,249,815 |
| Industrial Therms                     | 4,579,551  | 4,725,736  | 4,898,028  | 5,020,728  | 5,171,312  | 5,325,836  | 5,507,018  | 5,634,965  | 5,791,554  | 5,946,756  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 35,237,901 | 35,913,658 | 36,796,942 | 37,265,663 | 37,954,976 | 38,662,910 | 39,579,295 | 40,064,947 | 40,772,821 | 41,469,151 |
| Daily BaseLoad Therms                 | 27,948     | 28,359     | 29,111     | 29,150     | 29,523     | 30,220     | 30,220     | 30,592     | 31,372     | 31,382     |
| Peak Day Therms                       | 372,045    | 379,891    | 400,414    | 407,688    | 415,014    | 422,379    | 415,205    | 427,248    | 444,755    | 452,299    |
| Therms Per Residential Customer       | 649        | 649        | 653        | 649        | 649        | 649        | 649        | 649        | 649        | 648        |
| Therms Per Commercial Customer        | 3,556      | 3,553      | 3,570      | 3,546      | 3,543      | 3,542      | 3,559      | 3,537      | 3,535      | 3,531      |
| Therms Per Industrial Customer        | 37,452     | 37,453     | 37,639     | 37,437     | 37,437     | 37,454     | 37,441     | 37,455     | 37,456     | 37,439     |
| Residential Customers                 | 24,004     | 24,457     | 24,913     | 25,371     | 25,833     | 26,297     | 26,765     | 27,235     | 27,707     | 28,183     |
| Commercial Customers                  | 4,240      | 4,310      | 4,381      | 4,452      | 4,523      | 4,595      | 4,667      | 4,739      | 4,812      | 4,885      |
| Industrial Customers                  | 122        | 126        | 130        | 134        | 138        | 142        | 146        | 150        | 155        | 159        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 28,367     | 28,894     | 29,425     | 29,958     | 30,495     | 31,035     | 31,579     | 32,125     | 32,675     | 33,228     |
| <b>Zone 10</b>                        |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.40%      | 0.29%      | 0.82%      | -0.30%     | 0.40%      | 0.35%      | 0.82%      | -0.24%     | 0.40%      | 0.23%      |
| Residential Therms                    | 3,224,390  | 3,231,730  | 3,256,130  | 3,244,707  | 3,252,020  | 3,261,047  | 3,267,615  | 3,275,709  | 3,283,033  | 3,288,785  |
| Commercial Therms                     | 5,993,761  | 5,914,343  | 5,946,346  | 5,950,791  | 5,962,191  | 6,007,007  | 6,059,627  | 6,047,824  | 6,079,411  | 6,096,189  |
| Industrial Therms                     | 1,635,081  | 1,639,019  | 1,650,015  | 1,645,715  | 1,649,977  | 1,654,916  | 1,666,023  | 1,662,685  | 1,667,000  | 1,669,854  |
| Ind., Inst., & Cmcl. Interrup. Therms | 61,724     | 61,724     | 61,699     | 61,672     | 62,271     | 62,323     | 62,298     | 62,323     | 62,323     | 62,870     |
| Total Core Therms                     | 10,814,956 | 10,846,816 | 10,936,190 | 10,902,885 | 10,946,640 | 10,985,292 | 11,075,563 | 11,048,541 | 11,092,366 | 11,117,698 |
| Daily BaseLoad Therms                 | 8,918      | 8,865      | 7,539      | 7,356      | 8,503      | 8,691      | 8,779      | 6,749      | 5,554      | 6,562      |
| Peak Day Therms                       | 95,534     | 95,851     | 103,051    | 103,383    | 103,761    | 104,095    | 97,449     | 104,752    | 105,311    | 105,481    |
| Therms Per Residential Customer       | 110,585    | 110,081    | 110,967    | 109,597    | 109,597    | 109,105    | 109,983    | 108,624    | 108,633    | 108,148    |
| Therms Per Commercial Customer        | 22,062     | 22,119     | 22,293     | 22,224     | 22,341     | 22,422     | 22,607     | 22,561     | 22,688     | 22,750     |
| Therms Per Industrial Customer        | 126,378    | 126,381    | 126,948    | 126,336    | 126,308    | 126,374    | 126,901    | 126,356    | 126,414    | 126,347    |
| Residential Customers                 | 5,199      | 5,190      | 5,181      | 5,172      | 5,163      | 5,154      | 5,144      | 5,135      | 5,126      | 5,117      |
| Commercial Customers                  | 1,346      | 1,345      | 1,344      | 1,343      | 1,342      | 1,340      | 1,339      | 1,338      | 1,337      | 1,336      |
| Industrial Customers                  | 56         | 56         | 56         | 56         | 56         | 56         | 56         | 57         | 57         | 57         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 6,602      | 6,592      | 6,582      | 6,572      | 6,562      | 6,551      | 6,541      | 6,531      | 6,521      | 6,511      |

Appendix B  
Demand Forecast  
High Scenario

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| Zone 11                               | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Total Therms Pct. Growth              | 1.70%      | 1.67%      | 2.21%      | 1.05%      | 1.63%      | 1.64%      | 2.15%      | 1.03%      | 1.57%      | 1.51%      |
| Residential Therms                    | 17,058,632 | 17,374,779 | 17,793,142 | 18,007,471 | 18,329,493 | 18,659,519 | 19,093,012 | 19,313,829 | 19,643,906 | 19,969,365 |
| Commercial Therms                     | 20,145,838 | 20,390,397 | 20,748,727 | 20,876,064 | 21,127,243 | 21,384,124 | 21,753,072 | 21,887,288 | 22,143,822 | 22,390,723 |
| Industrial Therms                     | 5,121,299  | 5,268,659  | 5,444,438  | 5,565,907  | 5,717,648  | 5,873,488  | 6,058,167  | 6,184,974  | 6,342,731  | 6,499,034  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| Total Core Therms                     | 42,325,729 | 43,033,835 | 43,986,306 | 44,449,442 | 45,174,384 | 45,917,131 | 46,904,252 | 47,386,091 | 48,130,459 | 48,859,122 |
| Daily BaseLoad Therms                 | 36,163     | 36,581     | 37,338     | 37,347     | 37,750     | 38,503     | 38,492     | 38,639     | 39,230     | 39,641     |
| Peak Day Therms                       | 434,006    | 441,286    | 463,816    | 471,445    | 479,141    | 486,874    | 478,401    | 502,480    | 510,366    | 518,290    |
| Therms Per Residential Customer       | 2,904      | 2,905      | 2,921      | 2,906      | 2,907      | 2,908      | 2,924      | 2,910      | 2,910      | 2,911      |
| Therms Per Commercial Customer        | 28,715     | 28,709     | 28,830     | 28,684     | 28,707     | 28,706     | 28,827     | 28,686     | 28,709     | 28,699     |
| Therms Per Industrial Customer        | 94,839     | 94,827     | 95,232     | 94,771     | 94,755     | 94,769     | 95,174     | 94,741     | 94,726     | 94,686     |
| Residential Customers                 | 26,854     | 27,345     | 27,839     | 28,337     | 28,837     | 29,341     | 29,848     | 30,358     | 30,871     | 31,386     |
| Commercial Customers                  | 5,184      | 5,255      | 5,328      | 5,400      | 5,473      | 5,547      | 5,621      | 5,695      | 5,769      | 5,844      |
| Industrial Customers                  | 153        | 157        | 161        | 165        | 169        | 174        | 178        | 182        | 186        | 191        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 32,192     | 32,759     | 33,329     | 33,903     | 34,481     | 35,062     | 35,647     | 36,235     | 36,827     | 37,422     |
| <b>Zone 20</b>                        |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 2.29%      | 3.27%      | 3.79%      | 2.45%      | 3.05%      | 3.00%      | 3.57%      | 2.25%      | 2.82%      | 2.76%      |
| Residential Therms                    | 28,359,629 | 29,488,803 | 30,835,218 | 31,287,281 | 32,940,938 | 34,154,778 | 35,591,339 | 36,575,026 | 37,806,382 | 39,044,957 |
| Commercial Therms                     | 26,199,353 | 26,882,365 | 27,728,725 | 28,260,840 | 28,963,833 | 29,677,832 | 30,569,078 | 31,114,946 | 31,840,550 | 32,570,309 |
| Industrial Therms                     | 1,413,421  | 1,416,802  | 1,425,721  | 1,423,398  | 1,426,986  | 1,430,563  | 1,439,547  | 1,437,389  | 1,440,425  | 1,443,571  |
| Ind., Inst., & Cmcl. Interrup. Therms | 309,669    | 309,669    | 311,131    | 309,634    | 312,640    | 312,675    | 314,151    | 312,675    | 315,682    | 313,646    |
| Total Core Therms                     | 56,282,072 | 58,097,639 | 60,300,795 | 61,781,153 | 63,664,397 | 65,575,849 | 67,914,116 | 69,440,036 | 71,402,938 | 73,374,483 |
| Daily BaseLoad Therms                 | 46,943     | 48,138     | 49,685     | 50,055     | 50,737     | 51,180     | 53,096     | 55,161     | 57,400     | 59,470     |
| Peak Day Therms                       | 617,102    | 637,498    | 667,860    | 689,049    | 710,504    | 732,181    | 743,106    | 776,239    | 798,637    | 821,248    |
| Therms Per Residential Customer       | 2,715      | 2,715      | 2,733      | 2,716      | 2,716      | 2,717      | 2,735      | 2,718      | 2,719      | 2,719      |
| Therms Per Commercial Customer        | 23,066     | 23,014     | 23,086     | 22,905     | 22,860     | 22,818     | 22,902     | 22,730     | 22,681     | 22,640     |
| Therms Per Industrial Customer        | 133,999    | 134,001    | 134,513    | 133,977    | 133,981    | 133,996    | 134,508    | 133,991    | 133,937    | 133,937    |
| Residential Customers                 | 49,209     | 51,164     | 53,146     | 55,153     | 57,186     | 59,245     | 61,328     | 63,436     | 65,568     | 67,725     |
| Commercial Customers                  | 6,165      | 6,341      | 6,519      | 6,699      | 6,880      | 7,063      | 7,248      | 7,434      | 7,622      | 7,812      |
| Industrial Customers                  | 40         | 40         | 40         | 40         | 40         | 41         | 41         | 41         | 41         | 41         |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Total Core Customers                  | 55,416     | 57,548     | 59,707     | 61,894     | 64,109     | 66,350     | 68,618     | 70,913     | 73,233     | 75,579     |
| <b>Zone 24</b>                        |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 1.19%      | 1.11%      | 1.71%      | 0.48%      | 1.16%      | 1.08%      | 1.68%      | 0.45%      | 1.13%      | 1.05%      |
| Residential Therms                    | 5,188,494  | 5,269,899  | 5,386,853  | 5,433,880  | 5,516,559  | 5,599,782  | 5,720,589  | 5,767,240  | 5,851,596  | 5,936,221  |
| Commercial Therms                     | 4,592,911  | 4,634,134  | 4,703,125  | 4,715,822  | 4,756,536  | 4,798,621  | 4,849,285  | 4,881,809  | 4,923,138  | 4,965,381  |
| Industrial Therms                     | 342,234    | 342,405    | 343,040    | 342,787    | 343,113    | 343,289    | 343,971    | 343,713    | 343,987    | 344,160    |
| Ind., Inst., & Cmcl. Interrup. Therms | 965,685    | 965,685    | 970,580    | 965,590    | 974,964    | 975,060    | 980,003    | 975,060    | 984,436    | 984,339    |
| Total Core Therms                     | 11,089,324 | 11,212,123 | 11,403,598 | 11,458,078 | 11,591,173 | 11,716,752 | 11,913,848 | 11,967,823 | 12,103,157 | 12,230,101 |
| Daily BaseLoad Therms                 | 5,712      | 5,733      | 5,859      | 5,827      | 5,886      | 5,886      | 5,938      | 5,942      | 6,042      | 6,030      |
| Peak Day Therms                       | 126,441    | 127,919    | 129,874    | 131,370    | 132,970    | 134,482    | 135,514    | 137,527    | 139,154    | 140,697    |
| Therms Per Residential Customer       | 1,686      | 1,686      | 1,697      | 1,685      | 1,685      | 1,685      | 1,696      | 1,685      | 1,685      | 1,685      |
| Therms Per Commercial Customer        | 7,727      | 7,726      | 7,773      | 7,721      | 7,719      | 7,719      | 7,765      | 7,714      | 7,714      | 7,710      |
| Therms Per Industrial Customer        | 53,210     | 53,212     | 53,336     | 53,213     | 53,212     | 53,212     | 53,337     | 53,211     | 53,210     | 53,213     |
| Residential Customers                 | 8,689      | 8,825      | 8,962      | 9,100      | 9,238      | 9,377      | 9,517      | 9,657      | 9,799      | 9,940      |
| Commercial Customers                  | 1,617      | 1,632      | 1,648      | 1,663      | 1,679      | 1,694      | 1,710      | 1,726      | 1,741      | 1,757      |
| Industrial Customers                  | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         | 23         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 10,330     | 10,481     | 10,633     | 10,787     | 10,940     | 11,095     | 11,250     | 11,407     | 11,564     | 11,721     |
| <b>Zone 26</b>                        |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 0.94%      | 0.87%      | 1.39%      | 0.33%      | 0.94%      | 0.91%      | 1.39%      | 0.36%      | 0.94%      | 0.84%      |
| Residential Therms                    | 1,819,112  | 1,876,685  | 1,945,170  | 1,993,080  | 2,052,416  | 2,112,998  | 2,185,142  | 2,234,714  | 2,296,429  | 2,357,990  |
| Commercial Therms                     | 4,614,767  | 4,615,514  | 4,639,838  | 4,615,972  | 4,620,416  | 4,622,770  | 4,646,948  | 4,624,540  | 4,629,131  | 4,628,488  |
| Industrial Therms                     | 233,095    | 233,572    | 235,143    | 234,436    | 234,914    | 235,484    | 237,064    | 236,440    | 236,919    | 237,303    |
| Ind., Inst., & Cmcl. Interrup. Therms | 97,937     | 97,937     | 98,422     | 97,907     | 98,857     | 98,888     | 99,377     | 98,888     | 99,839     | 99,808     |
| Total Core Therms                     | 6,764,911  | 6,823,708  | 6,918,573  | 6,941,383  | 7,006,604  | 7,070,140  | 7,148,531  | 7,194,353  | 7,262,318  | 7,323,590  |
| Daily BaseLoad Therms                 | 7,569      | 7,579      | 7,643      | 7,616      | 7,690      | 7,709      | 7,745      | 7,744      | 7,809      | 7,781      |
| Peak Day Therms                       | 54,348     | 54,870     | 55,733     | 56,124     | 56,713     | 57,276     | 57,613     | 60,428     | 61,037     | 61,622     |
| Therms Per Residential Customer       | 1,764      | 1,764      | 1,774      | 1,764      | 1,764      | 1,764      | 1,773      | 1,764      | 1,764      | 1,764      |
| Therms Per Commercial Customer        | 59,148     | 59,033     | 59,114     | 58,839     | 59,108     | 59,031     | 59,085     | 58,820     | 59,118     | 59,011     |
| Therms Per Industrial Customer        | 16,823     | 16,818     | 16,892     | 16,801     | 16,794     | 16,797     | 16,872     | 16,787     | 16,782     | 16,771     |
| Residential Customers                 | 4,615      | 4,773      | 4,933      | 5,094      | 5,257      | 5,422      | 5,589      | 5,758      | 5,928      | 6,100      |
| Commercial Customers                  | 1,284      | 1,291      | 1,297      | 1,304      | 1,310      | 1,317      | 1,323      | 1,330      | 1,337      | 1,344      |
| Industrial Customers                  | 33         | 33         | 33         | 33         | 33         | 33         | 33         | 33         | 33         | 34         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| Total Core Customers                  | 5,933      | 6,097      | 6,264      | 6,432      | 6,602      | 6,773      | 6,947      | 7,122      | 7,299      | 7,478      |
| <b>Zone 30-S</b>                      |            |            |            |            |            |            |            |            |            |            |
| Total Therms Pct. Growth              | 1.40%      | 1.41%      | 1.84%      | 0.91%      | 1.36%      | 1.37%      | 1.80%      | 0.87%      | 1.32%      | 1.31%      |
| Residential Therms                    | 32,862,208 | 33,567,409 | 34,439,850 | 34,975,578 | 35,688,508 | 36,409,574 | 37,315,714 | 37,859,923 | 38,592,287 | 39,325,882 |
| Commercial Therms                     | 26,364,639 | 26,536,221 | 26,815,912 | 26,870,329 | 27,035,478 | 27,211,607 | 27,496,250 | 27,852,158 | 27,719,223 | 27,891,882 |
| Industrial Therms                     | 740,868    | 742,678    | 747,921    | 744,154    | 747,957    | 749,898    | 755,175    | 753,506    | 755,309    | 756,965    |
| Ind., Inst., & Cmcl. Interrup. Therms | 2,620,676  | 2,629,184  | 2,639,074  | 2,637,499  | 2,646,007  | 2,654,710  | 2,664,694  | 2,663,219  | 2,671,728  | 2,680,039  |
| Total Core Therms                     | 62,595,391 | 63,475,492 | 64,644,757 | 65,229,559 | 66,117,949 | 67,025,789 | 68,231,835 | 68,828,805 | 69,738,547 | 70,654,748 |
| Daily BaseLoad Therms                 | 61,808     | 62,098     | 62,691     | 62,960     | 63,366     | 60,173     | 63,016     | 60,017     | 61,529     | 59,982     |
| Peak Day Therms                       | 498,618    | 506,132    | 519,633    | 527,312    | 534,956    | 542,729    | 544,055    | 558,279    | 566,108    | 574,069    |
| Therms Per Residential Customer       | 1,408      | 1,408      | 1,415      | 1,407      | 1,407      | 1,407      | 1,415      | 1,407      | 1,407      | 1,407      |
| Therms Per Commercial Customer        | 10,770     | 10,747     | 10,766     | 10,695     | 10,668     | 10,648     | 10,668     | 10,601     | 10,575     | 10,554     |
| Therms Per Industrial Customer        | 49,455     | 49,455     | 49,684     | 49,446     | 49,447     | 49,455     | 49,684     | 49,455     | 49,456     | 49,446     |
| Residential Customers                 | 47,425     | 48,434     | 49,451     | 50,475     | 51,506     | 52,543     | 53,588     | 54,640     | 55,699     | 56,765     |
| Commercial Customers                  | 4,223      | 4,262      | 4,301      | 4,341      | 4,381      | 4,420      | 4,460      | 4,500      | 4,540      | 4,581      |
| Industrial Customers                  | 30         | 30         | 30         | 30         | 30         | 30         | 30         | 30         | 30         | 30         |
| Interruptible Customers               | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| Total Core Customers                  | 51,680     | 52,729     | 53,785     | 54,849     | 55,919     | 56,997     | 58,082     | 59,174     | 60,273     | 61,379     |

**Appendix B  
Demand Forecast  
High Scenario**

| Zone 30-W                             | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
|---------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Total Therms Pct. Growth</b>       | 1.75%       | 1.73%       | 2.22%       | 1.18%       | 1.68%       | 1.67%       | 2.14%       | 1.13%       | 1.61%       | 1.58%       |
| Residential Therms                    | 72,714,475  | 73,983,076  | 75,640,033  | 76,535,066  | 77,825,981  | 79,133,011  | 80,846,025  | 81,752,838  | 83,073,501  | 84,392,118  |
| Commercial Therms                     | 40,055,520  | 40,660,158  | 41,469,110  | 41,875,940  | 42,472,991  | 43,115,464  | 43,949,723  | 44,362,402  | 44,992,632  | 45,617,896  |
| Industrial Therms                     | 5,612,257   | 5,790,314   | 5,994,206   | 6,151,180   | 6,335,386   | 6,523,383   | 6,739,910   | 6,904,190   | 7,097,822   | 7,293,138   |
| Ind., Inst., & Cmcl. Interrup. Therms | 98,134      | 98,134      | 98,392      | 98,124      | 99,077      | 99,087      | 99,347      | 99,087      | 100,040     | 100,030     |
| <b>Total Core Therms</b>              | 118,481,386 | 120,531,683 | 123,201,742 | 124,660,310 | 126,753,436 | 128,870,945 | 131,635,005 | 133,118,516 | 135,263,994 | 137,403,132 |
| Daily Baseload Therms                 | 121,084     | 122,143     | 123,677     | 124,691     | 126,062     | 127,809     | 129,049     | 129,160     | 129,952     | 119,777     |
| Peak Day Therms                       | 910,351     | 926,030     | 955,726     | 971,804     | 988,011     | 1,004,321   | 1,005,842   | 1,037,203   | 1,053,798   | 1,070,495   |
| Therms Per Residential Customer       | 6,099       | 6,099       | 6,128       | 6,101       | 6,098       | 6,099       | 6,126       | 6,099       | 6,101       | 6,100       |
| Therms Per Commercial Customer        | 31,930      | 31,892      | 31,997      | 31,817      | 31,832      | 31,799      | 31,906      | 31,732      | 31,746      | 31,706      |
| Therms Per Industrial Customer        | 206,257     | 206,756     | 207,779     | 207,408     | 208,213     | 208,775     | 209,806     | 209,447     | 209,777     | 210,260     |
| Residential Customers                 | 103,329     | 105,129     | 106,940     | 108,762     | 110,594     | 112,436     | 114,290     | 116,153     | 118,027     | 119,912     |
| Commercial Customers                  | 12,416      | 12,625      | 12,836      | 13,049      | 13,262      | 13,476      | 13,692      | 13,909      | 14,127      | 14,346      |
| Industrial Customers                  | 280         | 288         | 297         | 306         | 315         | 324         | 333         | 343         | 352         | 362         |
| Interruptible Customers               | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| <b>Total Core Customers</b>           | 116,026     | 118,044     | 120,075     | 122,118     | 124,172     | 126,238     | 128,317     | 130,406     | 132,508     | 134,620     |

| Zone GTN                              | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037        | 2038        | 2039        |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|
| <b>Total Therms Pct. Growth</b>       | 2.92%      | 2.87%      | 3.31%      | 2.27%      | 2.73%      | 2.70%      | 3.13%      | 2.11%       | 2.56%       | 2.50%       |
| Residential Therms                    | 55,744,855 | 57,305,511 | 59,977,714 | 61,689,915 | 63,719,645 | 65,780,143 | 68,183,207 | 69,953,398  | 72,072,741  | 74,204,488  |
| Commercial Therms                     | 24,247,670 | 24,569,851 | 24,989,812 | 25,174,283 | 25,481,070 | 25,793,988 | 26,226,638 | 26,415,582  | 26,729,147  | 27,040,514  |
| Industrial Therms                     | 3,587,148  | 3,727,990  | 3,887,887  | 4,016,067  | 4,164,068  | 4,315,267  | 4,487,750  | 4,623,848   | 4,781,305   | 4,940,298   |
| Ind., Inst., & Cmcl. Interrup. Therms | 287,606    | 287,606    | 288,897    | 287,535    | 290,327    | 290,398    | 291,702    | 290,398     | 293,119     | 293,118     |
| <b>Total Core Therms</b>              | 83,887,279 | 86,290,757 | 89,144,310 | 91,167,800 | 93,655,110 | 96,179,796 | 99,189,298 | 101,283,226 | 103,876,383 | 106,478,418 |
| Daily Baseload Therms                 | 64,449     | 65,257     | 66,651     | 67,170     | 66,108     | 64,684     | 65,105     | 66,127      | 67,434      | 68,145      |
| Peak Day Therms                       | 779,321    | 801,530    | 835,998    | 859,061    | 882,385    | 905,941    | 916,282    | 953,778     | 978,071     | 1,002,588   |
| Therms Per Residential Customer       | 8,503      | 8,502      | 8,537      | 8,500      | 8,503      | 8,501      | 8,541      | 8,505       | 8,503       | 8,502       |
| Therms Per Commercial Customer        | 37,603     | 37,586     | 37,729     | 37,550     | 37,537     | 37,526     | 37,673     | 37,499      | 37,489      | 37,476      |
| Therms Per Industrial Customer        | 130,634    | 130,635    | 131,193    | 130,600    | 130,633    | 130,589    | 131,149    | 130,581     | 130,580     | 130,581     |
| Residential Customers                 | 74,825     | 77,476     | 80,160     | 82,874     | 85,620     | 88,396     | 91,203     | 94,039      | 96,905      | 99,800      |
| Commercial Customers                  | 7,989      | 8,098      | 8,207      | 8,317      | 8,427      | 8,538      | 8,650      | 8,763       | 8,876       | 8,990       |
| Industrial Customers                  | 160        | 167        | 173        | 180        | 187        | 194        | 201        | 209         | 216         | 223         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1           | 1           | 1           |
| <b>Total Core Customers</b>           | 82,975     | 85,742     | 88,541     | 91,372     | 94,235     | 97,129     | 100,055    | 103,011     | 105,998     | 109,014     |

| Zone ME-OR                            | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>       | 1.52%      | 1.42%      | 1.96%      | 0.85%      | 1.49%      | 1.41%      | 1.94%      | 0.84%      | 1.45%      | 1.35%      |
| Residential Therms                    | 8,327,769  | 8,546,482  | 8,819,016  | 8,989,307  | 9,214,716  | 9,443,862  | 9,730,578  | 9,905,778  | 10,139,935 | 10,374,513 |
| Commercial Therms                     | 7,652,131  | 7,677,376  | 7,741,270  | 7,726,935  | 7,761,039  | 7,787,853  | 7,852,513  | 7,839,294  | 7,873,686  | 7,898,031  |
| Industrial Therms                     | 552,094    | 553,640    | 557,905    | 556,223    | 557,423    | 559,017    | 561,308    | 561,683    | 562,852    | 564,346    |
| Ind., Inst., & Cmcl. Interrup. Therms | 710,656    | 710,656    | 713,293    | 710,556    | 717,455    | 717,556    | 720,218    | 717,556    | 724,455    | 724,353    |
| <b>Total Core Therms</b>              | 17,242,650 | 17,488,154 | 17,831,483 | 17,983,021 | 18,250,632 | 18,508,288 | 18,866,616 | 19,024,311 | 19,300,929 | 19,561,242 |
| Daily Baseload Therms                 | 15,794     | 15,944     | 15,314     | 15,249     | 16,184     | 16,166     | 16,525     | 15,219     | 14,535     | 12,425     |
| Peak Day Therms                       | 176,143    | 178,876    | 184,553    | 187,381    | 190,316    | 193,195    | 193,016    | 199,034    | 202,070    | 205,048    |
| Therms Per Residential Customer       | 3,154      | 3,154      | 3,172      | 3,153      | 3,153      | 3,153      | 3,171      | 3,153      | 3,153      | 3,153      |
| Therms Per Commercial Customer        | 29,005     | 29,003     | 29,141     | 28,998     | 29,052     | 29,052     | 29,191     | 29,050     | 29,104     | 29,100     |
| Therms Per Industrial Customer        | 87,840     | 87,865     | 88,341     | 87,866     | 87,865     | 87,889     | 88,362     | 87,900     | 87,885     | 87,904     |
| Residential Customers                 | 15,306     | 15,720     | 16,139     | 16,562     | 16,990     | 17,421     | 17,857     | 18,296     | 18,742     | 19,191     |
| Commercial Customers                  | 1,946      | 1,953      | 1,960      | 1,967      | 1,974      | 1,982      | 1,989      | 1,996      | 2,004      | 2,011      |
| Industrial Customers                  | 27         | 27         | 27         | 27         | 28         | 28         | 28         | 28         | 28         | 28         |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| <b>Total Core Customers</b>           | 17,281     | 17,702     | 18,128     | 18,559     | 18,994     | 19,433     | 19,876     | 20,324     | 20,776     | 21,232     |

| Zone ME-WA                            | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>       | 1.43%      | 1.48%      | 2.03%      | 0.83%      | 1.39%      | 1.45%      | 1.99%      | 0.80%      | 1.35%      | 1.38%      |
| Residential Therms                    | 9,075,367  | 9,285,624  | 9,558,241  | 9,709,659  | 9,924,620  | 10,142,475 | 10,426,911 | 10,580,303 | 10,801,517 | 11,022,796 |
| Commercial Therms                     | 6,327,405  | 6,336,420  | 6,372,238  | 6,344,574  | 6,344,378  | 6,354,301  | 6,390,199  | 6,363,373  | 6,363,181  | 6,371,260  |
| Industrial Therms                     | 320,038    | 332,913    | 347,643    | 359,118    | 372,467    | 386,055    | 401,678    | 413,608    | 427,614    | 441,709    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 15,722,811 | 15,954,956 | 16,278,122 | 16,413,351 | 16,641,464 | 16,882,831 | 17,218,788 | 17,357,284 | 17,592,312 | 17,835,764 |
| Daily Baseload Therms                 | 14,195     | 14,335     | 14,469     | 14,555     | 14,556     | 14,519     | 14,880     | 14,527     | 12,363     | 14,727     |
| Peak Day Therms                       | 167,032    | 169,617    | 174,371    | 177,026    | 179,635    | 182,329    | 182,464    | 187,717    | 190,404    | 193,134    |
| Therms Per Residential Customer       | 596        | 596        | 599        | 595        | 595        | 596        | 599        | 595        | 595        | 595        |
| Therms Per Commercial Customer        | 4,864      | 4,871      | 4,899      | 4,878      | 4,878      | 4,885      | 4,913      | 4,893      | 4,893      | 4,899      |
| Therms Per Industrial Customer        | 10,540     | 10,540     | 10,591     | 10,538     | 10,538     | 10,540     | 10,590     | 10,539     | 10,539     | 10,538     |
| Residential Customers                 | 15,236     | 15,590     | 15,946     | 16,305     | 16,667     | 17,031     | 17,398     | 17,768     | 18,140     | 18,515     |
| Commercial Customers                  | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      |
| Industrial Customers                  | 30         | 32         | 33         | 34         | 35         | 37         | 38         | 39         | 41         | 42         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 16,567     | 16,922     | 17,280     | 17,640     | 18,003     | 18,369     | 18,737     | 19,108     | 19,487     | 19,857     |

| Bellingham District                   | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Total Therms Pct. Growth</b>       | 1.90%      | 1.87%      | 2.36%      | 1.32%      | 1.81%      | 2.27%      | 1.80%      | 1.25%      | 1.73%      | 1.70%      |
| Residential Therms                    | 40,926,612 | 41,706,116 | 42,705,205 | 43,275,108 | 44,069,258 | 44,873,379 | 45,908,125 | 46,486,257 | 47,299,871 | 48,112,743 |
| Commercial Therms                     | 20,078,256 | 20,372,150 | 20,761,976 | 20,962,203 | 21,261,600 | 21,564,177 | 21,911,945 | 22,168,816 | 22,474,217 | 22,777,268 |
| Industrial Therms                     | 3,087,872  | 3,216,156  | 3,359,824  | 3,477,707  | 3,611,077  | 3,746,581  | 3,899,112  | 4,021,941  | 4,161,897  | 4,302,834  |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 64,092,740 | 65,294,422 | 66,833,005 | 67,715,019 | 68,941,934 | 70,184,137 | 71,779,183 | 72,677,013 | 73,935,986 | 75,192,845 |
| Daily Baseload Therms                 | 69,809     | 70,489     | 71,353     | 72,016     | 72,879     | 73,941     | 74,854     | 75,740     | 76,607     | 67,973     |
| Peak Day Therms                       | 479,367    | 488,239    | 505,015    | 514,139    | 523,333    | 532,577    | 533,467    | 551,235    | 560,656    | 570,126    |
| Therms Per Residential Customer       | 2,899      | 2,899      | 2,914      | 2,898      | 2,898      | 2,899      | 2,913      | 2,899      | 2,899      | 2,898      |
| Therms Per Commercial Customer        | 15,702     | 15,687     | 15,756     | 15,652     | 15,685     | 15,677     | 15,745     | 15,649     | 15,681     | 15,661     |
| Therms Per Industrial Customer        | 25,354     | 25,353     | 25,453     | 25,350     | 25,349     | 25,352     | 25,453     | 25,352     | 25,352     | 25,349     |
| Residential Customers                 | 56,400     | 57,476     | 58,558     | 59,648     | 60,744     | 61,847     | 62,957     | 64,074     | 65,197     | 66,327     |
| Commercial Customers                  | 6,336      | 6,436      | 6,537      | 6,639      | 6,741      | 6,844      | 6,947      | 7,051      | 7,155      | 7,260      |
| Industrial Customers                  | 126        | 131        | 136        | 141        | 147        | 152        | 158        | 163        | 169        | 175        |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 62,861     | 64,043     | 65,232     | 66,428     | 67,632     | 68,844     | 70,062     | 71,288     | 72,521     | 73,761     |

**Appendix B  
Demand Forecast  
High Scenario**

|                                       | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       | 2038       | 2039       |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>Mount Vernon District</b>          |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       | 1.58%      | 1.56%      | 2.05%      | 1.02%      | 1.52%      | 1.51%      | 1.99%      | 0.98%      | 1.47%      | 1.44%      |
| Residential Therms                    | 31,787,862 | 32,276,960 | 32,934,829 | 33,259,958 | 33,756,724 | 34,259,632 | 34,937,900 | 35,266,580 | 35,733,630 | 36,279,376 |
| Commercial Therms                     | 19,977,664 | 20,288,008 | 20,701,134 | 20,913,736 | 21,231,392 | 21,551,286 | 21,977,778 | 22,193,587 | 22,518,414 | 22,840,538 |
| Industrial Therms                     | 2,524,985  | 2,574,158  | 2,634,382  | 2,673,472  | 2,734,389  | 2,776,803  | 2,840,798  | 2,882,249  | 2,935,924  | 2,990,344  |
| Ind., Inst., & Cmcl. Interrup. Therms | 98,134     | 98,134     | 98,392     | 98,124     | 99,077     | 99,087     | 99,347     | 99,087     | 100,040    | 100,030    |
| <b>Total Core Therms</b>              | 54,388,646 | 55,237,260 | 56,368,737 | 56,945,291 | 57,811,502 | 58,686,807 | 59,855,822 | 60,441,503 | 61,328,008 | 62,210,287 |
| Daily BaseLoad Therms                 | 51,275     | 51,655     | 52,324     | 52,674     | 53,183     | 53,869     | 54,195     | 53,420     | 52,345     | 51,805     |
| Peak Day Therms                       | 430,983    | 437,791    | 450,710    | 457,665    | 464,678    | 471,744    | 472,396    | 485,969    | 493,142    | 500,368    |
| Therms Per Residential Customer       | 3,200      | 3,200      | 3,215      | 3,202      | 3,200      | 3,200      | 3,212      | 3,200      | 3,203      | 3,202      |
| Therms Per Commercial Customer        | 16,227     | 16,204     | 16,241     | 16,165     | 16,147     | 16,122     | 16,161     | 16,083     | 16,065     | 16,045     |
| Therms Per Industrial Customer        | 180,904    | 181,403    | 182,326    | 182,059    | 182,864    | 183,422    | 184,353    | 184,095    | 184,424    | 184,911    |
| Commercial Customers                  | 46,930     | 47,654     | 48,382     | 49,114     | 49,849     | 50,589     | 51,333     | 52,080     | 52,830     | 53,585     |
| Commercial Customers                  | 6,080      | 6,189      | 6,299      | 6,410      | 6,521      | 6,633      | 6,745      | 6,858      | 6,972      | 7,086      |
| Industrial Customers                  | 154        | 158        | 161        | 165        | 168        | 172        | 176        | 179        | 183        | 187        |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 53,165     | 54,001     | 54,843     | 55,689     | 56,540     | 57,394     | 58,254     | 59,118     | 59,987     | 60,859     |
| <b>Bremerton District</b>             |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       | 1.49%      | 1.49%      | 1.92%      | 0.99%      | 1.44%      | 1.45%      | 1.87%      | 0.95%      | 1.40%      | 1.39%      |
| Residential Therms                    | 29,955,903 | 30,621,841 | 31,446,315 | 31,966,083 | 32,646,418 | 33,333,805 | 34,190,843 | 34,718,335 | 35,417,614 | 36,119,023 |
| Commercial Therms                     | 23,344,138 | 23,506,657 | 23,746,861 | 23,827,049 | 23,986,541 | 24,152,600 | 24,417,622 | 24,478,429 | 24,639,833 | 24,804,376 |
| Industrial Therms                     | 455,770    | 456,867    | 460,207    | 459,054    | 460,180    | 461,309    | 464,671    | 463,527    | 464,653    | 465,719    |
| Ind., Inst., & Cmcl. Interrup. Therms | 2,620,676  | 2,629,184  | 2,639,074  | 2,637,499  | 2,646,007  | 2,654,710  | 2,664,696  | 2,663,219  | 2,671,728  | 2,680,339  |
| <b>Total Core Therms</b>              | 56,376,487 | 57,214,549 | 58,312,457 | 58,889,685 | 59,739,146 | 60,602,425 | 61,737,831 | 62,323,510 | 63,193,829 | 64,064,157 |
| Daily BaseLoad Therms                 | 55,642     | 55,945     | 56,460     | 56,760     | 57,179     | 57,937     | 58,782     | 58,682     | 58,968     | 59,081     |
| Peak Day Therms                       | 447,053    | 454,198    | 465,298    | 472,594    | 479,871    | 487,258    | 490,315    | 502,050    | 509,508    | 517,074    |
| Therms Per Residential Customer       | 691        | 691        | 694        | 691        | 691        | 691        | 691        | 691        | 691        | 691        |
| Therms Per Commercial Customer        | 6,710      | 6,685      | 6,688      | 6,634      | 6,609      | 6,586      | 6,590      | 6,539      | 6,515      | 6,493      |
| Therms Per Industrial Customer        | 29,610     | 29,609     | 29,753     | 29,607     | 29,608     | 29,609     | 29,753     | 29,609     | 29,610     | 29,607     |
| Commercial Customers                  | 43,360     | 44,324     | 45,296     | 46,274     | 47,259     | 48,252     | 49,251     | 50,256     | 51,269     | 52,288     |
| Commercial Customers                  | 3,479      | 3,516      | 3,554      | 3,591      | 3,629      | 3,667      | 3,705      | 3,744      | 3,782      | 3,820      |
| Industrial Customers                  | 15         | 15         | 15         | 16         | 16         | 16         | 16         | 16         | 16         | 16         |
| Interruptible Customers               | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          | 3          |
| <b>Total Core Customers</b>           | 46,857     | 47,859     | 48,868     | 49,884     | 50,907     | 51,938     | 52,975     | 54,019     | 55,070     | 56,128     |
| <b>Longview District</b>              |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       | 0.94%      | 0.91%      | 1.43%      | 0.35%      | 0.94%      | 0.94%      | 1.44%      | 0.39%      | 0.94%      | 0.88%      |
| Residential Therms                    | 1,819,112  | 1,876,685  | 1,945,170  | 1,993,068  | 2,052,416  | 2,112,998  | 2,185,142  | 2,234,714  | 2,296,429  | 2,359,990  |
| Commercial Therms                     | 4,350,713  | 4,351,512  | 4,375,065  | 4,351,891  | 4,353,904  | 4,356,133  | 4,379,684  | 4,357,939  | 4,359,940  | 4,359,316  |
| Industrial Therms                     | 233,095    | 233,572    | 235,143    | 234,436    | 234,914    | 235,484    | 237,064    | 236,440    | 236,919    | 237,303    |
| Ind., Inst., & Cmcl. Interrup. Therms | 97,937     | 97,937     | 98,422     | 97,907     | 98,857     | 98,888     | 99,377     | 98,888     | 99,839     | 99,808     |
| <b>Total Core Therms</b>              | 6,500,857  | 6,559,706  | 6,653,800  | 6,677,302  | 6,740,092  | 6,803,503  | 6,901,267  | 6,927,982  | 6,993,127  | 7,054,417  |
| Daily BaseLoad Therms                 | 7,342      | 7,352      | 7,443      | 7,423      | 7,463      | 7,562      | 7,518      | 7,517      | 7,609      | 7,588      |
| Peak Day Therms                       | 53,053     | 53,576     | 56,243     | 56,793     | 57,370     | 57,932     | 58,306     | 59,084     | 59,682     | 60,266     |
| Therms Per Residential Customer       | 1,764      | 1,764      | 1,774      | 1,764      | 1,764      | 1,764      | 1,773      | 1,764      | 1,764      | 1,764      |
| Therms Per Commercial Customer        | 7,725      | 7,720      | 7,752      | 7,710      | 7,708      | 7,705      | 7,737      | 7,696      | 7,697      | 7,691      |
| Therms Per Industrial Customer        | 16,823     | 16,818     | 16,892     | 16,801     | 16,796     | 16,797     | 16,872     | 16,787     | 16,782     | 16,771     |
| Commercial Customers                  | 4,615      | 4,713      | 4,833      | 4,933      | 5,094      | 5,257      | 5,422      | 5,589      | 5,758      | 5,928      |
| Commercial Customers                  | 1,279      | 1,285      | 1,292      | 1,298      | 1,305      | 1,312      | 1,318      | 1,325      | 1,332      | 1,339      |
| Industrial Customers                  | 33         | 33         | 33         | 33         | 33         | 33         | 33         | 33         | 33         | 34         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 5,928      | 6,092      | 6,259      | 6,427      | 6,597      | 6,768      | 6,942      | 7,117      | 7,294      | 7,473      |
| <b>Aberdeen District</b>              |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       | 0.62%      | 0.68%      | 1.11%      | 0.15%      | 0.61%      | 0.70%      | 1.10%      | 0.17%      | 0.61%      | 0.62%      |
| Residential Therms                    | 2,913,304  | 2,945,568  | 2,993,535  | 3,009,495  | 3,042,089  | 3,075,768  | 3,124,828  | 3,141,588  | 3,176,673  | 3,206,839  |
| Commercial Therms                     | 3,020,501  | 3,029,564  | 3,049,051  | 3,043,280  | 3,048,937  | 3,059,007  | 3,078,672  | 3,073,728  | 3,079,390  | 3,087,505  |
| Industrial Therms                     | 285,099    | 285,811    | 287,713    | 287,100    | 287,777    | 288,589    | 290,504    | 289,979    | 290,656    | 291,266    |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Therms</b>              | 6,218,904  | 6,260,943  | 6,330,300  | 6,339,875  | 6,378,803  | 6,423,364  | 6,494,004  | 6,505,295  | 6,544,719  | 6,585,611  |
| Daily BaseLoad Therms                 | 6,165      | 6,153      | 6,231      | 6,200      | 6,186      | 6,237      | 6,234      | 6,335      | 6,330      | 6,401      |
| Peak Day Therms                       | 51,565     | 51,934     | 54,334     | 54,716     | 55,085     | 55,471     | 53,740     | 56,228     | 56,600     | 56,994     |
| Therms Per Residential Customer       | 717        | 717        | 720        | 716        | 716        | 717        | 717        | 717        | 717        | 716        |
| Therms Per Commercial Customer        | 4,060      | 4,062      | 4,079      | 4,061      | 4,059      | 4,062      | 4,079      | 4,062      | 4,060      | 4,061      |
| Therms Per Industrial Customer        | 19,846     | 19,846     | 19,931     | 19,839     | 19,839     | 19,846     | 19,930     | 19,846     | 19,846     | 19,839     |
| Commercial Customers                  | 4,065      | 4,110      | 4,155      | 4,201      | 4,246      | 4,292      | 4,338      | 4,384      | 4,430      | 4,477      |
| Commercial Customers                  | 744        | 746        | 748        | 749        | 751        | 753        | 755        | 757        | 758        | 760        |
| Industrial Customers                  | 14         | 14         | 14         | 14         | 15         | 15         | 15         | 15         | 15         | 15         |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -          | -          | -          |
| <b>Total Core Customers</b>           | 4,823      | 4,870      | 4,917      | 4,964      | 5,012      | 5,059      | 5,107      | 5,155      | 5,203      | 5,252      |
| <b>Kennewick District</b>             |            |            |            |            |            |            |            |            |            |            |
| <b>Total Therms Pct. Growth</b>       | 3.57%      | 3.48%      | 4.05%      | 2.67%      | 3.27%      | 3.21%      | 3.78%      | 2.42%      | 3.02%      | 2.93%      |
| Residential Therms                    | 27,424,185 | 28,552,630 | 29,897,710 | 30,849,652 | 32,002,577 | 33,215,644 | 34,645,854 | 35,634,393 | 36,894,916 | 38,102,893 |
| Commercial Therms                     | 22,218,995 | 22,861,440 | 23,650,314 | 24,161,477 | 24,825,005 | 25,497,100 | 26,327,302 | 26,851,521 | 27,540,389 | 28,228,189 |
| Industrial Therms                     | 1,073,376  | 1,075,919  | 1,082,881  | 1,080,943  | 1,083,630  | 1,086,378  | 1,093,383  | 1,091,608  | 1,094,296  | 1,096,631  |
| Ind., Inst., & Cmcl. Interrup. Therms | 213,595    | 213,595    | 214,607    | 213,559    | 215,633    | 215,668    | 216,691    | 215,668    | 217,742    | 217,706    |
| <b>Total Core Therms</b>              | 50,930,151 | 52,703,583 | 54,840,512 | 56,305,631 | 58,146,844 | 60,014,870 | 62,283,231 | 63,793,190 | 65,717,243 | 67,645,419 |
| Daily BaseLoad Therms                 | 44,161     | 45,318     | 46,405     | 47,121     | 47,824     | 48,219     | 50,115     | 49,019     | 51,854     | 49,001     |
| Peak Day Therms                       | 566,662    | 586,665    | 616,074    | 636,861    | 657,910    | 679,177    | 690,261    | 722,404    | 744,387    | 766,578    |
| Therms Per Residential Customer       | 1,715      | 1,715      | 1,727      | 1,715      | 1,715      | 1,715      | 1,727      | 1,715      | 1,715      | 1,715      |
| Therms Per Commercial Customer        | 64,130     | 64,008     | 64,131     | 63,800     | 64,061     | 63,978     | 64,074     | 63,755     | 64,045     | 63,934     |
| Therms Per Industrial Customer        | 93,033     | 93,032     | 93,407     | 93,014     | 93,016     | 93,029     | 93,403     | 93,028     | 93,029     | 93,010     |
| Commercial Customers                  | 47,390     | 49,344     | 51,325     | 53,331     | 55,364     | 57,421     | 59,504     | 61,611     | 63,742     | 65,898     |
| Commercial Customers                  | 5,385      | 5,552      | 5,720      | 5,889      | 6,061      | 6,234      | 6,408      | 6,585      | 6,762      | 6,942      |
| Industrial Customers                  | 24         | 24         | 24         | 24         | 24         | 24         | 24         | 24         | 24         | 24         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
| <b>Total Core Customers</b>           | 52,800     | 54,920     | 57,069     | 59,246     | 61,449     | 63,680     | 65,937     | 68,220     | 70,530     | 72,865     |

Appendix B  
Demand Forecast  
High Scenario

|                                       | 2030       | 2031       | 2032       | 2033       | 2034       | 2035       | 2036       | 2037        | 2038        | 2039        |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|
| <b>Walla Walla District</b>           |            |            |            |            |            |            |            |             |             |             |
| Total Therms Pct. Growth              | 1.43%      | 1.48%      | 2.03%      | 0.83%      | 1.39%      | 1.45%      | 1.99%      | 0.80%       | 1.35%       | 1.38%       |
| Residential Therms                    | 9,075,367  | 9,285,624  | 9,558,241  | 9,709,659  | 9,924,620  | 10,142,475 | 10,426,911 | 10,580,303  | 10,801,517  | 11,022,796  |
| Commercial Therms                     | 6,327,405  | 6,336,420  | 6,372,238  | 6,344,574  | 6,344,378  | 6,354,301  | 6,390,199  | 6,363,373   | 6,363,181   | 6,371,260   |
| Industrial Therms                     | 320,038    | 332,913    | 347,643    | 359,118    | 372,467    | 386,055    | 401,678    | 413,608     | 427,614     | 441,709     |
| Ind., Inst., & Cmcl. Interrup. Therms | -          | -          | -          | -          | -          | -          | -          | -           | -           | -           |
| Total Core Therms                     | 15,722,811 | 15,954,956 | 16,278,122 | 16,413,351 | 16,641,466 | 16,882,831 | 17,218,788 | 17,357,284  | 17,592,312  | 17,835,764  |
| Daily BaseLoad Therms                 | 14,195     | 14,335     | 14,489     | 14,555     | 14,556     | 14,519     | 14,880     | 14,527      | 12,363      | 14,727      |
| Peak Day Therms                       | 167,032    | 169,617    | 174,371    | 177,026    | 179,635    | 182,329    | 182,656    | 187,717     | 190,404     | 193,174     |
| Therms Per Residential Customer       | 596        | 596        | 599        | 595        | 595        | 596        | 599        | 595         | 595         | 595         |
| Therms Per Commercial Customer        | 4,864      | 4,871      | 4,899      | 4,878      | 4,878      | 4,885      | 4,913      | 4,893       | 4,893       | 4,899       |
| Therms Per Industrial Customer        | 10,540     | 10,540     | 10,591     | 10,538     | 10,538     | 10,540     | 10,590     | 10,539      | 10,539      | 10,538      |
| Residential Customers                 | 15,236     | 15,590     | 15,946     | 16,305     | 16,667     | 17,031     | 17,398     | 17,768      | 18,140      | 18,515      |
| Commercial Customers                  | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301      | 1,301       | 1,301       | 1,301       |
| Industrial Customers                  | 30         | 32         | 33         | 34         | 35         | 37         | 38         | 39          | 41          | 42          |
| Interruptible Customers               | -          | -          | -          | -          | -          | -          | -          | -           | -           | -           |
| Total Core Customers                  | 16,567     | 16,922     | 17,280     | 17,640     | 18,003     | 18,369     | 18,737     | 19,108      | 19,481      | 19,857      |
| <b>Wenatchee District</b>             |            |            |            |            |            |            |            |             |             |             |
| Total Therms Pct. Growth              | 0.45%      | 0.42%      | 0.90%      | -0.09%     | 0.47%      | 0.44%      | 0.92%      | -0.07%      | 0.42%       | 0.41%       |
| Residential Therms                    | 1,570,896  | 1,573,173  | 1,584,751  | 1,577,548  | 1,579,828  | 1,582,328  | 1,593,956  | 1,586,924   | 1,589,204   | 1,591,292   |
| Commercial Therms                     | 8,436,819  | 8,478,490  | 8,559,923  | 8,558,697  | 8,605,092  | 8,649,206  | 8,734,268  | 8,734,876   | 8,778,806   | 8,820,673   |
| Industrial Therms                     | 826,401    | 828,449    | 833,870    | 832,290    | 834,351    | 836,490    | 841,956    | 840,457     | 841,965     | 843,883     |
| Ind., Inst., & Cmcl. Interrup. Therms | 96,074     | 96,074     | 96,524     | 96,074     | 97,007     | 97,007     | 97,461     | 97,007      | 97,007      | 97,940      |
| Total Core Therms                     | 10,930,190 | 10,976,185 | 11,075,671 | 11,064,609 | 11,116,278 | 11,165,131 | 11,267,641 | 11,259,263  | 11,307,916  | 11,352,788  |
| Daily BaseLoad Therms                 | 9,684      | 9,715      | 10,189     | 9,799      | 9,912      | 9,900      | 9,869      | 9,508       | 9,776       | 8,327       |
| Peak Day Therms                       | 95,423     | 95,852     | 98,289     | 98,723     | 99,190     | 99,637     | 98,076     | 100,543     | 101,019     | 101,478     |
| Therms Per Residential Customer       | 1,870      | 1,874      | 1,884      | 1,876      | 1,876      | 1,880      | 1,890      | 1,881       | 1,882       | 1,883       |
| Therms Per Commercial Customer        | 24,722     | 24,673     | 24,730     | 24,569     | 24,564     | 24,524     | 24,590     | 24,439      | 24,427      | 24,385      |
| Therms Per Industrial Customer        | 93,939     | 93,943     | 94,309     | 93,923     | 93,924     | 93,925     | 94,303     | 93,929      | 93,929      | 93,870      |
| Residential Customers                 | 3,250      | 3,251      | 3,252      | 3,254      | 3,255      | 3,256      | 3,258      | 3,259       | 3,260       | 3,262       |
| Commercial Customers                  | 1,543      | 1,552      | 1,562      | 1,572      | 1,583      | 1,593      | 1,603      | 1,613       | 1,624       | 1,634       |
| Industrial Customers                  | 35         | 35         | 35         | 35         | 35         | 35         | 35         | 35          | 36          | 36          |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1           | 1           | 1           |
| Total Core Customers                  | 4,828      | 4,840      | 4,851      | 4,862      | 4,874      | 4,885      | 4,897      | 4,909       | 4,921       | 4,932       |
| <b>Yakima District</b>                |            |            |            |            |            |            |            |             |             |             |
| Total Therms Pct. Growth              | 1.58%      | 1.54%      | 2.08%      | 0.92%      | 1.52%      | 1.53%      | 2.03%      | 0.91%       | 1.47%       | 1.39%       |
| Residential Therms                    | 19,647,570 | 19,969,509 | 20,409,030 | 20,612,259 | 20,940,047 | 21,277,373 | 21,732,156 | 21,943,248  | 22,279,101  | 22,608,922  |
| Commercial Therms                     | 21,847,193 | 22,111,177 | 22,498,333 | 22,631,602 | 22,909,682 | 23,189,113 | 23,587,471 | 23,730,262  | 24,013,879  | 24,277,533  |
| Industrial Therms                     | 6,269,984  | 6,420,113  | 6,603,422  | 6,721,788  | 6,876,631  | 7,036,099  | 7,228,397  | 7,352,983   | 7,513,894   | 7,671,945   |
| Ind., Inst., & Cmcl. Interrup. Therms | 61,724     | 61,724     | 61,699     | 61,672     | 62,271     | 62,323     | 62,298     | 62,323      | 62,922      | 62,870      |
| Total Core Therms                     | 47,826,470 | 48,562,523 | 49,572,484 | 50,027,321 | 50,788,630 | 51,564,907 | 52,610,322 | 53,088,816  | 53,869,796  | 54,621,269  |
| Daily BaseLoad Therms                 | 38,407     | 38,779     | 38,166     | 38,030     | 39,581     | 40,482     | 40,610     | 38,954      | 38,513      | 39,537      |
| Peak Day Therms                       | 485,853    | 493,414    | 521,693    | 529,624    | 537,648    | 545,678    | 531,927    | 561,867     | 570,083     | 578,318     |
| Therms Per Residential Customer       | 112,618    | 112,114    | 113,011    | 111,621    | 111,629    | 111,137    | 112,026    | 110,656     | 110,664     | 110,179     |
| Therms Per Commercial Customer        | 36,413     | 36,473     | 36,711     | 36,573     | 36,684     | 36,770     | 37,019     | 36,906      | 37,027      | 37,090      |
| Therms Per Industrial Customer        | 168,244    | 168,224    | 168,976    | 168,146    | 168,104    | 168,175    | 168,877    | 168,132     | 168,178     | 168,080     |
| Residential Customers                 | 30,623     | 31,104     | 31,589     | 32,077     | 32,567     | 33,061     | 33,559     | 34,059      | 34,562      | 35,068      |
| Commercial Customers                  | 5,772      | 5,843      | 5,914      | 5,985      | 6,057      | 6,129      | 6,202      | 6,274       | 6,348       | 6,422       |
| Industrial Customers                  | 190        | 195        | 199        | 203        | 207        | 211        | 216        | 220         | 224         | 229         |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2           | 2           | 2           |
| Total Core Customers                  | 36,587     | 37,143     | 37,703     | 38,266     | 38,833     | 39,404     | 39,978     | 40,555      | 41,136      | 41,721      |
| <b>Central Oregon (Bend) District</b> |            |            |            |            |            |            |            |             |             |             |
| Total Therms Pct. Growth              | 2.92%      | 2.87%      | 3.31%      | 2.27%      | 2.73%      | 2.70%      | 3.13%      | 2.11%       | 2.56%       | 2.50%       |
| Residential Therms                    | 55,744,855 | 57,705,511 | 59,977,714 | 61,689,915 | 63,719,645 | 65,780,143 | 68,183,207 | 69,953,398  | 72,072,741  | 74,204,488  |
| Commercial Therms                     | 24,267,670 | 24,569,851 | 24,989,812 | 25,174,283 | 25,481,070 | 25,793,988 | 26,226,638 | 26,415,582  | 26,729,147  | 27,040,514  |
| Industrial Therms                     | 3,587,148  | 3,727,790  | 3,887,887  | 4,016,067  | 4,164,068  | 4,315,267  | 4,487,750  | 4,623,848   | 4,781,305   | 4,940,298   |
| Ind., Inst., & Cmcl. Interrup. Therms | 287,606    | 287,606    | 288,897    | 287,535    | 290,327    | 290,398    | 291,702    | 290,398     | 293,190     | 293,118     |
| Total Core Therms                     | 83,887,279 | 86,290,757 | 89,144,310 | 91,167,800 | 93,655,110 | 96,179,796 | 99,189,298 | 101,283,226 | 103,876,383 | 106,478,418 |
| Daily BaseLoad Therms                 | 64,449     | 65,257     | 66,651     | 67,170     | 68,108     | 68,684     | 65,195     | 66,127      | 67,434      | 68,145      |
| Peak Day Therms                       | 779,321    | 801,530    | 833,998    | 859,061    | 882,385    | 905,941    | 916,282    | 953,778     | 978,071     | 1,002,588   |
| Therms Per Residential Customer       | 8,503      | 8,502      | 8,537      | 8,500      | 8,503      | 8,505      | 8,541      | 8,505       | 8,503       | 8,502       |
| Therms Per Commercial Customer        | 37,603     | 37,586     | 37,729     | 37,550     | 37,537     | 37,526     | 37,673     | 37,499      | 37,489      | 37,476      |
| Therms Per Industrial Customer        | 130,634    | 130,635    | 131,193    | 130,600    | 130,633    | 130,589    | 131,149    | 130,581     | 130,580     | 130,556     |
| Residential Customers                 | 74,825     | 77,476     | 80,160     | 82,874     | 85,620     | 88,396     | 91,203     | 94,039      | 96,905      | 99,800      |
| Commercial Customers                  | 7,989      | 8,098      | 8,207      | 8,317      | 8,427      | 8,538      | 8,650      | 8,763       | 8,876       | 8,990       |
| Industrial Customers                  | 160        | 167        | 173        | 180        | 187        | 194        | 201        | 209         | 216         | 223         |
| Interruptible Customers               | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1           | 1           | 1           |
| Total Core Customers                  | 82,975     | 85,742     | 88,541     | 91,372     | 94,235     | 97,129     | 100,055    | 103,011     | 105,998     | 109,014     |
| <b>Pendleton District</b>             |            |            |            |            |            |            |            |             |             |             |
| Total Therms Pct. Growth              | 1.52%      | 1.42%      | 1.96%      | 0.85%      | 1.49%      | 1.41%      | 1.94%      | 0.84%       | 1.45%       | 1.35%       |
| Residential Therms                    | 8,327,769  | 8,546,462  | 8,819,016  | 8,989,307  | 9,214,716  | 9,443,862  | 9,730,578  | 9,905,778   | 10,139,935  | 10,374,513  |
| Commercial Therms                     | 7,652,131  | 7,677,376  | 7,741,270  | 7,726,935  | 7,761,059  | 7,787,853  | 7,852,513  | 7,839,294   | 7,873,686   | 7,890,031   |
| Industrial Therms                     | 552,094    | 553,640    | 557,905    | 556,223    | 557,423    | 559,017    | 563,308    | 561,683     | 562,852     | 564,346     |
| Ind., Inst., & Cmcl. Interrup. Therms | 710,656    | 710,656    | 713,293    | 713,293    | 717,455    | 717,556    | 720,218    | 717,556     | 717,556     | 724,353     |
| Total Core Therms                     | 17,242,650 | 17,488,154 | 17,831,483 | 17,983,021 | 18,250,632 | 18,508,288 | 18,866,616 | 19,024,311  | 19,300,929  | 19,561,242  |
| Daily BaseLoad Therms                 | 15,794     | 15,944     | 15,314     | 15,249     | 16,184     | 16,166     | 16,525     | 15,219      | 14,535      | 12,425      |
| Peak Day Therms                       | 176,143    | 178,876    | 184,553    | 187,381    | 190,316    | 193,195    | 193,016    | 199,034     | 202,070     | 205,048     |
| Therms Per Residential Customer       | 3,154      | 3,154      | 3,172      | 3,153      | 3,153      | 3,171      | 3,171      | 3,153       | 3,153       | 3,153       |
| Therms Per Commercial Customer        | 29,005     | 29,003     | 29,141     | 28,998     | 29,052     | 29,052     | 29,191     | 29,050      | 29,104      | 29,100      |
| Therms Per Industrial Customer        | 87,840     | 87,865     | 88,341     | 87,866     | 87,855     | 87,889     | 88,362     | 87,900      | 87,885      | 87,900      |
| Residential Customers                 | 15,306     | 15,720     | 16,139     | 16,562     | 16,990     | 17,421     | 17,857     | 18,298      | 18,742      | 19,191      |
| Commercial Customers                  | 1,949      | 1,956      | 1,963      | 1,970      | 1,978      | 1,985      | 1,992      | 1,999       | 2,007       | 2,014       |
| Industrial Customers                  | 28         | 28         | 28         | 29         | 29         | 29         | 29         | 29          | 29          | 29          |
| Interruptible Customers               | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2           | 2           | 2           |
| Total Core Customers                  | 17,285     | 17,706     | 18,132     | 18,563     | 18,998     | 19,437     | 19,880     | 20,328      | 20,780      | 21,236      |

Appendix B  
Demand Forecast  
High Scenario

|  | 2030        | 2031        | 2032        | 2033        | 2034        | 2035        | 2036        | 2037        | 2038        | 2039        |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Eastern Oregon (Ontario) District</b> |             |             |             |             |             |             |             |             |             |             |
| Total Therms Pct. Growth                 | 1.19%       | 1.11%       | 1.71%       | 0.48%       | 1.16%       | 1.08%       | 1.68%       | 0.45%       | 1.13%       | 1.05%       |
| Residential Therms                       | 5,188,494   | 5,269,899   | 5,386,853   | 5,433,880   | 5,516,559   | 5,599,782   | 5,720,589   | 5,767,240   | 5,851,596   | 5,936,221   |
| Commercial Therms                        | 4,592,911   | 4,634,134   | 4,703,125   | 4,715,622   | 4,756,536   | 4,796,621   | 4,869,285   | 4,881,809   | 4,923,138   | 4,965,381   |
| Industrial Therms                        | 342,234     | 342,405     | 343,040     | 342,787     | 343,113     | 343,289     | 343,971     | 343,713     | 343,987     | 344,160     |
| Ind., Inst., & Cmcl. Interrup. Therms    | 965,685     | 965,685     | 970,580     | 965,590     | 974,964     | 975,040     | 980,003     | 975,040     | 984,436     | 984,339     |
| Total Core Therms                        | 11,089,324  | 11,212,123  | 11,403,598  | 11,458,078  | 11,591,173  | 11,716,752  | 11,913,848  | 11,967,823  | 12,103,157  | 12,230,101  |
| Daily BaseLoad Therms                    | 5,712       | 5,733       | 5,859       | 5,827       | 5,886       | 4,986       | 5,938       | 5,042       | 4,861       | 4,830       |
| Peak Day Therms                          | 126,441     | 127,919     | 129,874     | 131,370     | 132,970     | 134,482     | 135,514     | 137,527     | 139,154     | 140,697     |
| Therms Per Residential Customer          | 1,686       | 1,686       | 1,697       | 1,685       | 1,685       | 1,685       | 1,696       | 1,685       | 1,685       | 1,685       |
| Therms Per Commercial Customer           | 7,727       | 7,726       | 7,773       | 7,721       | 7,719       | 7,717       | 7,765       | 7,714       | 7,712       | 7,710       |
| Therms Per Industrial Customer           | 53,210      | 53,212      | 53,336      | 53,213      | 53,212      | 53,212      | 53,337      | 53,211      | 53,210      | 53,213      |
| Residential Customers                    | 8,689       | 8,825       | 8,962       | 9,100       | 9,238       | 9,377       | 9,517       | 9,657       | 9,799       | 9,940       |
| Commercial Customers                     | 1,617       | 1,632       | 1,648       | 1,663       | 1,679       | 1,694       | 1,710       | 1,726       | 1,741       | 1,757       |
| Industrial Customers                     | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          | 23          |
| Interruptible Customers                  | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| Total Core Customers                     | 10,330      | 10,481      | 10,633      | 10,787      | 10,940      | 11,095      | 11,250      | 11,407      | 11,564      | 11,721      |
| <b>Oregon</b>                            |             |             |             |             |             |             |             |             |             |             |
| Total Therms Pct. Growth                 | 2.53%       | 2.47%       | 2.95%       | 1.88%       | 2.39%       | 2.35%       | 2.82%       | 1.77%       | 2.27%       | 2.21%       |
| Residential Therms                       | 69,261,118  | 71,521,892  | 74,183,583  | 76,113,102  | 78,450,920  | 80,823,788  | 83,634,375  | 85,626,417  | 88,044,272  | 90,515,222  |
| Commercial Therms                        | 36,512,712  | 36,881,362  | 37,434,207  | 37,617,040  | 37,998,644  | 38,380,462  | 38,948,435  | 39,136,685  | 39,935,971  | 39,903,926  |
| Industrial Therms                        | 4,481,476   | 4,623,834   | 4,788,832   | 4,915,077   | 5,064,604   | 5,217,573   | 5,395,029   | 5,529,245   | 5,688,145   | 5,868,803   |
| Ind., Inst., & Cmcl. Interrup. Therms    | 1,963,947   | 1,963,947   | 1,972,769   | 1,963,681   | 1,982,746   | 1,983,014   | 1,991,922   | 1,983,014   | 2,002,082   | 2,001,811   |
| Total Core Therms                        | 112,219,253 | 114,991,034 | 118,379,391 | 120,608,900 | 123,496,915 | 126,404,836 | 129,969,762 | 132,275,360 | 135,280,469 | 138,269,762 |
| Daily BaseLoad Therms                    | 85,955      | 86,935      | 87,824      | 88,246      | 88,178      | 85,836      | 87,568      | 86,387      | 86,830      | 86,400      |
| Peak Day Therms                          | 1,081,904   | 1,108,324   | 1,150,425   | 1,177,812   | 1,205,671   | 1,233,618   | 1,244,811   | 1,290,339   | 1,319,295   | 1,348,334   |
| Therms Per Residential Customer          | 13,342      | 13,342      | 13,405      | 13,339      | 13,341      | 13,343      | 13,409      | 13,343      | 13,341      | 13,340      |
| Therms Per Commercial Customer           | 74,336      | 74,315      | 74,643      | 74,269      | 74,308      | 74,296      | 74,628      | 74,263      | 74,305      | 74,286      |
| Therms Per Industrial Customer           | 271,685     | 271,712     | 272,870     | 271,679     | 271,700     | 271,690     | 272,848     | 271,693     | 271,675     | 271,673     |
| Residential Customers                    | 98,820      | 102,022     | 105,261     | 108,536     | 111,847     | 115,194     | 118,577     | 121,994     | 125,445     | 128,931     |
| Commercial Customers                     | 11,555      | 11,686      | 11,818      | 11,950      | 12,083      | 12,217      | 12,352      | 12,488      | 12,624      | 12,761      |
| Industrial Customers                     | 211         | 218         | 225         | 231         | 238         | 245         | 253         | 260         | 267         | 275         |
| Interruptible Customers                  | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           | 4           |
| Total Core Customers                     | 110,590     | 113,929     | 117,307     | 120,722     | 124,173     | 127,661     | 131,186     | 134,746     | 138,341     | 141,972     |
| <b>Washington</b>                        |             |             |             |             |             |             |             |             |             |             |
| Total Therms Pct. Growth                 | 1.87%       | 1.85%       | 2.35%       | 1.26%       | 1.79%       | 1.79%       | 2.28%       | 1.21%       | 1.72%       | 1.69%       |
| Residential Therms                       | 165,120,813 | 168,808,106 | 173,469,785 | 176,252,830 | 180,033,977 | 183,873,402 | 188,745,758 | 191,592,341 | 195,466,955 | 199,401,873 |
| Commercial Therms                        | 129,601,684 | 131,335,418 | 133,740,895 | 134,794,509 | 136,566,531 | 138,373,104 | 140,864,897 | 141,952,532 | 143,767,950 | 145,566,658 |
| Industrial Therms                        | 15,076,620  | 15,423,957  | 15,845,087  | 16,125,908  | 16,485,336  | 16,853,788  | 17,297,564  | 17,592,791  | 17,967,819  | 18,341,634  |
| Ind., Inst., & Cmcl. Interrup. Therms    | 3,188,139   | 3,196,648   | 3,208,717   | 3,204,836   | 3,218,852   | 3,227,683   | 3,239,870   | 3,236,192   | 3,250,210   | 3,258,392   |
| Total Core Therms                        | 312,987,256 | 318,764,129 | 326,264,484 | 330,378,082 | 336,304,695 | 342,327,976 | 350,148,089 | 354,373,857 | 360,882,934 | 368,568,556 |
| Daily BaseLoad Therms                    | 296,681     | 299,739     | 303,061     | 304,579     | 308,664     | 308,666     | 315,057     | 308,702     | 310,597     | 298,940     |
| Peak Day Therms                          | 2,776,991   | 2,831,284   | 2,942,029   | 2,998,144   | 3,054,719   | 3,111,804   | 3,109,142   | 3,227,097   | 3,285,481   | 3,344,378   |
| Therms Per Residential Customer          | 126,070     | 125,568     | 126,537     | 125,079     | 125,085     | 124,596     | 125,555     | 124,118     | 124,130     | 123,644     |
| Therms Per Commercial Customer           | 180,555     | 180,385     | 180,966     | 180,042     | 180,394     | 180,310     | 180,909     | 180,023     | 180,410     | 180,258     |
| Therms Per Industrial Customer           | 638,292     | 638,777     | 641,638     | 639,277     | 640,037     | 640,706     | 643,535     | 641,317     | 641,631     | 641,945     |
| Residential Customers                    | 251,868     | 257,626     | 263,436     | 269,298     | 275,210     | 281,173     | 287,186     | 293,248     | 299,359     | 305,519     |
| Commercial Customers                     | 31,918      | 32,420      | 32,926      | 33,435      | 33,948      | 34,464      | 34,984      | 35,507      | 36,033      | 36,563      |
| Industrial Customers                     | 622         | 636         | 650         | 665         | 680         | 695         | 710         | 725         | 740         | 756         |
| Interruptible Customers                  | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           | 9           |
| Total Core Customers                     | 284,417     | 290,691     | 297,022     | 303,407     | 309,847     | 316,341     | 322,889     | 329,489     | 336,142     | 342,847     |
| <b>System</b>                            |             |             |             |             |             |             |             |             |             |             |
| Total Therms Pct. Growth                 | 2.04%       | 2.01%       | 2.51%       | 1.43%       | 1.95%       | 1.94%       | 2.43%       | 1.36%       | 1.87%       | 1.83%       |
| Residential Therms                       | 234,381,931 | 240,329,998 | 247,653,368 | 252,365,932 | 258,484,897 | 264,697,189 | 272,380,133 | 277,218,758 | 283,561,226 | 289,917,095 |
| Commercial Therms                        | 166,114,396 | 168,216,779 | 171,175,102 | 172,411,549 | 174,565,175 | 176,753,566 | 179,813,332 | 181,089,217 | 183,993,921 | 185,470,584 |
| Industrial Therms                        | 19,558,096  | 20,047,791  | 20,633,919  | 21,040,985  | 21,549,940  | 22,071,360  | 22,692,593  | 23,122,036  | 23,655,964  | 24,190,437  |
| Ind., Inst., & Cmcl. Interrup. Therms    | 5,152,086   | 5,160,995   | 5,181,487   | 5,188,516   | 5,201,597   | 5,210,697   | 5,231,792   | 5,219,206   | 5,252,292   | 5,260,203   |
| Total Core Therms                        | 425,206,508 | 433,755,163 | 444,443,875 | 450,986,982 | 459,801,610 | 468,732,813 | 480,117,851 | 486,649,217 | 495,763,403 | 504,838,319 |
| Daily BaseLoad Therms                    | 382,636     | 386,674     | 390,885     | 392,825     | 396,842     | 394,503     | 402,825     | 395,089     | 397,427     | 388,340     |
| Peak Day Therms                          | 3,858,896   | 3,939,608   | 4,092,454   | 4,175,955   | 4,260,390   | 4,345,422   | 4,353,963   | 4,517,436   | 4,604,776   | 4,692,711   |
| Therms Per Residential Customer          | 139,413     | 138,910     | 139,943     | 138,417     | 138,426     | 138,426     | 137,940     | 138,964     | 137,462     | 137,471     |
| Therms Per Commercial Customer           | 254,890     | 254,700     | 255,629     | 254,311     | 254,702     | 254,606     | 255,537     | 254,286     | 254,715     | 254,544     |
| Therms Per Industrial Customer           | 909,976     | 910,489     | 914,508     | 910,956     | 911,738     | 912,396     | 916,383     | 913,009     | 913,305     | 913,638     |
| Residential Customers                    | 350,687     | 359,647     | 368,697     | 377,834     | 387,057     | 396,367     | 405,763     | 415,242     | 424,805     | 434,450     |
| Commercial Customers                     | 43,473      | 44,106      | 44,744      | 45,385      | 46,032      | 46,682      | 47,336      | 47,995      | 48,658      | 49,324      |
| Industrial Customers                     | 833         | 854         | 875         | 896         | 918         | 940         | 962         | 985         | 1,008       | 1,031       |
| Interruptible Customers                  | 13          | 13          | 13          | 13          | 14          | 14          | 14          | 14          | 14          | 14          |
| Total Core Customers                     | 395,007     | 404,621     | 414,329     | 424,129     | 434,021     | 444,002     | 454,075     | 464,235     | 474,484     | 484,819     |

Appendix C  
Regulatory Compliance Matrix  
2020 OR IRP



## **Appendix C - Introduction**

In Order No. 89-507, the Commission adopted “least-cost planning” as the preferred approach to utility resource planning. As part of the IRP, Cascade followed the adopted rules and guidelines. In this Appendix, Cascade outlines the rules and guidelines as well as how the Company complied with each.

| <b>Order No. 07-047</b> |   |   |
|-------------------------|---|---|
| Guideline (1)(a)        | All resources must be evaluated on a consistent and comparable basis  | Completed throughout the IRP, Chapter 9 provides an in-depth analysis of the resources considered in the derivation of Cascade's preferred portfolio.   |
|                         | All known resources for meeting the utility's load should be considered, including supply-side options which focus on the generation, purchase and transmission of power – or gas purchases, transportation, and storage – and demand side options which focus on conservation and demand response. | Completed throughout the IRP, Chapter 9 provides an in-depth analysis of the resources considered in the derivation of Cascade's preferred portfolio. Demand side options are discussed in Chapter 6.   |
|                         | Consistent assumptions and methods should be used for evaluation of all resources.  | Cascade uses consistent assumptions and methods while evaluating all resources throughout the IRP.  |
|                         | The after-tax marginal weighted-average cost of capital (WACC) should be used to discount all future resource costs.  | Cascade uses the after-tax marginal weighted-average cost of capital in all calculations involving discounted future resource costs. This is discussed in Chapter 5.  |
| Guideline (1)(b)        | Risk and uncertainty must be considered.  | Cascade uses Value-at-risk (VAR) analysis to capture the intrinsic and extrinsic value of all resources. This is discussed in Chapter 9.  |
|                         | At a minimum, utilities should address the following: sources of risk and uncertainty: Natural gas utilities: demand (peak, swing and baseload), commodity supply and price, transportation availability and price, and costs to comply with any regulation of greenhouse gas emissions.            | Cascade performs Monte Carlo Simulations to stochastically evaluate scenarios and sensitivities related to demand (peak, swing and baseload), commodity supply and price, transportation availability and price, and costs to comply with any regulation of greenhouse gas emissions. This is discussed in Chapter 9. |

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|                         | <p>Utilities should identify in their plans any additional sources of risk and uncertainty.</p>  | <p>All sources of risk and uncertainty are discussed in Chapter 9.</p>   |
| <p>Guideline (1)(c)</p> | <p>The primary goal must be the selection of a portfolio of resources with the best combination of expected costs and associated risks and uncertainties for the utility and its customers.</p> <p>The planning horizon for analyzing resource choices should be at least 20 years and account for end effects.</p> <p>Utilities should consider all costs with a reasonable likelihood of being included in rates over the long term, which extends beyond the planning horizon and the life of the resource.</p> | <p>Cascade uses VaR analysis to capture the intrinsic and extrinsic value of all resources, and select the portfolio with the best combination of expected costs and associated risks and uncertainties for the utility and its customers. This is discussed in Chapter 9.</p> <p>Cascade performs its analysis over a 20-year or longer time horizon throughout the IRP. All cost analysis includes any projected costs that may extend beyond the 20-year horizon.</p> |
|                         | <p>Utilities should use present value of revenue requirement (PVRR) as the key cost metric. The plan should include analysis of current and estimated future costs for all long-lived resources such as power plants, gas storage facilities, and pipelines, as well as all short-lived resources such as gas supply and short-term power purchases.</p>   | <p>Cascade uses PVRR as the key metric to rank its candidate portfolios. This cost figure includes all current and estimated future costs for the resources within each portfolio. This analysis is in Chapter 9.</p>  |
|                         | <p>To address risk, the plan should include, at a minimum:</p>   |  |

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|                | <p>1. Two measures of PVRR risk: one that measures the variability of costs and one that measures the severity of bad outcomes.</p> <p>2. Discussion of the proposed use and impact on costs and risks of physical and financial hedging.</p>  | <p>Cascade uses Monte Carlo analysis to measure the variability of costs, and VaR analysis to measure the impact of severe outcomes. Cascade views any portfolio containing unserved demand as unacceptable.</p> <p>Chapter 4 discusses the Company's approach to financial derivatives.</p>    |
|                | <p>The utility should explain in its plan how its resource choices appropriately balance cost and risk.</p>  | <p>Cascade uses VaR analysis to appropriately balance intrinsic and extrinsic costs. This is mainly discussed in Chapter 9.</p>   |
| Guideline 1(d) | <p>The plan must be consistent with the long-run public interest as expressed in Oregon and federal energy policies.</p>   | <p>This IRP is consistent with the long-run public interest. Discussion of Oregon and national energy policies can be found in Chapter 6.</p>   |
| Guideline 2(a) | <p>The public, which includes other utilities, should be allowed significant involvement in the preparation of the IRP. Involvement includes opportunities to contribute information and ideas, as well as to receive information. Parties must have an opportunity to make relevant inquiries of the utility formulating the plan. Disputes about whether information requests are relevant or unreasonably burdensome, or whether a utility is being properly responsive, may be submitted to the Commission for resolution.</p> | <p>Cascade ensures that stakeholders have access to materials and can make comments. The company is always willing to meet with stakeholders to further explain any topics of interest. Further information about public participation can be found in Chapter 10 as well as in Appendix A.</p> |
| Guideline 2(b) | <p>While confidential information must be protected, the utility should make</p>   | <p>Cascade ensures that stakeholders have access to materials and can make comments. The company is always willing to meet with stakeholders to</p>   |

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|                       | <p>public, in its plan, any non-confidential information that is relevant to its resource evaluation and action plan. Confidential information may be protected through use of a protective order, through aggregation or shielding of data, or through any other mechanism approved by the Commission.</p> | <p>further explain any topics of interest. Further information about public participation can be found in Appendix A.</p>  |
| <p>Guideline 2(c)</p> | <p>The utility must provide a draft IRP for public review and comment prior to filing a final plan with the Commission.</p>   | <p>The 2020 Oregon Draft IRP has been filed on 5/12/2020. It will be posted on the CNGC website and distributed to all stakeholders involved in Cascade's IRP Process. There were no hard copies produced for the Draft.</p> |
| <p>Guideline 3(a)</p> | <p>A utility must file an IRP within two years of its previous IRP acknowledgment order. If the utility does not intend to take any significant resource action for at least two years after its next IRP is due, the utility may request an extension of its filing date from the Commission.</p>          | <p>This IRP is filed within Oregon Commission deadlines.</p>   |
| <p>Guideline 3(b)</p> | <p>The utility must present the results of its filed plan to the Commission at a public meeting prior to the deadline for written public comment.</p>   | <p>This will be completed when the meeting is scheduled.</p>   |
| <p>Guideline 3(c)</p> | <p>Commission staff and parties should complete their comments and recommendations within six months of IRP filing.</p>   | <p>To be completed by Staff.</p>   |
| <p>Guideline 3(d)</p> | <p>The Commission will consider comments and recommendations on a utility's plan</p>  | <p>To be completed by Staff.</p>   |

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|                       | <p>at a public meeting before issuing an order on acknowledgment. The Commission may provide the utility an opportunity to revise the plan before issuing an acknowledgment order.</p>  |   |
| <p>Guideline 3(e)</p> | <p>The Commission may provide direction to a utility regarding any additional analyses or actions that the utility should undertake in its next IRP.</p>  | <p>To be completed by Staff.</p>  |
| <p>Guideline 3(f)</p> | <p>Each utility must submit an annual update on its most recently acknowledged plan. The update is due on or before the acknowledgment order anniversary date. Once a utility anticipates a significant deviation from its acknowledged IRP, it must file an update with the Commission, unless the utility is within six months of filing its next IRP. The utility must summarize the update at a Commission public meeting. The utility may request acknowledgment of changes in proposed actions identified in an update.</p> | <p>Cascade filed its most recent update on 07/31/2019. Cascade plans to continue to comply with this guideline.</p> |
| <p>Guideline 3(g)</p> | <p>Unless the utility requests acknowledgement of changes in proposed actions, the annual update is an informational filing that:</p>   |   |
|                       | <p>Describes what actions the utility has taken to implement the plan;</p>  | <p>Cascade filed its most recent update on 07/31/2019. Cascade plans to continue to comply with this guideline.</p> |

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|                | Provides an assessment of what has changed since the acknowledgment order that affects the action plan, including changes in such factors as load, expiration of resource contracts, supply-side and demand-side resource acquisitions, resource costs, and transmission availability; and  | Cascade filed its most recent update on 07/31/2019. Cascade plans to continue to comply with this guideline.   |
|                | Justifies any deviations from the acknowledged action plan.   | Cascade filed its most recent update on 07/31/2019. Cascade plans to continue to comply with this guideline.   |
| Guideline 4    | At a minimum, the plan must include the following elements:   |  |
| Guideline 4(a) | An explanation of how the utility met each of the substantive and procedural requirements;  | Cascade has filled out a compliance matrix to meet this requirement. Information regarding the compliance matrix can be found in Appendix C.   |
| Guideline 4(b) | Analysis of high and low load growth scenarios in addition to stochastic load risk analysis with an explanation of major assumptions;   | Cascade uses VaR analysis to stochastically test its preferred portfolio in a variety of scenarios, including high and low load growth, limited availability of supplies, and limited availability of storage. This analysis along with an explanation of the major assumptions is discussed in Chapter 9. |
| Guideline 4(c) | For electric utilities, . . .   | Not applicable   |
| Guideline 4(d) | For natural gas utilities, a determination of the peaking, swing and base-load gas supply and associated transportation and storage expected for each year of the plan, given existing resources; and identification of gas supplies (peak, swing and base-load), transportation and storage needed to bridge the gap between expected loads and resources; | Chapter 4 of the IRP discusses the various supply, storage, and transportation resources available for each year of the plan. Additionally, Chapter 9 of the IRP graphically identifies the mix of existing and incremental resources used to meet expected loads on a peak day and annual basis.          |

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| Guideline 4(d) | <p>Identification and estimated costs of all supply-side and demand-side resource options, taking into account anticipated advances in technology;</p>   | <p>Appendix E outlines the estimated costs of supply side resource options and Appendix D outlines the estimated costs of all demand-side resource options.</p>  |
| Guideline 4(d) | <p>Analysis of measures the utility intends to take to provide reliable service, including cost-risk tradeoffs;</p>  | <p>Cascade discusses the measures that will be taken to provide reliable service in Chapter 9. This plan includes the cost-risk tradeoffs evaluated in the VaR analysis which can be found in Chapter 9.</p>   |
| Guideline 4(e) | <p>Identification of key assumptions about the future (e.g., fuel prices and environmental compliance costs) and alternative scenarios considered;</p>   | <p>Cascade uses VaR analysis to stochastically test its preferred portfolio in a variety of scenarios and sensitivities, including high and low load growth, limited availability of storage, and various environmental compliance cost scenarios. This analysis along with an explanation of the major assumptions is discussed in Chapter 9.</p> |
| Guideline 4(f) | <p>Analysis of measures the utility intends to take to provide reliable service, including cost-risk tradeoffs;</p>  | <p>Cascade discusses the measures that will be taken to provide reliable service in Chapter 9. This plan includes the cost-risk tradeoffs evaluated in the VaR analysis which can be found in Chapter 9.</p>   |
| Guideline 4(g) | <p>Identification of key assumptions about the future (e.g., fuel prices and environmental compliance costs) and alternative scenarios considered;</p>   | <p>Cascade uses VaR analysis to stochastically test its preferred portfolio in a variety of scenarios and sensitivities, including high and low load growth, limited availability of storage, and various environmental compliance cost scenarios. This analysis along with an explanation of the major assumptions is discussed in Chapter 9.</p> |
| Guideline 4(h) | <p>Construction of a representative set of resource portfolios to test various operating characteristics, resource types, fuels and sources, technologies, lead times, in-service dates, durations and general locations – system-wide or delivered to a specific portion of the system;</p> | <p>Discussion of the representative set of portfolios can be found in Chapter 9.</p>   |



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| Guideline 4(i) | Evaluation of the performance of the candidate portfolios over the range of identified risks and uncertainties;  | Discussion of the performance of the candidate portfolio over a range of scenarios and sensitivities can be found in Chapter 9.  |
| Guideline 4(j) | Results of testing and rank ordering of the portfolios by cost and risk metric, and interpretation of those results;   | Results of the testing and rank order of the portfolios by cost and risk metric, along with an interpretation of those results, can be found in Chapter 9.                                 |
| Guideline 4(k) | Analysis of the uncertainties associated with each portfolio evaluated;  | Cascade analyzes the uncertainties associated with each portfolio in its VaR analysis which can be found in Chapter 9.   |
| Guideline 4(l) | Selection of a portfolio that represents the best combination of cost and risk for the utility and its customers;  | Cascade has selected a portfolio that is the best combination of risk for the utility and its customers. Discussion of this portfolio can be found in Chapter 9.                           |
| Guideline 4(m) | Identification and explanation of any inconsistencies of the selected portfolio with any state and federal energy policies that may affect a utility's plan and any barriers to implementation; and  | Cascade has not identified any inconsistencies with its preferred portfolio and state/federal energy policies. Discussion of Oregon and federal energy policies can be found in Chapter 6. |
| Guideline 4(n) | An action plan with resource activities the utility intends to undertake over the next two to four years to acquire the identified resources, regardless of whether the activity was acknowledged in a previous IRP, with the key attributes of each resource specified as in portfolio testing. | Cascade's four-year action plan can be found in Chapter 11.  |
| Guideline 5    | Electric Transmission  | Not applicable.  |
| Guideline 6(a) | Each utility should ensure that a conservation potential study is conducted periodically for its entire service territory.   | Cascade partners with the Energy Trust of Oregon (ETO) for its energy efficiency efforts in Oregon. Energy efficiency efforts are discussed in Chapter 6.                                  |

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| <p>Guideline 6(b)</p> | <p>To the extent that a utility controls the level of funding for conservation programs in its service territory, the utility should include in its action plan all best cost/risk portfolio conservation resources for meeting projected resource needs, specifying annual savings targets.</p>   | <p>Cascade partners with the Energy Trust of Oregon (ETO) for its energy efficiency efforts in Oregon. Energy efficiency efforts are discussed in Chapter 6. The impact of conservation on resource needs are integrated in Chapter 9.</p>   |
| <p>Guideline 6(c)</p> | <p>To the extent that an outside party administers conservation programs in a utility's service territory at a level of funding that is beyond the utility's control, the utility should:</p> <ul style="list-style-type: none"> <li>• Determine the amount of conservation resources in the best cost/risk portfolio without regard to any limits on funding of conservation programs; and</li> <li>• Identify the preferred portfolio and action plan consistent with the outside party's projection of conservation acquisition.</li> </ul> | <p>Cascade partners with the Energy Trust of Oregon (ETO) for its energy efficiency efforts in Oregon. Energy efficiency efforts are discussed in Chapter 6. The impact of conservation on resource needs are integrated in Chapter 9.</p>   |
| <p>Guideline 7</p>    | <p>Plans should evaluate demand response resources, including voluntary rate programs, on par with other options for meeting energy, capacity, and transmission needs (for electric utilities) or gas supply and transportation needs (for natural gas utilities).</p>   | <p>In Chapter 6, the Company explains that it offers interruptible service as a voluntary option to customers in both Oregon and Washington, and that this offering is a load management program. Chapter 4, Supply Side Resources discusses interruptible service as a needle-peaking supply-side resource.</p> |

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| <p>Guideline 8 (revised – new guideline is from Order No. 08-339)</p> | <p>a. <b>BASE CASE AND OTHER COMPLIANCE SCENARIOS:</b> The utility should construct a base-case scenario to reflect what it considers to be the most likely regulatory compliance future for carbon dioxide (CO<sub>2</sub>), etc. The utility also should develop several compliance scenarios ranging from the present CO<sub>2</sub> regulatory level to the upper reaches of credible proposals by governing entities. Each compliance scenario should include a time profile of CO<sub>2</sub> compliance requirements. The utility should identify whether the basis of those requirements, or “costs” would be CO<sub>2</sub> taxes, a ban on certain type of resources, or CO<sub>2</sub> caps (with or without flexibility mechanism such as allowance or credit trading or a safety valve). The analysis should recognize significant and important upstream emissions that would likely have a significant impact on its resource decisions.</p> | <p>Cascade’s base case scenario contains what the Company expects the cost for regulatory compliance to be. In its stochastic analysis, Cascade performs a sensitivity analysis of the VaR that results from a range of CO<sub>2</sub> related regulatory costs. The results of this can be found in Chapter 9. Additional discussion of Carbon compliance can be found in Chapter 6.</p> |
|   | <p>b. <b>TESTING ALTERNATIVE PORTFOLIOS AGAINST THE COMPLIANCE SCENARIOS:</b> The utility should estimate, under each of the</p>  | <p>Cascade uses PVRR as the key metric to rank its candidate portfolios. This cost figure includes all current and estimated future costs for the resources within each portfolio. This analysis is in Chapter 9.</p>   |

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|  | <p>compliance scenarios, the present value of revenue requirement (PVR) costs and risk measures, over at least 20 years, for a set of reasonable alternative portfolios from which the preferred portfolio is selected. The utility should incorporate end-effect considerations in the analyses to allow for comparisons of portfolios containing resources with economic or physical lives that extend beyond the planning period. The utility should also modify projected lifetimes as necessary to be consistent with the compliance scenario under analysis. In addition, the utility should include, if material, sensitivity analyses on a range of reasonably possible regulatory scenario futures for nitrogen oxide, sulfur oxides, and mercury to further inform the preferred portfolio selection.</p> | <p>Cascade analyzed a wide variety of extreme carbon scenarios. No carbon scenario created a substantial difference in the preferred portfolio.</p> |
|  | <p>c. TRIGGER POINT ANALYSIS: The utility should identify at least one CO2 compliance “turning point” scenario which, if anticipated now, would lead to, or “trigger” the selection of a portfolio of resources that is</p>   |   |

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|                     | <p>substantially different from the preferred portfolio. The utility should develop a substitute portfolio appropriate for this trigger-point scenario and compare the substitute portfolio’s expected cost and risk performance to that of the preferred portfolio – under the base case and each of the above CO2 compliance scenarios. The utility should provide its assessment of whether a CO2 regulatory future that is equally or more stringent than the identified trigger point will be mandated.</p> |  |
|                     | <p>d. OREGON COMPLIANCE PORTFOLIO: If none of the above portfolios is consistent with Oregon energy policies (including state goals for reducing GHGs) as those policies are applied to the utility, the utility should construct the best cost/risk portfolio that achieves that consistency, present its cost and risk parameters, and compare it to those of the preferred and alternative portfolios.</p>  | <p>All of Cascade’s candidate portfolios are consistent with Oregon energy policies.</p>   |
| <p>Guideline 9</p>  | <p>An electric utility’s . . .</p>   | <p>Not applicable</p>  |
| <p>Guideline 10</p> | <p>Natural gas utilities should analyze, on an integrated basis, gas supply,</p>   | <p>Chapter 4 of the IRP discusses the various supply, storage, and transportation resources available for each year of the plan. Additionally,</p> |

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|                        | <p>transportation, and storage, along with demand side resources, to reliably meet peak, swing, and base-load system requirements. Electric and natural gas utility plans should demonstrate that the utility's chosen portfolio achieves its stated reliability, cost and risk objectives.</p> | <p>Chapter 9 of the IRP graphically identifies the mix of existing and incremental resources used to meet expected loads on peak day and annually.</p> |
| <p>Guideline 12</p>    | <p>Electric utilities should . . .</p>  | <p>Not applicable</p>  |
| <p>Guideline 13(a)</p> | <p>Electric utilities should . . .</p>  | <p>Not applicable</p>  |
| <p>Guideline 13(b)</p> | <p>Natural gas utilities should either describe in the IRP their bidding practices for gas supply and transportation, or provide a description of those practices following IRP acknowledgment.</p>   | <p>Cascade's bidding practices for gas supply and transportation can be found in Chapter 4.</p>  |

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| <b>Order No. 11-196, UM 1286, PGA Guidelines</b> |  |   |
| Appendix, Page 2 of 16, No. 1                    | For natural gas utilities, each IRP preparation process and final published IRP will address both planning to meet normal annual expected demand (as defined by the LOC - both base-load and swing) by day and planning to meet annual peak demand by day. The planning will include gas supply and associated transportation along with expected use of storage.  | Chapter 4 of the IRP discusses the various supply, storage, and transportation resources available for each year of the plan. Additionally, Chapter 9 of the IRP graphically identifies the mix of existing and incremental resources used to meet expected loads on peak day and annually. |
| Appendix, Page 3 & 4 of 16, No. 6                | <p>As part of the PGA filing, final IRP submission, and general rate case filing each LDC will include an attestation that it has verified, to the best of its knowledge, the historical values for (but not limited to) customer number, sales volumes, etc. are consistent if not totally equivalent among the following:</p> <ul style="list-style-type: none"> <li>a) All filings with FEREC and the Securities and Exchange Commission (SEC);</li> <li>b) Results of operations reports submitted to the OPUC;</li> <li>c) Most current IRP or IRP update;</li> <li>d) Most recent PGA filing (final); and</li> <li>e) Most recent general rate review filing.</li> </ul> <p>If the LDC cannot make such an attestation it should explain the</p> | Cascade has included this attestation in its 2020 IRP.  |

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|                                     | variations and why these variations should be allowed.  |  |
| Appendix, Page 4 of 16, No. 7       | All forecasts of demand, weather, etc. upon which the gas supply portfolio for the current PGA filing is based should be based on a methodology and data sources that are consistent with the most recently acknowledged IRP or IRP update and most recently concluded general rate review for the utility. If the methodology and/or data sources are not consistent each difference should be identified, explained, and documented as part of the PGA as well as the IRP and general rate review filing work papers. | All of Cascade’s forecasts used in the PGA filing are based on a methodology and data sources that are consistent with the 2019 Oregon IRP update. |
| <b>Order No. 16-054, Appendix A</b> |   |  |
| Page 5, No. 1                       | Clearly show the plan to acquire all cost-effective energy efficiency.  | Chapter 6 discusses Cascade’s plan to acquire all cost-effective energy efficiency.  |
| Page 5, No. 2                       | Provide complete conservation resource potential results and inputs specific to Cascade only, not including results of other Energy Trust territories or for measures that do not apply to Cascade territory.   | Conservation resource potential results and inputs can be found in Chapter 6.  |
| Page 5, No. 3                       | Provide updated data and explanations for the policies and methodologies used to inform the DSM analysis.   | Policies and methodologies used to inform the DSM analysis is discussed in Chapter 6.  |
| Page 5, No. 4                       | Incorporate commercial market transformation savings similar to   | Commercial market transformation savings are discussed in Chapter 6.   |



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|                         | residential methods and include an explanation for how those assumptions are derived and applied within the IRP.  |   |
| Page 5, No. 5           | Clearly document assumptions behind capacity contribution of energy efficiency and how the capacity value is incorporated into resource planning.   | Assumptions behind capacity contribution of energy efficiency are documented in Chapter 6.  |
| Page 5, No. 6           | Provide an explanation regarding how annual energy savings are translated into peak day demand and capacity resources.  | The methodology behind the transformation of energy savings to peak day demand and capacity resources is discussed in Chapter 9.  |
| Page 8, 1&2, Nos. 1 & 2 | Future Cascade IRPs include portfolio analyses and present the analysis results clearly delineating the three analysis steps, and how those steps progressively lead to identification of the preferred portfolio of resources. | Portfolio analysis and identification of the preferred portfolio can be found in Chapter 9.                                       |
| Page 8, No. 3           | Future Cascade IRPs perform and clearly present this trade-off analysis.  | This is discussed in Chapter 9.   |
| Page 8, No. 5           | Future Cascade IRPs provide a clear, complete, and concise presentation of the portfolio analysis results in a single Chapter of the IRP.   | This is discussed in Chapter 9.   |
| Page 9                  | Staff recommends that Cascade work with Staff and other interested parties to develop a comprehensive database comprising of both economic and weather variables such as price, income, employment, different Heating Degree    | Cascade has improved its forecast modeling for the 2020 IRP. Information about new modeling techniques can be found in Chapter 3. |

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|                | <p>Days (HDD) cutoffs, seasonality, etc., and formulate alternative regression models to identify the drivers of the forecasted values and plausibility of the parameter estimates relative to the economic theory on demand for natural gas.</p>  |  |
| <p>Page 10</p> | <p>Staff recommends that future Cascade IRPs include detailed descriptions of, and basis for, the gas purchasing plan and hedging strategy, as well as the gas purchasing risk management plan/policy/strategy.</p>  | <p>Cascade includes a detailed description of its gas purchasing plan and hedging strategy in Chapter 4.</p> |
| <p>Page 10</p> | <p>Staff also recommends that in the next IRP, Cascade comprehensively describe the rationale by which it chooses the hedging percentage levels, including upper limits of hedged gas based on the market environments (e.g., price levels, volatility, etc.), Cascade's risk tolerance (e.g., tolerance bands of potential losses), etc. In the meantime, Staff recommends that Cascade continue to apprise Staff and other parties during the recurring quarterly meetings of changes in the hedged gas percentage levels.</p> | <p>Cascade discusses its hedging practices in Chapter 4.</p>   |
| <p>Page 11</p> | <p>Staff recommends that future Cascade IRPs present separate listings of</p>  | <p>A discussion of all distribution system projects can be found in Chapter 8.</p>                           |

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|         | enhancement projects from the other projects.   |   |
| Page 12 | Staff recommends for future IRPs that Cascade inform the Commission in its IRP of the price of renewable natural gas as compared to traditional source of natural gas, and report to the Commission how much renewable natural gas it purchased between the IRP filing years. | Cascade discusses the price of RNG in Chapter 7 as well as in Appendix I. Cascade has not purchased any renewable natural gas.  |
| Page 12 | Staff also recommends that Cascade report its EPA's Greenhouse Inventory Report information to the Commission in each of its future IRPs for each year preceding each IRP.  | Subpart NN emissions for Oregon in 2018 was 562,197.4 Metric Tons of CO <sub>2e</sub> and 597,463.7 Metric Tons of CO <sub>2e</sub> in 2019.  |
| Page 12 | Staff recommends that Cascade evaluate its staffing approach and make changes where needed, to ensure that its required regulatory IRP activities are performed on schedule and in compliance with Commission requirements.   | Cascade made enhancements to its staffing prior to the 2018 IRP, adding two new analysts and retaining the services of a consultant. Cascade has kept the same team through the 2020 IRP. |
| Page 13 | Staff recommends that future IRPs use the Executive Summary to summarize the contents of the IRP, rather than to present additional information.  | Cascade's executive summary now summarizes the contents of the IRP, this can be found in Chapter 1.   |

Appendix D  
Demand Side Management  
2020 OR IRP

# Impacts on utility peak demand

This appendix provides an annual update on Energy Trust's impacts on utility demand. It describes ongoing and future approaches to work with utilities and other stakeholders to employ distributed energy resources to mitigate peak demand on a systemwide basis for utilities, alleviate local distribution system constraints and lower utility costs for the benefit of ratepayers. This appendix also discusses the impacts energy efficiency and renewable resources have on peak demand and the progress being made on the further development of methods to quantify and value the impact peak demand reductions have on utility transmission, supply and distribution systems. Specifically, this appendix addresses the following purposes:

1. Report Energy Trust annual program impacts on peak demand for electric and natural gas utilities. This includes:
  - Expected winter and summer coincident peak capacity contribution estimates from 2019 energy efficiency and solar generation measures.
2. Assess data and tools needed to link utility system management objectives to specific Energy Trust actions. These might include:
  - Actionable information about opportunities to avoid specific system investments.
  - Description of methods for linking the areas where investments are needed in demographic and load data for program targeting.
  - Possible enhancements to cost-effectiveness analyses considering capacity and other values to the grid.
3. Identify and report on complementary pilots and initiatives that reduce peak demand and meet corresponding grid optimization objectives, developed in coordination with utilities. This includes:
  - Work with utilities to identify where and how Energy Trust programs reduce demand on critical elements of the power delivery system.

## A. Report the value of current program impacts on peak demand

Energy Trust helps customers install energy efficiency and renewable generation measures that not only save energy and offset electricity, but also provide additional benefits to the utility system and to ratepayers. Energy Trust will continue to improve its understanding of how energy efficiency savings and renewable generation provide these additional benefits to utilities. Energy Trust is incorporating this evolving knowledge into avoided cost benefit calculations to estimate the value of impacts of energy efficiency activities on utilities' peak demand.

### Peak demand reduction estimates from energy efficiency

For 2019, Energy Trust estimated peak demand reductions from electric and gas energy-efficiency projects by calculating the percent of annual energy savings that occur during the system's peak time periods identified by utilities, and documented and approved by the Oregon Public Utility Commission (OPUC) for use in the calculation of Energy Trust avoided costs via OPUC docket UM 1893. To estimate the portion of electric energy savings in those periods, Energy Trust relied on load profiles taken from the

Northwest Power and Conservation Council's Seventh Power Plan<sup>1</sup>. For natural gas, Energy Trust calculated both peak-day demand reductions and peak-hour demand reductions by relying on peak factors from two sources: peak-day factors were based on electric analogs taken from the Northwest Power and Conservation Council's Seventh Power Plan for several end-uses, and peak day factors for space heat end-use savings were developed by NW Natural. Energy Trust relied on peak-hour factors developed by NW Natural for all end-uses. These factors are used to calculate gas peak reductions by end-use at the measure level.

Energy Trust's electric efficiency programs resulted in the following peak demand reduction estimates for 2019.

**Table 1. 2019 Net electric system efficiency peak demand reduction estimates (MW) at generator**

| Utility       | Summer MW   | Winter MW   | Total aMW Saved |
|---------------|-------------|-------------|-----------------|
| PGE           | 37.8        | 42.0        | 32.8            |
| Pacific Power | 22.2        | 27.6        | 20.5            |
| <b>Total</b>  | <b>60.0</b> | <b>69.6</b> | <b>53.3</b>     |

For gas measures, Energy Trust calculated peak-day and peak-hour natural gas savings, presented in the table below.

**Table 2. 2019 Net natural gas system efficiency peak demand reduction estimates (therms)**

| Utility             | Peak-day therms | Peak-hour therms | Total therms Saved |
|---------------------|-----------------|------------------|--------------------|
| Northwest Natural   | 62,394          | 4,304            | 5,019,618          |
| Cascade Natural Gas | 5,632           | 389              | 498,517            |
| Avista              | 4,603           | 333              | 384,599            |
| <b>Total</b>        | <b>72,628</b>   | <b>5,026</b>     | <b>5,902,734</b>   |

The above 2019 tables do not include Northwest Energy Efficiency Alliance activities. Energy Trust does not disaggregate market transformation savings into end-use profiles that would allow us to quantify peak demand savings.

#### **Peak demand reduction estimates from solar electric generation**

Energy Trust estimated 2019 average peak demand contributions from residential and non-residential solar electric projects. Energy Trust estimated average generation from installed solar projects for multiple

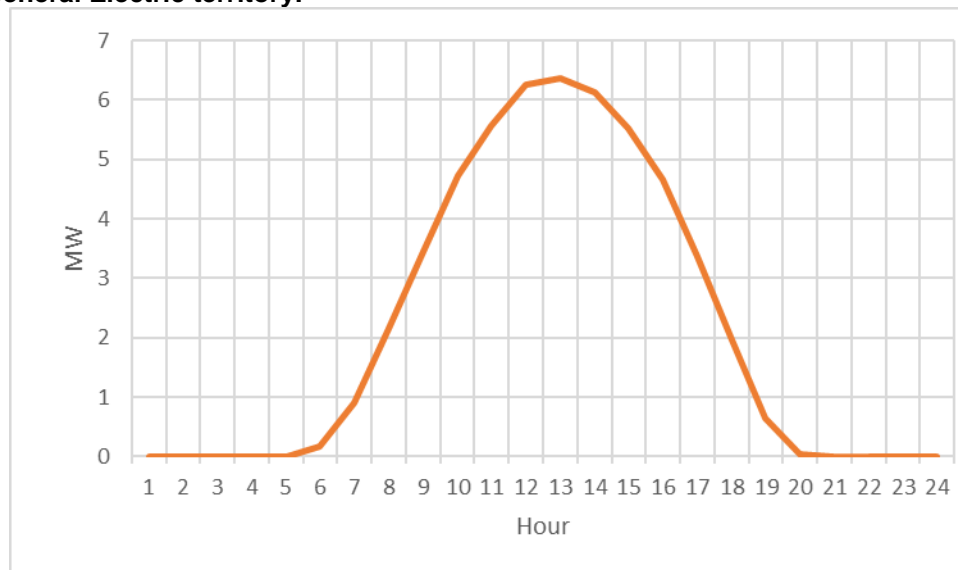
<sup>1</sup> <https://nwcouncil.app.box.com/s/ph0by9u53vygowx42rms5oytojhdmg5x>

locations throughout Energy Trust territory during peak hours by using monthly generation profiles for representative project types based on variation caused by shading, tilt, orientation and geographic location. Actual peak contributions for each project varies based on time of day and weather. Table 3 shows the average solar generation over the peak period identified by each utility for each season. The figures below show the average daily solar generation profile shape by season and utility.

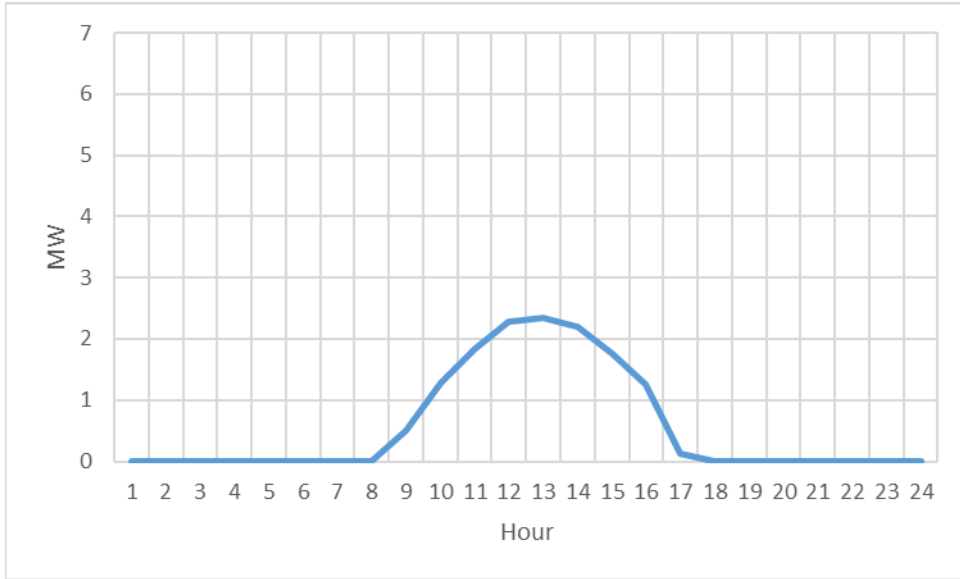
**Table 3. 2019 solar electric generation peak demand reduction estimates (MW)**

| Utility       | Summer MW   | Winter MW   | Total Generation (MWh) |
|---------------|-------------|-------------|------------------------|
| PGE           | 2.65        | 1.15        | 12,765                 |
| Pacific Power | 2.95        | 0.65        | 11,041                 |
| <b>Total</b>  | <b>5.60</b> | <b>1.80</b> | <b>23,806</b>          |

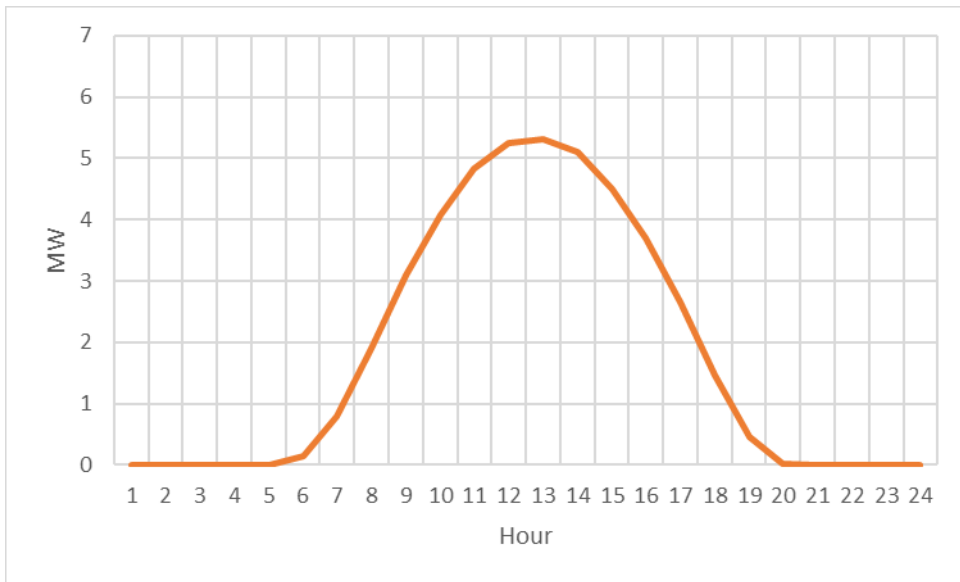
**Figure 1: Average Hourly summer solar generation profile from all 2019 solar installations in Portland General Electric territory.**



**Figure 2: Average Hourly winter solar generation profile from all 2019 solar installations in Portland General Electric territory.**

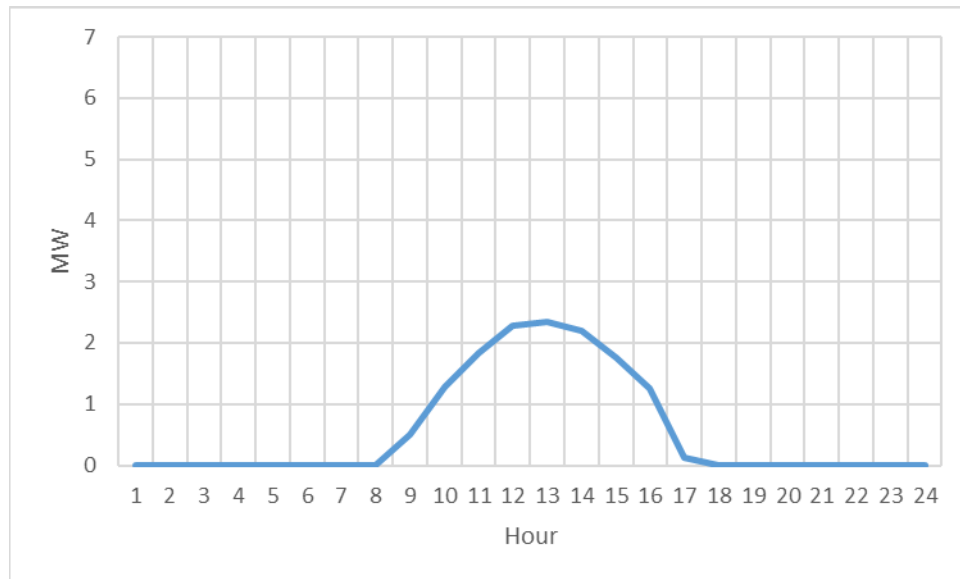


**Figure 3: Average Hourly summer solar generation profile from all 2019 solar installations in Pacific Power territory.**





**Figure 4: Average Hourly winter solar generation profile from all 2019 solar installations in Pacific Power territory.**



The above 2019 tables and figures **exclude** demand reduction estimates from:

- Renewable energy generation projects other than solar electric projects. Energy Trust has not incorporated these impacts into reporting because there are a relatively small number of projects with high degrees of production variability. More work is required to estimate the demand contributions of these projects and Energy Trust will consider doing so in future reporting.

## **B. Assess data and tools needed to link utility grid objectives to specific Energy Trust actions**

Energy Trust began to work with Kevala Analytics as part of a U.S. Department of Energy grant to share past renewable energy and energy efficiency project information to facilitate planning for the interconnection and integration of distributed energy resources such as energy efficiency, solar and solar plus storage. In 2020, Energy Trust will continue that work under a contract in order to continue to explore the ability of the tool to provide transparency into localized grid constraints, areas of increased interconnection cost and the impacts on the distribution grid of delivering distributed energy resources. Energy Trust will coordinate with stakeholders as appropriate and all results will be shared with the OPUC, PGE and Pacific Power.

Beginning in September of 2018, Energy Trust and Portland General Electric (PGE) partnered to deliver direct installation (DI) of smart thermostats in PGE's territory. Customers receiving DI smart thermostats are required to be automatically enrolled in PGE's Smart Thermostat Demand Response (DR) program. In 2019, the direct install offering led approximately 4,200 smart thermostats being installed in homes in PGE's territory. PGE uses advanced metering infrastructure (AMI) technology throughout its system, with AMI producing 15-minute interval readings collected on meters for homes and businesses. AMI data's availability, paired with Energy Trust program data, provided a unique and rich dataset that can be used to fill gaps about our understanding of a smart thermostat's energy

efficiency and DR impacts throughout each hour of the year. In 2019, Energy Trust contracted with the Cadmus Group Inc. to develop a savings profile for smart thermostats. Energy Trust will work with the RTF to operationalize smart thermostat savings shapes when they are completed in 2021.

The Northwest Energy Efficiency Alliance (NEEA) and regional stakeholders began the End-Use Load Research (EULR) project in 2019 to help gather meter data for load profile development. The Northwest has not conducted large-scale studies on how different types of residential and commercial customers use electricity on a daily basis for almost 30 years – the Home Energy Metering Study (HEMS) and the Commercial Energy Metering Study (CEMS), aim to address deficiencies for a number of end-use profiles. The EULR Study is a key component of Energy Trust’s strategy to update end use and whole home load shape estimations. This study design was informed by a collaborative planning effort conducted by NEEA’s Partners, including Energy Trust. The main objective of this study is to develop a robust characterization of energy consumption of key heating and cooling measures to support planning and implementation to pursue clean energy goals and support utility information needs. Key benefits include:

- An updated framework to assess the contributions energy efficiency technologies make to reducing utility peak demand.
- A better understanding of how to integrate renewable energy into the grid, increasing reliability as the deployment of distributed generation and new end use technologies increases over time; and
- Prioritized data by end use for application in a range of utility functions including demand response, load forecasting and resource planning.

## **C. Report on and Energy Trust activities that help meet grid objectives in coordination with utilities**

Energy-efficiency programs have the potential to help electric and natural gas utilities address demand-related challenges. Energy Trust can provide further benefit to utility systems by increasing the saturation of energy-efficient, demand response-capable equipment (such as internet connected thermostats and heat pump water heaters with built in Wi-Fi), providing additional options for utilities when considering potential demand response programs. Utility demand response programs can use this equipment as a resource in reacting to peak demand events. Through targeted load management pilot designs, Energy Trust is exploring offering additional incentives for measures and services that contribute to coincident peak demand reduction. Additionally, Energy Trust’s well-established program marketing and outreach efforts, sales channels, contractor connections and customer relationships may prove valuable to utilities in marketing combined efficiency and demand management equipment and service packages.

Energy Trust is working on the following grid optimization related efforts:

### **Coordination with Portland General Electric**

Energy Trust acts as a representative on PGE’s advisory committee for its Smart Grid Test Bed - Demand Response pilot. In this role, Energy Trust provided advice on the design of the test bed and feedback on the written pilot proposal PGE submitted to the OPUC. While awaiting the

OPUC's decision on the proposal, Energy Trust is helping PGE further prepare for the test bed through the development of coordinated marketing arrangements and joint measures as described below.

In 2019, Energy Trust worked with PGE to help expand the customer base of smart thermostats that could be enrolled in PGE's demand response program. One of the primary points of coordination with PGE is the residential thermostat direct-install program where Energy Trust and PGE co-fund the installation of qualified smart thermostats in targeted locations with the intention of reaching respective energy efficiency and demand response objectives. In 2019, Energy Trust worked with PGE to launch a pilot aiming to install smart thermostats in small- to medium-sized businesses and evaluate the energy and demand curtailment impacts of smart thermostats in these businesses.

### **Grid Harmonization New Home Construction**

In 2019, Energy Trust completed a research effort to understand opportunities for Energy Trust residential new construction programs to deliver benefits to the grid. This exploration revealed that in the future, distributed energy resources (DERs) will deliver significant value for residential customers and utilities. The research suggested that program and installation costs of DERs could be reduced if DERs were considered and adopted during the construction of a home as opposed to being retrofitted into the home at a future date. DERs identified during this research included demand response enablement, solar or solar readiness, electric vehicle charging, battery storage, and others. In 2020, Energy Trust plans to work with stakeholders to begin integrating existing and new emerging DER technologies into the Energy Performance Score (EPS) program design.

### **Targeted load management pilots with utilities**

Energy Trust collaborated with Pacific Power to implement a targeted load management pilot in the North Santiam Canyon from July 2017 through Dec. 2018. The goal of that pilot was to test the quick deployment of energy efficiency in a targeted area. The targeted area has 180 projects completed, compared to 170 projects within the baseline period, representing a 6% increase in participation in the targeted area. In addition, all the projects implemented saved 6,451,932 kWh representing 878 kW of summer peak demand reduction and 901 kW of gross winter peak reduction. In 2019, Energy Trust collaborated with Pacific Power to launch a second targeted load management pilot in the Phoenix area. This pilot builds off the learnings of the North Santiam Canyon by increasing the flexibility of Energy Trust's energy efficiency and solar program offerings and delivery strategies and testing the efficacy of additional tactics to achieve demand reduction objectives. One example is integrating and promoting pilot measures that have the potential to achieve greater peak savings and provide increased incentives up to the maximum incentive allowed under current avoided costs to achieve pilot goals. The implementation phase of the pilot began June 1, 2019 and will continue through December 2020.

In 2019, Energy Trust and NW Natural continued development of a three-phased pilot project to determine a value per peak therm that NW Natural can use to vet energy efficiency against other supply side resources to address future location specific constraints. NW Natural filed the pilot

proposal with the OPUC as an amendment to their 2018 Integrated Resource Plan (IRP) in the spring of 2019. The proposal includes pilot design, a research hypothesis, key research questions and the overall objectives of the pilot. The team initially planned to launch in Silverton Aug. 1, 2020 but changed gears and launched in the Creswell and Cottage Grove areas in September 2019 after discovering a lack of available data in Silverton. The project is currently in Phase 1, promoting increased marketing and outreach to the area to determine impacts. Phase 1 is set to run through July 2020. Phase 2 (Aug. 2020 – July 2021) will focus on providing increased incentives up to our current cost-effectiveness caps. Phase 3 (Aug. 2021– July2022) is pending OPUC approval and aims to look at applying a localized avoided cost value for the project area.

### **Quantifying peak natural gas savings with NW Natural**

Energy Trust continued working with NW Natural to improve our avoided cost methodology as part of OPUC AR 621 to incorporate the supply and distribution capacity values associated with peak savings. In 2019, Energy Trust began using peak hour values for avoided natural gas distribution costs, aligning more closely with utility system planners. In 2020, Energy Trust hopes to continue to advance our understanding of peak hour coincident factors for natural gas and improve the list of end-uses and peak hour factors used to assess natural gas end-use coincidence during a peak hour.

# Appendix E

## Current & Alternative Resources

2020 OR IRP

## **Appendix E - Introduction**

The purpose of this document is to transparently describe the transportation and supply inputs that were utilized in the preferred portfolio described in the Resource Integration chapter. Pages 3-17 provides annual commodity costs, annual supply amounts, and the annual unit commodity cost at a dollar per dekatherm for supply. Pages 18-71 provides fuel rates, Maximum daily quantity (MDQ), reservation rates, and transportation rates for Cascade's transportation contracts. Also, pages 72-109 show the multiple scenarios Cascade ran as well as cost and served/unserved results for each scenario.

### **Types of Supply - Summary**

- Base – Can be listed as “Base” or “Fixed”; this is an annual supply that we must take if we contract it.
- Winter – This is another supply that we must take but is only available during the winter season (November-March).
- Day Gas – Can be broken down by winter and summer day gas. We only have to take what we need of this type of gas, and because it is more flexible, it is more expensive than Base or Winter gas.
- Peak – Used to serve demand when all other options are exhausted. It is also the most expensive type of gas.

| Supply      | Data Item                    | 2020     | 2021     | 2022     | 2023     | 2024     |
|-------------|------------------------------|----------|----------|----------|----------|----------|
| AECO FIXED  | Commodity Cost               | 6260.343 | 7543.676 | 6374.004 | 6361.544 | 7814.403 |
| AECO FIXED  | Take: Monthly by Supply      | 3413.491 | 4113.237 | 3475.465 | 3468.672 | 4260.852 |
| AECO FIXED  | Unit Commodity Cost (\$/dth) | 1.834    | 1.834    | 1.834    | 1.834    | 1.834    |
| AECO FIXEDW | Commodity Cost               | 928.9487 | 2361.747 | 3090.64  | 4533.223 | 6113.236 |
| AECO FIXEDW | Take: Monthly by Supply      | 527.512  | 1341.14  | 1755.048 | 2574.232 | 3471.457 |
| AECO FIXEDW | Unit Commodity Cost (\$/dth) | 1.761    | 1.761    | 1.761    | 1.761    | 1.761    |
| AECO INDEX  | Commodity Cost               | 981.1027 | 0        | 0        | 0        | 0        |
| AECO INDEX  | Take: Monthly by Supply      | 696.3249 | 0        | 0        | 0        | 0        |
| AECO INDEX  | Unit Commodity Cost (\$/dth) | 1.408973 |          |          |          |          |
| AECO INDEXW | Commodity Cost               | 757.2351 | 0        | 0        | 0        | 0        |
| AECO INDEXW | Take: Monthly by Supply      | 390.514  | 0        | 0        | 0        | 0        |
| AECO INDEXW | Unit Commodity Cost (\$/dth) | 1.939073 |          |          |          |          |
|             | Commodity Cost               | 49.4     | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 25       | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) | 1.976    |          |          |          |          |
| HUNT DAY S  | Commodity Cost               | 0        | 4208.847 | 4010.979 | 4326.927 | 3133.557 |
| HUNT DAY S  | Take: Monthly by Supply      | 0        | 1442.447 | 1284.357 | 1276.253 | 838.0144 |
| HUNT DAY S  | Unit Commodity Cost (\$/dth) |          | 2.917852 | 3.122948 | 3.390338 | 3.739263 |
| HUNT DAY W  | Commodity Cost               | 1873.668 | 2598.027 | 3087.304 | 3187.871 | 2450.654 |
| HUNT DAY W  | Take: Monthly by Supply      | 573.3133 | 645.765  | 774.68   | 772.3019 | 492.2727 |
| HUNT DAY W  | Unit Commodity Cost (\$/dth) | 3.26814  | 4.023177 | 3.985264 | 4.127753 | 4.978244 |
| HUNT FIXED  | Commodity Cost               | 30006.53 | 0        | 0        | 0        | 4233.37  |
| HUNT FIXED  | Take: Monthly by Supply      | 6864.912 | 0        | 0        | 0        | 968.5129 |
| HUNT FIXED  | Unit Commodity Cost (\$/dth) | 4.371    |          |          |          | 4.371    |
| HUNT FIXEDW | Commodity Cost               | 7259.375 | 0        | 0        | 0        | 0        |
| HUNT FIXEDW | Take: Monthly by Supply      | 1412.055 | 0        | 0        | 0        | 0        |
| HUNT FIXEDW | Unit Commodity Cost (\$/dth) | 5.141    |          |          |          |          |
| HUNT INDEX  | Commodity Cost               | 10967.92 | 9892.979 | 20256.4  | 19171.14 | 9501.55  |
| HUNT INDEX  | Take: Monthly by Supply      | 4410.027 | 2801.152 | 5867.6   | 5352.213 | 2448.067 |
| HUNT INDEX  | Unit Commodity Cost (\$/dth) | 2.487042 | 3.531754 | 3.452246 | 3.581908 | 3.881245 |
| HUNT INDEXW | Commodity Cost               | 3254.405 | 1985.059 | 0        | 1965.078 | 2984.058 |
| HUNT INDEXW | Take: Monthly by Supply      | 820.9807 | 470.257  | 0        | 480.9491 | 717.4815 |
| HUNT INDEXW | Unit Commodity Cost (\$/dth) | 3.964046 | 4.221222 |          | 4.085833 | 4.159073 |
| HUNT PEAK   | Commodity Cost               | 4134.363 | 9244.433 | 10610.13 | 7474.213 | 9925.908 |
| HUNT PEAK   | Take: Monthly by Supply      | 1180.91  | 3091.234 | 2941.781 | 1937.932 | 2530.165 |
| HUNT PEAK   | Unit Commodity Cost (\$/dth) | 3.500997 | 2.990532 | 3.606705 | 3.856799 | 3.923028 |
|             | Commodity Cost               | 0        | 40.59211 | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 10.94138 | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          | 3.709962 |          |          |          |
| KGATE PEAK  | Commodity Cost               | 424.3325 | 2690.908 | 4240.964 | 2816.687 | 267.7674 |
| KGATE PEAK  | Take: Monthly by Supply      | 162.5117 | 703.5434 | 1044.357 | 653.7938 | 58.67063 |
| KGATE PEAK  | Unit Commodity Cost (\$/dth) | 2.611089 | 3.824793 | 4.060837 | 4.308219 | 4.563909 |
|             | Commodity Cost               | 80.04    | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 30       | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) | 2.668    |          |          |          |          |
| NON CORE    | Commodity Cost               | 1563.419 | 1863.8   | 1801.552 | 1927.537 | 2354.706 |

| Supply      | Data Item                    | 2020     | 2021     | 2022     | 2023     | 2024     |
|-------------|------------------------------|----------|----------|----------|----------|----------|
| NON CORE    | Take: Monthly by Supply      | 447.5863 | 452.0471 | 456.5526 | 461.1031 | 465.6992 |
| NON CORE    | Unit Commodity Cost (\$/dth) | 3.493    | 4.123021 | 3.94599  | 4.180273 | 5.056281 |
| OPAL DAY W  | Commodity Cost               | 17.82047 | 55.76885 | 54.35447 | 57.03405 | 63.15274 |
| OPAL DAY W  | Take: Monthly by Supply      | 7.339568 | 15       | 13.67048 | 13.4697  | 13.88449 |
| OPAL DAY W  | Unit Commodity Cost (\$/dth) | 2.428    | 3.717923 | 3.976047 | 4.234248 | 4.548439 |
| OPAL FIXED  | Commodity Cost               | 420.8291 | 0        | 0        | 0        | 0        |
| OPAL FIXED  | Take: Monthly by Supply      | 171.6269 | 0        | 0        | 0        | 0        |
| OPAL FIXED  | Unit Commodity Cost (\$/dth) | 2.452    |          |          |          |          |
| OPAL FIXEDW | Commodity Cost               | 143.2189 | 0        | 205.0226 | 214.3198 | 0        |
| OPAL FIXEDW | Take: Monthly by Supply      | 56.65305 | 0        | 81.10072 | 84.77841 | 0        |
| OPAL FIXEDW | Unit Commodity Cost (\$/dth) | 2.528    |          | 2.528    | 2.528    |          |
| OPAL INDEX  | Commodity Cost               | 98.30706 | 0        | 0        | 0        | 0        |
| OPAL INDEX  | Take: Monthly by Supply      | 35.60837 | 0        | 0        | 0        | 0        |
| OPAL INDEX  | Unit Commodity Cost (\$/dth) | 2.760786 |          |          |          |          |
| OPAL INDEXW | Commodity Cost               | 254.1525 | 0        | 0        | 0        | 0        |
| OPAL INDEXW | Take: Monthly by Supply      | 94.93792 | 0        | 0        | 0        | 0        |
| OPAL INDEXW | Unit Commodity Cost (\$/dth) | 2.677039 |          |          |          |          |
|             | Commodity Cost               | 579.8    | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 260      | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) | 2.23     |          |          |          |          |
|             | Commodity Cost               | 163.866  | 240.6563 | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 62       | 62       | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) | 2.643    | 3.881554 |          |          |          |
| ROCK DAY S  | Commodity Cost               | 0        | 5323.986 | 0        | 0        | 3672.454 |
| ROCK DAY S  | Take: Monthly by Supply      | 0        | 1766.204 | 0        | 0        | 879.7125 |
| ROCK DAY S  | Unit Commodity Cost (\$/dth) |          | 3.014367 |          |          | 4.174607 |
| ROCK DAY W  | Commodity Cost               | 2130.782 | 3558.561 | 0        | 0        | 0        |
| ROCK DAY W  | Take: Monthly by Supply      | 940.776  | 982.3811 | 0        | 0        | 0        |
| ROCK DAY W  | Unit Commodity Cost (\$/dth) | 2.26492  | 3.622384 |          |          |          |
| ROCK FIXED  | Commodity Cost               | 5773.346 | 16812.36 | 20716.2  | 20981.34 | 21435.76 |
| ROCK FIXED  | Take: Monthly by Supply      | 2354.546 | 6856.592 | 8448.697 | 8556.828 | 8742.156 |
| ROCK FIXED  | Unit Commodity Cost (\$/dth) | 2.452    | 2.452    | 2.452    | 2.452    | 2.452    |
| ROCK FIXEDW | Commodity Cost               | 9932.081 | 22207    | 24247.97 | 24132.04 | 24193.17 |
| ROCK FIXEDW | Take: Monthly by Supply      | 3928.829 | 8784.416 | 9591.759 | 9545.9   | 9570.081 |
| ROCK FIXEDW | Unit Commodity Cost (\$/dth) | 2.528    | 2.528    | 2.528    | 2.528    | 2.528    |
| ROCK INDEX  | Commodity Cost               | 1137.148 | 0        | 0        | 0        | 0        |
| ROCK INDEX  | Take: Monthly by Supply      | 431.4034 | 0        | 0        | 0        | 0        |
| ROCK INDEX  | Unit Commodity Cost (\$/dth) | 2.635927 |          |          |          |          |
| ROCK INDEXW | Commodity Cost               | 3348.171 | 0        | 0        | 0        | 0        |
| ROCK INDEXW | Take: Monthly by Supply      | 1263.88  | 0        | 0        | 0        | 0        |
| ROCK INDEXW | Unit Commodity Cost (\$/dth) | 2.649121 |          |          |          |          |
|             | Commodity Cost               | 681.3234 | 841.7737 | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 299.25   | 369.7228 | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) | 2.27677  | 2.27677  |          |          |          |
|             | Commodity Cost               | 5.711428 | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 4        | 0        | 0        | 0        | 0        |



| Supply      | Data Item                    | 2020     | 2021     | 2022     | 2023     | 2024     |
|-------------|------------------------------|----------|----------|----------|----------|----------|
|             | Unit Commodity Cost (\$/dth) | 1.427857 |          |          |          |          |
|             | Commodity Cost               | 56.62475 | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 26       | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) | 2.177875 |          |          |          |          |
|             | Commodity Cost               | 139.698  | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 60       | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) | 2.3283   |          |          |          |          |
|             | Commodity Cost               | 312.3832 | 604.6126 | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 139.5    | 270      | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) | 2.239306 | 2.239306 |          |          |          |
| STANREALIGN | Commodity Cost               | 106.766  | 642.8253 | 659.026  | 530.3173 | 368.5514 |
| STANREALIGN | Take: Monthly by Supply      | 41       | 170.2572 | 164      | 124.0736 | 80.09245 |
| STANREALIGN | Unit Commodity Cost (\$/dth) | 2.604049 | 3.775612 | 4.018451 | 4.274216 | 4.601575 |
| STAT2 INDEX | Commodity Cost               | 12021.33 | 0        | 0        | 0        | 0        |
| STAT2 INDEX | Take: Monthly by Supply      | 5357.569 | 0        | 0        | 0        | 0        |
| STAT2 INDEX | Unit Commodity Cost (\$/dth) | 2.243803 |          |          |          |          |
|             | Commodity Cost               | 448.5    | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 150      | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) | 2.99     |          |          |          |          |
|             | Commodity Cost               | 319.1825 | 308.7175 | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 213.5    | 206.5    | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) | 1.495    | 1.495    |          |          |          |
|             | Commodity Cost               | 435.1131 | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 154.8445 | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) | 2.81     |          |          |          |          |
|             | Commodity Cost               | 604.675  | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 361      | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) | 1.675    |          |          |          |          |

| Supply      | Data Item                    | 2025     | 2026     | 2027     | 2028     | 2029     |
|-------------|------------------------------|----------|----------|----------|----------|----------|
| AECO FIXED  | Commodity Cost               | 8049.579 | 7992.115 | 8214.606 | 7889.73  | 8400.938 |
| AECO FIXED  | Take: Monthly by Supply      | 4389.083 | 4357.751 | 4479.065 | 4301.925 | 4580.664 |
| AECO FIXED  | Unit Commodity Cost (\$/dth) | 1.834    | 1.834    | 1.834    | 1.834    | 1.834    |
| AECO FIXEDW | Commodity Cost               | 6052.166 | 6486.058 | 6064.781 | 6537.02  | 6077.363 |
| AECO FIXEDW | Take: Monthly by Supply      | 3436.778 | 3683.167 | 3443.942 | 3712.107 | 3451.086 |
| AECO FIXEDW | Unit Commodity Cost (\$/dth) | 1.761    | 1.761    | 1.761    | 1.761    | 1.761    |
| AECO INDEX  | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| AECO INDEX  | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| AECO INDEX  | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| AECO INDEXW | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| AECO INDEXW | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| AECO INDEXW | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| HUNT DAY S  | Commodity Cost               | 3480.232 | 2078.032 | 1996.546 | 3218.231 | 2330.615 |
| HUNT DAY S  | Take: Monthly by Supply      | 823.161  | 446.4659 | 409.0876 | 616.773  | 420.2588 |
| HUNT DAY S  | Unit Commodity Cost (\$/dth) | 4.227888 | 4.654402 | 4.880484 | 5.217853 | 5.545667 |
| HUNT DAY W  | Commodity Cost               | 3721.454 | 3814.561 | 3975.886 | 4171.839 | 4413.965 |
| HUNT DAY W  | Take: Monthly by Supply      | 704.6795 | 681.1903 | 685.9549 | 697.1411 | 686.5953 |
| HUNT DAY W  | Unit Commodity Cost (\$/dth) | 5.281058 | 5.599846 | 5.796133 | 5.984209 | 6.428773 |
| HUNT FIXED  | Commodity Cost               | 26039.24 | 29659.46 | 30027.35 | 29628.76 | 29037.69 |
| HUNT FIXED  | Take: Monthly by Supply      | 5957.273 | 6785.51  | 6869.674 | 6778.485 | 6643.26  |
| HUNT FIXED  | Unit Commodity Cost (\$/dth) | 4.371    | 4.371    | 4.371    | 4.371    | 4.371    |
| HUNT FIXEDW | Commodity Cost               | 0        | 0        | 0        | 0        | 280.3147 |
| HUNT FIXEDW | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 54.52533 |
| HUNT FIXEDW | Unit Commodity Cost (\$/dth) |          |          |          |          | 5.141    |
| HUNT INDEX  | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| HUNT INDEX  | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| HUNT INDEX  | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| HUNT INDEXW | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| HUNT INDEXW | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| HUNT INDEXW | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| HUNT PEAK   | Commodity Cost               | 3566.835 | 4103.089 | 4490.093 | 5867.184 | 6413.902 |
| HUNT PEAK   | Take: Monthly by Supply      | 661.9741 | 776.2783 | 797.8123 | 994.0849 | 1010.94  |
| HUNT PEAK   | Unit Commodity Cost (\$/dth) | 5.38818  | 5.28559  | 5.628006 | 5.902096 | 6.344492 |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| KGATE PEAK  | Commodity Cost               | 260.6595 | 198.085  | 223.7634 | 245.2036 | 254.7667 |
| KGATE PEAK  | Take: Monthly by Supply      | 52.93211 | 37.46845 | 40.98463 | 43.33352 | 41.5442  |
| KGATE PEAK  | Unit Commodity Cost (\$/dth) | 4.924412 | 5.286715 | 5.459692 | 5.658521 | 6.132424 |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| NON CORE    | Commodity Cost               | 2530.278 | 2699.533 | 2791.851 | 2941.448 | 3210.03  |

| Supply      | Data Item                    | 2025     | 2026     | 2027     | 2028     | 2029     |
|-------------|------------------------------|----------|----------|----------|----------|----------|
| NON CORE    | Take: Monthly by Supply      | 470.3412 | 475.0295 | 479.7649 | 484.5475 | 489.378  |
| NON CORE    | Unit Commodity Cost (\$/dth) | 5.379665 | 5.682873 | 5.819207 | 6.070506 | 6.559408 |
| OPAL DAY W  | Commodity Cost               | 71.35594 | 76.30566 | 74.75031 | 76.40862 | 74.89087 |
| OPAL DAY W  | Take: Monthly by Supply      | 14.62431 | 14.76468 | 13.76478 | 13.36484 | 12.13845 |
| OPAL DAY W  | Unit Commodity Cost (\$/dth) | 4.879268 | 5.16812  | 5.430548 | 5.717136 | 6.169722 |
| OPAL FIXED  | Commodity Cost               | 0        | 22.87045 | 153.4817 | 155.7897 | 162.1367 |
| OPAL FIXED  | Take: Monthly by Supply      | 0        | 9.327263 | 62.59449 | 63.53576 | 66.12426 |
| OPAL FIXED  | Unit Commodity Cost (\$/dth) |          | 2.452    | 2.452    | 2.452    | 2.452    |
| OPAL FIXEDW | Commodity Cost               | 0        | 0        | 0        | 40.82281 | 225.6253 |
| OPAL FIXEDW | Take: Monthly by Supply      | 0        | 0        | 0        | 16.14826 | 89.25052 |
| OPAL FIXEDW | Unit Commodity Cost (\$/dth) |          |          |          | 2.528    | 2.528    |
| OPAL INDEX  | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| OPAL INDEX  | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| OPAL INDEX  | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| OPAL INDEXW | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| OPAL INDEXW | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| OPAL INDEXW | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| ROCK DAY S  | Commodity Cost               | 5155.579 | 2624.302 | 2372.021 | 1500.042 | 2902.623 |
| ROCK DAY S  | Take: Monthly by Supply      | 1157.349 | 541.632  | 462.712  | 278.475  | 499.2842 |
| ROCK DAY S  | Unit Commodity Cost (\$/dth) | 4.454647 | 4.845176 | 5.126345 | 5.38663  | 5.813568 |
| ROCK DAY W  | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| ROCK DAY W  | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| ROCK DAY W  | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| ROCK FIXED  | Commodity Cost               | 20351.94 | 20498.73 | 22059.57 | 22998.54 | 22607.39 |
| ROCK FIXED  | Take: Monthly by Supply      | 8300.14  | 8360.002 | 8996.563 | 9379.501 | 9219.982 |
| ROCK FIXED  | Unit Commodity Cost (\$/dth) | 2.452    | 2.452    | 2.452    | 2.452    | 2.452    |
| ROCK FIXEDW | Commodity Cost               | 25074.25 | 24677.61 | 24101.07 | 23283.44 | 23320.8  |
| ROCK FIXEDW | Take: Monthly by Supply      | 9918.609 | 9761.714 | 9533.652 | 9210.222 | 9225.002 |
| ROCK FIXEDW | Unit Commodity Cost (\$/dth) | 2.528    | 2.528    | 2.528    | 2.528    | 2.528    |
| ROCK INDEX  | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| ROCK INDEX  | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| ROCK INDEX  | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| ROCK INDEXW | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| ROCK INDEXW | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| ROCK INDEXW | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |

| Supply      | Data Item                    | 2025     | 2026     | 2027     | 2028     | 2029     |
|-------------|------------------------------|----------|----------|----------|----------|----------|
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| STANREALIGN | Commodity Cost               | 662.5432 | 574.5931 | 612.157  | 635.6119 | 656.6581 |
| STANREALIGN | Take: Monthly by Supply      | 132.6879 | 107.5218 | 110      | 111      | 107      |
| STANREALIGN | Unit Commodity Cost (\$/dth) | 4.993246 | 5.343969 | 5.565064 | 5.726234 | 6.136991 |
| STAT2 INDEX | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| STAT2 INDEX | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| STAT2 INDEX | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |

| Supply      | Data Item                    | 2030     | 2031     | 2032     | 2033     | 2034     |
|-------------|------------------------------|----------|----------|----------|----------|----------|
| AECO FIXED  | Commodity Cost               | 8990.931 | 8607.231 | 8469.02  | 8335.634 | 8368.769 |
| AECO FIXED  | Take: Monthly by Supply      | 4902.362 | 4693.147 | 4617.786 | 4545.056 | 4563.124 |
| AECO FIXED  | Unit Commodity Cost (\$/dth) | 1.834    | 1.834    | 1.834    | 1.834    | 1.834    |
| AECO FIXEDW | Commodity Cost               | 5631.578 | 6079.139 | 6387.319 | 6348.15  | 6306.47  |
| AECO FIXEDW | Take: Monthly by Supply      | 3197.943 | 3452.095 | 3627.098 | 3604.855 | 3581.187 |
| AECO FIXEDW | Unit Commodity Cost (\$/dth) | 1.761    | 1.761    | 1.761    | 1.761    | 1.761    |
| AECO INDEX  | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| AECO INDEX  | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| AECO INDEX  | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| AECO INDEXW | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| AECO INDEXW | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| AECO INDEXW | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| HUNT DAY S  | Commodity Cost               | 2557.576 | 3796.635 | 3908.744 | 4031.2   | 4139.324 |
| HUNT DAY S  | Take: Monthly by Supply      | 424.7113 | 616.4836 | 614.3749 | 613.6807 | 619.0812 |
| HUNT DAY S  | Unit Commodity Cost (\$/dth) | 6.021917 | 6.158535 | 6.362148 | 6.568889 | 6.686237 |
| HUNT DAY W  | Commodity Cost               | 4753.203 | 7001.415 | 4876.221 | 5104.731 | 6788.327 |
| HUNT DAY W  | Take: Monthly by Supply      | 687.484  | 996.5045 | 678.5606 | 689.8966 | 899.3532 |
| HUNT DAY W  | Unit Commodity Cost (\$/dth) | 6.913911 | 7.025974 | 7.186124 | 7.39927  | 7.548009 |
| HUNT FIXED  | Commodity Cost               | 28501.9  | 28012.48 | 27663.32 | 27172.14 | 26751.78 |
| HUNT FIXED  | Take: Monthly by Supply      | 6520.682 | 6408.712 | 6328.831 | 6216.457 | 6120.289 |
| HUNT FIXED  | Unit Commodity Cost (\$/dth) | 4.371    | 4.371    | 4.371    | 4.371    | 4.371    |
| HUNT FIXEDW | Commodity Cost               | 750.725  | 876.1488 | 1018.834 | 2526.371 | 5521.869 |
| HUNT FIXEDW | Take: Monthly by Supply      | 146.027  | 170.4238 | 198.1782 | 491.4163 | 1074.085 |
| HUNT FIXEDW | Unit Commodity Cost (\$/dth) | 5.141    | 5.141    | 5.141    | 5.141    | 5.141    |
| HUNT INDEX  | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| HUNT INDEX  | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| HUNT INDEX  | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| HUNT INDEXW | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| HUNT INDEXW | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| HUNT INDEXW | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| HUNT PEAK   | Commodity Cost               | 3176.982 | 8817.611 | 8827.018 | 5795.311 | 6387.501 |
| HUNT PEAK   | Take: Monthly by Supply      | 490.1512 | 1279.997 | 1247.849 | 811.8771 | 873.4114 |
| HUNT PEAK   | Unit Commodity Cost (\$/dth) | 6.481636 | 6.888776 | 7.073789 | 7.138162 | 7.313279 |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| KGATE PEAK  | Commodity Cost               | 283.0853 | 294.8526 | 332.2176 | 400.7872 | 414.2806 |
| KGATE PEAK  | Take: Monthly by Supply      | 43.06972 | 44.54319 | 48.77297 | 57.08819 | 57.99637 |
| KGATE PEAK  | Unit Commodity Cost (\$/dth) | 6.572722 | 6.619476 | 6.811511 | 7.020491 | 7.143216 |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| NON CORE    | Commodity Cost               | 3463.14  | 3513.477 | 3662.162 | 3810.34  | 3908.957 |

| Supply      | Data Item                    | 2030     | 2031     | 2032     | 2033     | 2034     |
|-------------|------------------------------|----------|----------|----------|----------|----------|
| NON CORE    | Take: Monthly by Supply      | 494.2567 | 499.1843 | 504.1612 | 509.1878 | 514.2646 |
| NON CORE    | Unit Commodity Cost (\$/dth) | 7.006763 | 7.038436 | 7.263872 | 7.483173 | 7.60106  |
| OPAL DAY W  | Commodity Cost               | 74.11153 | 70.11919 | 67.6336  | 17.05772 | 20.60311 |
| OPAL DAY W  | Take: Monthly by Supply      | 11.20231 | 10.50472 | 9.7944   | 2.390562 | 2.832036 |
| OPAL DAY W  | Unit Commodity Cost (\$/dth) | 6.615739 | 6.675014 | 6.905333 | 7.135441 | 7.275019 |
| OPAL FIXED  | Commodity Cost               | 162.1367 | 151.9498 | 159.2517 | 157.0332 | 159.8287 |
| OPAL FIXED  | Take: Monthly by Supply      | 66.12426 | 61.96974 | 64.94767 | 64.04291 | 65.18299 |
| OPAL FIXED  | Unit Commodity Cost (\$/dth) | 2.452    | 2.452    | 2.452    | 2.452    | 2.452    |
| OPAL FIXEDW | Commodity Cost               | 468.1447 | 667.229  | 829.0527 | 1013.082 | 1188.178 |
| OPAL FIXEDW | Take: Monthly by Supply      | 185.1838 | 263.9355 | 327.9481 | 400.7445 | 470.0073 |
| OPAL FIXEDW | Unit Commodity Cost (\$/dth) | 2.528    | 2.528    | 2.528    | 2.528    | 2.528    |
| OPAL INDEX  | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| OPAL INDEX  | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| OPAL INDEX  | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| OPAL INDEXW | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| OPAL INDEXW | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| OPAL INDEXW | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| ROCK DAY S  | Commodity Cost               | 3206.895 | 2064.505 | 2069.58  | 2142.016 | 2331.454 |
| ROCK DAY S  | Take: Monthly by Supply      | 512.6924 | 325.3946 | 315.0633 | 315.3402 | 337.2692 |
| ROCK DAY S  | Unit Commodity Cost (\$/dth) | 6.255008 | 6.34462  | 6.568776 | 6.792714 | 6.912738 |
| ROCK DAY W  | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| ROCK DAY W  | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| ROCK DAY W  | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| ROCK FIXED  | Commodity Cost               | 22375.86 | 21308.71 | 22425.24 | 21508.49 | 21522.83 |
| ROCK FIXED  | Take: Monthly by Supply      | 9125.555 | 8690.336 | 9145.695 | 8771.816 | 8777.665 |
| ROCK FIXED  | Unit Commodity Cost (\$/dth) | 2.452    | 2.452    | 2.452    | 2.452    | 2.452    |
| ROCK FIXEDW | Commodity Cost               | 23350.52 | 24421.46 | 23524.98 | 24343.54 | 23970.66 |
| ROCK FIXEDW | Take: Monthly by Supply      | 9236.756 | 9660.388 | 9305.766 | 9629.563 | 9482.064 |
| ROCK FIXEDW | Unit Commodity Cost (\$/dth) | 2.528    | 2.528    | 2.528    | 2.528    | 2.528    |
| ROCK INDEX  | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| ROCK INDEX  | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| ROCK INDEX  | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| ROCK INDEXW | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| ROCK INDEXW | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| ROCK INDEXW | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |

| Supply      | Data Item                    | 2030     | 2031     | 2032     | 2033     | 2034     |
|-------------|------------------------------|----------|----------|----------|----------|----------|
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| STANREALIGN | Commodity Cost               | 709.5581 | 720.4982 | 764.5761 | 778.7018 | 793.4313 |
| STANREALIGN | Take: Monthly by Supply      | 107      | 107      | 111      | 110      | 110      |
| STANREALIGN | Unit Commodity Cost (\$/dth) | 6.631384 | 6.733628 | 6.888073 | 7.079107 | 7.213012 |
| STAT2 INDEX | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| STAT2 INDEX | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| STAT2 INDEX | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |

| Supply      | Data Item                    | 2035     | 2036     | 2037     | 2038     | 2039     |
|-------------|------------------------------|----------|----------|----------|----------|----------|
| AECO FIXED  | Commodity Cost               | 9193.508 | 9068.282 | 11101.41 | 11530.79 | 12022.33 |
| AECO FIXED  | Take: Monthly by Supply      | 5012.818 | 4944.537 | 6053.112 | 6287.234 | 6555.249 |
| AECO FIXED  | Unit Commodity Cost (\$/dth) | 1.834    | 1.834    | 1.834    | 1.834    | 1.834    |
| AECO FIXEDW | Commodity Cost               | 5475.663 | 5745.053 | 4090.169 | 4072.746 | 3927.477 |
| AECO FIXEDW | Take: Monthly by Supply      | 3109.406 | 3262.381 | 2322.64  | 2312.746 | 2230.254 |
| AECO FIXEDW | Unit Commodity Cost (\$/dth) | 1.761    | 1.761    | 1.761    | 1.761    | 1.761    |
| AECO INDEX  | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| AECO INDEX  | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| AECO INDEX  | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| AECO INDEXW | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| AECO INDEXW | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| AECO INDEXW | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| HUNT DAY S  | Commodity Cost               | 4232.827 | 4356.482 | 4471.973 | 4176.213 | 2454.526 |
| HUNT DAY S  | Take: Monthly by Supply      | 613.7685 | 613.489  | 610      | 556.6826 | 318.9969 |
| HUNT DAY S  | Unit Commodity Cost (\$/dth) | 6.896455 | 7.101157 | 7.331104 | 7.501964 | 7.694516 |
| HUNT DAY W  | Commodity Cost               | 4140.2   | 1504.879 | 1074.451 | 785.1914 | 87.09499 |
| HUNT DAY W  | Take: Monthly by Supply      | 537.0189 | 191.999  | 134.2001 | 95.79481 | 10       |
| HUNT DAY W  | Unit Commodity Cost (\$/dth) | 7.709598 | 7.837951 | 8.006333 | 8.196597 | 8.709499 |
| HUNT FIXED  | Commodity Cost               | 25789.42 | 25598.96 | 25395.66 | 25055.61 | 24730.97 |
| HUNT FIXED  | Take: Monthly by Supply      | 5900.118 | 5856.545 | 5810.034 | 5732.238 | 5657.967 |
| HUNT FIXED  | Unit Commodity Cost (\$/dth) | 4.371    | 4.371    | 4.371    | 4.371    | 4.371    |
| HUNT FIXEDW | Commodity Cost               | 9587.265 | 15351    | 18341.66 | 20111.72 | 21906.26 |
| HUNT FIXEDW | Take: Monthly by Supply      | 1864.864 | 2985.995 | 3567.722 | 3912.025 | 4261.089 |
| HUNT FIXEDW | Unit Commodity Cost (\$/dth) | 5.141    | 5.141    | 5.141    | 5.141    | 5.141    |
| HUNT INDEX  | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| HUNT INDEX  | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| HUNT INDEX  | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| HUNT INDEXW | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| HUNT INDEXW | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| HUNT INDEXW | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| HUNT PEAK   | Commodity Cost               | 5079.17  | 4747.551 | 1148.263 | 825.3555 | 688.2438 |
| HUNT PEAK   | Take: Monthly by Supply      | 704.5435 | 647.4931 | 153.6563 | 105.5897 | 84.78774 |
| HUNT PEAK   | Unit Commodity Cost (\$/dth) | 7.209165 | 7.332204 | 7.472932 | 7.816628 | 8.117256 |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| KGATE PEAK  | Commodity Cost               | 401.6991 | 423.659  | 286.9716 | 287.9142 | 293.5657 |
| KGATE PEAK  | Take: Monthly by Supply      | 54.6276  | 56.12763 | 36.25853 | 35.63    | 35.63    |
| KGATE PEAK  | Unit Commodity Cost (\$/dth) | 7.35341  | 7.548137 | 7.914595 | 8.080667 | 8.239284 |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| NON CORE    | Commodity Cost               | 4058.827 | 4215.45  | 4392.599 | 4530.053 | 4668.965 |



| Supply      | Data Item                    | 2035     | 2036     | 2037     | 2038     | 2039     |
|-------------|------------------------------|----------|----------|----------|----------|----------|
| NON CORE    | Take: Monthly by Supply      | 519.3923 | 524.5712 | 529.8019 | 535.085  | 540.4208 |
| NON CORE    | Unit Commodity Cost (\$/dth) | 7.81457  | 8.035991 | 8.291021 | 8.466045 | 8.639499 |
| OPAL DAY W  | Commodity Cost               | 24.73271 | 20.32355 | 33.36106 | 39.20361 | 41.94521 |
| OPAL DAY W  | Take: Monthly by Supply      | 3.297531 | 2.625323 | 4.204269 | 4.848035 | 5.078076 |
| OPAL DAY W  | Unit Commodity Cost (\$/dth) | 7.500371 | 7.741352 | 7.935045 | 8.086495 | 8.26006  |
| OPAL FIXED  | Commodity Cost               | 158.0977 | 156.224  | 148.393  | 148.0248 | 156.5548 |
| OPAL FIXED  | Take: Monthly by Supply      | 64.47703 | 63.71288 | 60.51918 | 60.36902 | 63.84778 |
| OPAL FIXED  | Unit Commodity Cost (\$/dth) | 2.452    | 2.452    | 2.452    | 2.452    | 2.452    |
| OPAL FIXEDW | Commodity Cost               | 1330.041 | 1475.372 | 1604.154 | 1703.079 | 1849.803 |
| OPAL FIXEDW | Take: Monthly by Supply      | 526.1238 | 583.6122 | 634.5545 | 673.6863 | 731.726  |
| OPAL FIXEDW | Unit Commodity Cost (\$/dth) | 2.528    | 2.528    | 2.528    | 2.528    | 2.528    |
| OPAL INDEX  | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| OPAL INDEX  | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| OPAL INDEX  | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| OPAL INDEXW | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| OPAL INDEXW | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| OPAL INDEXW | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| ROCK DAY S  | Commodity Cost               | 186.3105 | 0        | 1478.132 | 1169.141 | 1044.327 |
| ROCK DAY S  | Take: Monthly by Supply      | 26.11768 | 0        | 195.6414 | 152.0477 | 132.679  |
| ROCK DAY S  | Unit Commodity Cost (\$/dth) | 7.133498 |          | 7.555315 | 7.689303 | 7.871076 |
| ROCK DAY W  | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| ROCK DAY W  | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| ROCK DAY W  | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| ROCK FIXED  | Commodity Cost               | 23846    | 23980.49 | 21719.83 | 23458.97 | 20412.24 |
| ROCK FIXED  | Take: Monthly by Supply      | 9725.123 | 9779.97  | 8858.004 | 9567.279 | 8324.731 |
| ROCK FIXED  | Unit Commodity Cost (\$/dth) | 2.452    | 2.452    | 2.452    | 2.452    | 2.452    |
| ROCK FIXEDW | Commodity Cost               | 21707.81 | 20966.53 | 22863.25 | 20747.77 | 24046.38 |
| ROCK FIXEDW | Take: Monthly by Supply      | 8586.949 | 8293.722 | 9044.009 | 8207.186 | 9512.019 |
| ROCK FIXEDW | Unit Commodity Cost (\$/dth) | 2.528    | 2.528    | 2.528    | 2.528    | 2.528    |
| ROCK INDEX  | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| ROCK INDEX  | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| ROCK INDEX  | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| ROCK INDEXW | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| ROCK INDEXW | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| ROCK INDEXW | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |

| Supply      | Data Item                    | 2035     | 2036     | 2037     | 2038     | 2039     |
|-------------|------------------------------|----------|----------|----------|----------|----------|
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
| STANREALIGN | Commodity Cost               | 781.8075 | 754.4307 | 718.0506 | 591.9677 | 97.56464 |
| STANREALIGN | Take: Monthly by Supply      | 105.5416 | 99       | 91.71373 | 73.8608  | 12       |
| STANREALIGN | Unit Commodity Cost (\$/dth) | 7.407579 | 7.620512 | 7.829259 | 8.01464  | 8.130387 |
| STAT2 INDEX | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
| STAT2 INDEX | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
| STAT2 INDEX | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |
|             | Commodity Cost               | 0        | 0        | 0        | 0        | 0        |
|             | Take: Monthly by Supply      | 0        | 0        | 0        | 0        | 0        |
|             | Unit Commodity Cost (\$/dth) |          |          |          |          |          |

| Supply      | Data Item                    | 2040     |
|-------------|------------------------------|----------|
| AECO FIXED  | Commodity Cost               | 8132.802 |
| AECO FIXED  | Take: Monthly by Supply      | 4434.461 |
| AECO FIXED  | Unit Commodity Cost (\$/dth) | 1.834    |
| AECO FIXEDW | Commodity Cost               | 7229.757 |
| AECO FIXEDW | Take: Monthly by Supply      | 4105.484 |
| AECO FIXEDW | Unit Commodity Cost (\$/dth) | 1.761    |
| AECO INDEX  | Commodity Cost               | 0        |
| AECO INDEX  | Take: Monthly by Supply      | 0        |
| AECO INDEX  | Unit Commodity Cost (\$/dth) |          |
| AECO INDEXW | Commodity Cost               | 0        |
| AECO INDEXW | Take: Monthly by Supply      | 0        |
| AECO INDEXW | Unit Commodity Cost (\$/dth) |          |
|             | Commodity Cost               | 0        |
|             | Take: Monthly by Supply      | 0        |
|             | Unit Commodity Cost (\$/dth) |          |
| HUNT DAY S  | Commodity Cost               | 299.8786 |
| HUNT DAY S  | Take: Monthly by Supply      | 39.64847 |
| HUNT DAY S  | Unit Commodity Cost (\$/dth) | 7.563433 |
| HUNT DAY W  | Commodity Cost               | 87.46181 |
| HUNT DAY W  | Take: Monthly by Supply      | 10       |
| HUNT DAY W  | Unit Commodity Cost (\$/dth) | 8.746181 |
| HUNT FIXED  | Commodity Cost               | 21725.36 |
| HUNT FIXED  | Take: Monthly by Supply      | 4970.341 |
| HUNT FIXED  | Unit Commodity Cost (\$/dth) | 4.371    |
| HUNT FIXEDW | Commodity Cost               | 14732.32 |
| HUNT FIXEDW | Take: Monthly by Supply      | 2865.653 |
| HUNT FIXEDW | Unit Commodity Cost (\$/dth) | 5.141    |
| HUNT INDEX  | Commodity Cost               | 55393.83 |
| HUNT INDEX  | Take: Monthly by Supply      | 7295.904 |
| HUNT INDEX  | Unit Commodity Cost (\$/dth) | 7.592457 |
| HUNT INDEXW | Commodity Cost               | 0        |
| HUNT INDEXW | Take: Monthly by Supply      | 0        |
| HUNT INDEXW | Unit Commodity Cost (\$/dth) |          |
| HUNT PEAK   | Commodity Cost               | 972.1637 |
| HUNT PEAK   | Take: Monthly by Supply      | 113.7439 |
| HUNT PEAK   | Unit Commodity Cost (\$/dth) | 8.546955 |
|             | Commodity Cost               | 0        |
|             | Take: Monthly by Supply      | 0        |
|             | Unit Commodity Cost (\$/dth) |          |
| KGATE PEAK  | Commodity Cost               | 295.1717 |
| KGATE PEAK  | Take: Monthly by Supply      | 35.63    |
| KGATE PEAK  | Unit Commodity Cost (\$/dth) | 8.284359 |
|             | Commodity Cost               | 0        |
|             | Take: Monthly by Supply      | 0        |
|             | Unit Commodity Cost (\$/dth) |          |
| NON CORE    | Commodity Cost               | 0        |

|             |                              |          |
|-------------|------------------------------|----------|
| Supply      | Data Item                    | 2040     |
| NON CORE    | Take: Monthly by Supply      | 0        |
| NON CORE    | Unit Commodity Cost (\$/dth) |          |
| OPAL DAY W  | Commodity Cost               | 45.23136 |
| OPAL DAY W  | Take: Monthly by Supply      | 5.444766 |
| OPAL DAY W  | Unit Commodity Cost (\$/dth) | 8.30731  |
| OPAL FIXED  | Commodity Cost               | 943.0169 |
| OPAL FIXED  | Take: Monthly by Supply      | 384.5909 |
| OPAL FIXED  | Unit Commodity Cost (\$/dth) | 2.452    |
| OPAL FIXEDW | Commodity Cost               | 1140.146 |
| OPAL FIXEDW | Take: Monthly by Supply      | 451.0072 |
| OPAL FIXEDW | Unit Commodity Cost (\$/dth) | 2.528    |
| OPAL INDEX  | Commodity Cost               | 0        |
| OPAL INDEX  | Take: Monthly by Supply      | 0        |
| OPAL INDEX  | Unit Commodity Cost (\$/dth) |          |
| OPAL INDEXW | Commodity Cost               | 0        |
| OPAL INDEXW | Take: Monthly by Supply      | 0        |
| OPAL INDEXW | Unit Commodity Cost (\$/dth) |          |
|             | Commodity Cost               | 0        |
|             | Take: Monthly by Supply      | 0        |
|             | Unit Commodity Cost (\$/dth) |          |
|             | Commodity Cost               | 0        |
|             | Take: Monthly by Supply      | 0        |
|             | Unit Commodity Cost (\$/dth) |          |
| ROCK DAY S  | Commodity Cost               | 1264.124 |
| ROCK DAY S  | Take: Monthly by Supply      | 159.7516 |
| ROCK DAY S  | Unit Commodity Cost (\$/dth) | 7.913057 |
| ROCK DAY W  | Commodity Cost               | 0        |
| ROCK DAY W  | Take: Monthly by Supply      | 0        |
| ROCK DAY W  | Unit Commodity Cost (\$/dth) |          |
| ROCK FIXED  | Commodity Cost               | 13389.69 |
| ROCK FIXED  | Take: Monthly by Supply      | 5460.72  |
| ROCK FIXED  | Unit Commodity Cost (\$/dth) | 2.452    |
| ROCK FIXEDW | Commodity Cost               | 17861.48 |
| ROCK FIXEDW | Take: Monthly by Supply      | 7065.459 |
| ROCK FIXEDW | Unit Commodity Cost (\$/dth) | 2.528    |
| ROCK INDEX  | Commodity Cost               | 0        |
| ROCK INDEX  | Take: Monthly by Supply      | 0        |
| ROCK INDEX  | Unit Commodity Cost (\$/dth) |          |
| ROCK INDEXW | Commodity Cost               | 0        |
| ROCK INDEXW | Take: Monthly by Supply      | 0        |
| ROCK INDEXW | Unit Commodity Cost (\$/dth) |          |
|             | Commodity Cost               | 0        |
|             | Take: Monthly by Supply      | 0        |
|             | Unit Commodity Cost (\$/dth) |          |
|             | Commodity Cost               | 0        |
|             | Take: Monthly by Supply      | 0        |

| Supply      | Data Item                    | 2040     |
|-------------|------------------------------|----------|
|             | Unit Commodity Cost (\$/dth) |          |
|             | Commodity Cost               | 0        |
|             | Take: Monthly by Supply      | 0        |
|             | Unit Commodity Cost (\$/dth) |          |
|             | Commodity Cost               | 0        |
|             | Take: Monthly by Supply      | 0        |
|             | Unit Commodity Cost (\$/dth) |          |
|             | Commodity Cost               | 0        |
|             | Take: Monthly by Supply      | 0        |
|             | Unit Commodity Cost (\$/dth) |          |
| STANREALIGN | Commodity Cost               | 14.79563 |
| STANREALIGN | Take: Monthly by Supply      | 1.815997 |
| STANREALIGN | Unit Commodity Cost (\$/dth) | 8.147388 |
| STAT2 INDEX | Commodity Cost               | 0        |
| STAT2 INDEX | Take: Monthly by Supply      | 0        |
| STAT2 INDEX | Unit Commodity Cost (\$/dth) |          |
|             | Commodity Cost               | 0        |
|             | Take: Monthly by Supply      | 0        |
|             | Unit Commodity Cost (\$/dth) |          |
|             | Commodity Cost               | 0        |
|             | Take: Monthly by Supply      | 0        |
|             | Unit Commodity Cost (\$/dth) |          |
|             | Commodity Cost               | 0        |
|             | Take: Monthly by Supply      | 0        |
|             | Unit Commodity Cost (\$/dth) |          |
|             | Commodity Cost               | 0        |
|             | Take: Monthly by Supply      | 0        |
|             | Unit Commodity Cost (\$/dth) |          |

| Transport | Data Item                         | 2020     | 2021     | 2022     | 2023     |
|-----------|-----------------------------------|----------|----------|----------|----------|
| FTHLS2023 | First of Month MDQ by Transport   | 0        | 0        | 0        | 20       |
| FTHLS2023 | Rate: D1 by Transport             | 0        | 0        | 0        | 4.056555 |
| FTHLSFS1  | First of Month MDQ by Transport   | 38.01    | 38.01    | 38.01    | 38.01    |
| FTHLSFS1  | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| FTHLSFS2  | First of Month MDQ by Transport   | 37.512   | 37.512   | 37.512   | 37.512   |
| FTHLSFS2  | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| FTHLSFS3  | First of Month MDQ by Transport   | 258.996  | 258.996  | 258.996  | 258.996  |
| FTHLSFS3  | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| GTN13687  | Fuel Volume by Transport          | 2.96E-02 | 1.69E-02 | 4.09E-03 | 4.08E-03 |
| GTN13687  | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| GTN13687  | Rate: D1 by Transport             | 46.99277 | 46.99277 | 46.99277 | 46.99277 |
| GTN13687  | Rate: Transportation by Transport | 6.38E-02 | 6.38E-02 | 6.38E-02 | 6.38E-02 |
| GTN13688  | Fuel Volume by Transport          | 6.49E-03 | 2.35E-03 | 6.49E-04 | 8.30E-04 |
| GTN13688  | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| GTN13688  | Rate: D1 by Transport             | 46.99277 | 46.99277 | 46.99277 | 46.99277 |
| GTN13688  | Rate: Transportation by Transport | 6.38E-02 | 6.38E-02 | 6.38E-02 | 6.38E-02 |
| GTN17019W | Fuel Volume by Transport          | 2.18E-03 | 3.42E-02 | 1.19E-02 | 2.72E-02 |
| GTN17019W | First of Month MDQ by Transport   | 138.696  | 138.696  | 138.696  | 138.696  |
| GTN17019W | Rate: D1 by Transport             | 26.75282 | 26.75282 | 26.75282 | 26.75282 |
| GTN17019W | Rate: Transportation by Transport | 2.08E-02 | 2.08E-02 | 2.08E-02 | 2.08E-02 |
| GTN17021  | Fuel Volume by Transport          | 2.03E-03 | 2.95E-03 | 2.80E-03 | 3.25E-03 |
| GTN17021  | First of Month MDQ by Transport   | 2.4      | 2.4      | 2.4      | 2.4      |
| GTN17021  | Rate: D1 by Transport             | 50.06817 | 50.06817 | 50.06817 | 50.06817 |
| GTN17021  | Rate: Transportation by Transport | 0.052159 | 0.052159 | 0.052159 | 0.052159 |
| GTN17022  | Fuel Volume by Transport          | 3.19E-03 | 3.42E-03 | 3.18E-03 | 3.55E-03 |
| GTN17022  | First of Month MDQ by Transport   | 2.784    | 2.784    | 2.784    | 2.784    |
| GTN17022  | Rate: D1 by Transport             | 51.6523  | 51.6523  | 51.6523  | 51.6523  |
| GTN17022  | Rate: Transportation by Transport | 0.05429  | 0.05429  | 0.05429  | 0.05429  |
| GTN17023  | Fuel Volume by Transport          | 2.57E-02 | 3.26E-02 | 3.05E-02 | 2.70E-02 |
| GTN17023  | First of Month MDQ by Transport   | 26.591   | 26.591   | 26.591   | 26.591   |
| GTN17023  | Rate: D1 by Transport             | 69.83419 | 69.83419 | 69.83419 | 69.83419 |
| GTN17023  | Rate: Transportation by Transport | 7.88E-02 | 7.88E-02 | 7.88E-02 | 7.88E-02 |
| GTN17025  | Fuel Volume by Transport          | 3.91E-02 | 4.70E-02 | 4.67E-02 | 3.82E-02 |
| GTN17025  | First of Month MDQ by Transport   | 39.943   | 39.943   | 39.943   | 39.943   |
| GTN17025  | Rate: D1 by Transport             | 72.20897 | 72.20897 | 72.20897 | 72.20897 |
| GTN17025  | Rate: Transportation by Transport | 0.081965 | 0.081965 | 0.081965 | 0.081965 |
| GTN17026  | Fuel Volume by Transport          | 2.88E-02 | 3.49E-02 | 3.46E-02 | 2.70E-02 |
| GTN17026  | First of Month MDQ by Transport   | 36.118   | 36.118   | 36.118   | 36.118   |
| GTN17026  | Rate: D1 by Transport             | 73.85019 | 73.85019 | 73.85019 | 73.85019 |
| GTN17026  | Rate: Transportation by Transport | 8.42E-02 | 8.42E-02 | 8.42E-02 | 8.42E-02 |
| GTN17028  | Fuel Volume by Transport          | 0.102162 | 9.31E-02 | 9.55E-02 | 0.094256 |
| GTN17028  | First of Month MDQ by Transport   | 127.809  | 127.809  | 127.809  | 127.809  |
| GTN17028  | Rate: D1 by Transport             | 76.16361 | 76.16361 | 76.16361 | 76.16361 |
| GTN17028  | Rate: Transportation by Transport | 8.73E-02 | 8.73E-02 | 8.73E-02 | 8.73E-02 |
| GTN17031  | Fuel Volume by Transport          | 1.67E-02 | 1.15E-02 | 2.03E-02 | 2.09E-02 |
| GTN17031  | First of Month MDQ by Transport   | 32.473   | 32.473   | 32.473   | 32.473   |

| Transport    | Data Item                         | 2020     | 2021     | 2022     | 2023     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| GTN17031     | Rate: D1 by Transport             | 78.25866 | 78.25866 | 78.25866 | 78.25866 |
| GTN17031     | Rate: Transportation by Transport | 9.01E-02 | 9.01E-02 | 9.01E-02 | 9.01E-02 |
| GTN17033     | Fuel Volume by Transport          | 1.26E-04 | 1.15E-04 | 3.49E-04 | 3.24E-04 |
| GTN17033     | First of Month MDQ by Transport   | 0.54     | 0.54     | 0.54     | 0.54     |
| GTN17033     | Rate: D1 by Transport             | 80.358   | 80.358   | 80.358   | 80.358   |
| GTN17033     | Rate: Transportation by Transport | 9.29E-02 | 9.29E-02 | 9.29E-02 | 9.29E-02 |
| GTN17034     | Fuel Volume by Transport          | 2.10E-03 | 1.66E-03 | 2.53E-03 | 2.74E-03 |
| GTN17034     | First of Month MDQ by Transport   | 4.996    | 4.996    | 4.996    | 4.996    |
| GTN17034     | Rate: D1 by Transport             | 82.79414 | 82.79414 | 82.79414 | 82.79414 |
| GTN17034     | Rate: Transportation by Transport | 0.096186 | 0.096186 | 0.096186 | 0.096186 |
| GTN17036     | Fuel Volume by Transport          | 2.45E-04 | 4.72E-04 | 4.76E-04 | 5.40E-04 |
| GTN17036     | First of Month MDQ by Transport   | 0.9      | 0.9      | 0.9      | 0.9      |
| GTN17036     | Rate: D1 by Transport             | 85.43009 | 85.43009 | 85.43009 | 85.43009 |
| GTN17036     | Rate: Transportation by Transport | 9.97E-02 | 9.97E-02 | 9.97E-02 | 9.97E-02 |
| GTN17037     | Fuel Volume by Transport          | 1.63E-02 | 4.12E-02 | 3.94E-02 | 4.32E-02 |
| GTN17037     | First of Month MDQ by Transport   | 122.28   | 122.28   | 122.28   | 122.28   |
| GTN17037     | Rate: D1 by Transport             | 98.70544 | 98.70544 | 98.70544 | 98.70544 |
| GTN17037     | Rate: Transportation by Transport | 0.117592 | 0.117592 | 0.117592 | 0.117592 |
| GTN18507     | Fuel Volume by Transport          | 3.29E-02 | 1.58E-02 | 0.025377 | 3.92E-02 |
| GTN18507     | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| GTN18507     | Rate: D1 by Transport             | 98.70544 | 98.70544 | 98.70544 | 98.70544 |
| GTN18507     | Rate: Transportation by Transport | 0.117592 | 0.117592 | 0.117592 | 0.117592 |
| GTN2023      | Fuel Volume by Transport          | 0        | 0        | 0        | 7.49E-03 |
| GTN2023      | First of Month MDQ by Transport   | 0        | 0        | 0        | 40       |
| GTN2023      | Rate: D1 by Transport             | 0        | 0        | 0        | 16.49598 |
| GTN2023      | Rate: Transportation by Transport | 0        | 0        | 0        | 1.96E-02 |
| GTN2023BND   | First of Month MDQ by Transport   | 0        | 0        | 0        | 40       |
| GTN2023CHEM  | First of Month MDQ by Transport   | 0        | 0        | 0        | 40       |
| GTN2023GILC  | First of Month MDQ by Transport   | 0        | 0        | 0        | 40       |
| GTN2023KOSMO | First of Month MDQ by Transport   | 0        | 0        | 0        | 40       |
| GTN2023LAPI  | First of Month MDQ by Transport   | 0        | 0        | 0        | 40       |
| GTN2023MADR  | First of Month MDQ by Transport   | 0        | 0        | 0        | 40       |
| GTN2023NBEND | First of Month MDQ by Transport   | 0        | 0        | 0        | 40       |
| GTN2023PRNG  | First of Month MDQ by Transport   | 0        | 0        | 0        | 40       |
| GTN2023PRVL  | First of Month MDQ by Transport   | 0        | 0        | 0        | 40       |
| GTN2023REDM  | First of Month MDQ by Transport   | 0        | 0        | 0        | 40       |
| GTN2023SNTP  | First of Month MDQ by Transport   | 0        | 0        | 0        | 40       |
| GTN2023STEAM | First of Month MDQ by Transport   | 0        | 0        | 0        | 40       |
| GTNSTANBND   | First of Month MDQ by Transport   | 352.489  | 352.489  | 352.489  | 352.489  |
| GTNSTANCHEM  | First of Month MDQ by Transport   | 225.58   | 225.58   | 225.58   | 225.58   |
| GTNSTANGILC  | First of Month MDQ by Transport   | 229.676  | 229.676  | 229.676  | 229.676  |
| GTNSTANKOSMO | First of Month MDQ by Transport   | 206.32   | 206.32   | 206.32   | 206.32   |
| GTNSTANLAPI  | First of Month MDQ by Transport   | 225.22   | 225.22   | 225.22   | 225.22   |
| GTNSTANMADR  | First of Month MDQ by Transport   | 251.271  | 251.271  | 251.271  | 251.271  |
| GTNSTANNBEND | First of Month MDQ by Transport   | 224.68   | 224.68   | 224.68   | 224.68   |
| GTNSTANPRNG  | First of Month MDQ by Transport   | 224.68   | 224.68   | 224.68   | 224.68   |

| Transport    | Data Item                         | 2020     | 2021     | 2022     | 2023     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| GTNSTANPRVL  | First of Month MDQ by Transport   | 264.623  | 264.623  | 264.623  | 264.623  |
| GTNSTANREDM  | First of Month MDQ by Transport   | 260.798  | 260.798  | 260.798  | 260.798  |
| GTNSTANSNTP  | First of Month MDQ by Transport   | 224.68   | 224.68   | 224.68   | 224.68   |
| GTNSTANSTEA  | First of Month MDQ by Transport   | 257.153  | 257.153  | 257.153  | 257.153  |
| HUNT_TO_NWPN | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| JPOUT        | First of Month MDQ by Transport   | 676.392  | 676.392  | 676.392  | 676.392  |
| MDDOSMSSPLOP | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| MDDOSTN2STAN | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTO24  | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTO26  | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTO30W | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTOME  | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOZ10      | First of Month MDQ by Transport   | 189.048  | 189.048  | 189.048  | 189.048  |
| MDDOZ11      | First of Month MDQ by Transport   | 380.484  | 380.484  | 380.484  | 380.484  |
| MDDOZ20      | First of Month MDQ by Transport   | 674.436  | 674.436  | 674.436  | 674.436  |
| MDDOZ24      | First of Month MDQ by Transport   | 170.964  | 170.964  | 170.964  | 170.964  |
| MDDOZ26      | First of Month MDQ by Transport   | 369.6    | 369.6    | 369.6    | 369.6    |
| MDDOZ3S      | First of Month MDQ by Transport   | 498.024  | 498.024  | 498.024  | 498.024  |
| MDDOZ3W      | First of Month MDQ by Transport   | 754.272  | 754.272  | 754.272  | 754.272  |
| MDDOZME      | First of Month MDQ by Transport   | 434.94   | 434.94   | 434.94   | 434.94   |
| NOVA20030393 | First of Month MDQ by Transport   | 263.676  | 263.676  | 263.676  | 263.676  |
| NOVA20030393 | Rate: D1 by Transport             | 46.4653  | 46.4653  | 46.4653  | 46.4653  |
| NOVA2023     | First of Month MDQ by Transport   | 0        | 0        | 0        | 40       |
| NOVA2023     | Rate: D1 by Transport             | 0        | 0        | 0        | 7.765434 |
| NWP100002N   | Fuel Volume by Transport          | 45.91    | 2.226354 | 1.975359 | 3.811731 |
| NWP100002N   | First of Month MDQ by Transport   | 1065.732 | 1065.732 | 1065.732 | 1065.732 |
| NWP100002N   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100002N   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100002S   | Fuel Volume by Transport          | 145.9811 | 297.9793 | 288.003  | 289.0692 |
| NWP100002S   | First of Month MDQ by Transport   | 1059.084 | 1059.084 | 1059.084 | 1059.084 |
| NWP100002S   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100002S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100002STN | Fuel Volume by Transport          | 0.6601   | 1.570681 | 0.692254 | 0        |
| NWP100002STN | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP100002STN | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100002STN | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134N11 | Fuel Volume by Transport          | 0        | 0        | 4.03E-04 | 0        |
| NWP100134N11 | First of Month MDQ by Transport   | 0.3      | 0.3      | 0.3      | 0.3      |
| NWP100134N11 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134N11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134N20 | Fuel Volume by Transport          | 0        | 1.61E-03 | 0        | 0        |
| NWP100134N20 | First of Month MDQ by Transport   | 1.2      | 1.2      | 1.2      | 1.2      |
| NWP100134N20 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134N20 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134N3S | Fuel Volume by Transport          | 0        | 6.44E-04 | 6.44E-04 | 0        |
| NWP100134N3S | First of Month MDQ by Transport   | 0.48     | 0.48     | 0.48     | 0.48     |



| Transport    | Data Item                         | 2020     | 2021     | 2022     | 2023     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP100134N3S | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134N3S | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134S11 | Fuel Volume by Transport          | 1.65E-02 | 4.83E-02 | 4.83E-02 | 4.03E-02 |
| NWP100134S11 | First of Month MDQ by Transport   | 0.3      | 0.3      | 0.3      | 0.3      |
| NWP100134S11 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134S11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134S20 | Fuel Volume by Transport          | 6.60E-02 | 0.1932   | 0.19481  | 0.185536 |
| NWP100134S20 | First of Month MDQ by Transport   | 1.2      | 1.2      | 1.2      | 1.2      |
| NWP100134S20 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134S20 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134S3S | Fuel Volume by Transport          | 2.64E-02 | 7.73E-02 | 7.73E-02 | 6.44E-02 |
| NWP100134S3S | First of Month MDQ by Transport   | 0.48     | 0.48     | 0.48     | 0.48     |
| NWP100134S3S | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134S3S | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100149N   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP100149N   | First of Month MDQ by Transport   | 0.528    | 0.528    | 0.528    | 0.528    |
| NWP100149N   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100149N   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100149S   | Fuel Volume by Transport          | 0.020463 | 5.99E-02 | 0.060391 | 4.99E-02 |
| NWP100149S   | First of Month MDQ by Transport   | 0.372    | 0.372    | 0.372    | 0.372    |
| NWP100149S   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100149S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100150N   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP100150N   | First of Month MDQ by Transport   | 1.116    | 1.116    | 1.116    | 1.116    |
| NWP100150N   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100150N   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100150S   | Fuel Volume by Transport          | 4.42E-02 | 0.129444 | 0.130523 | 0.10787  |
| NWP100150S   | First of Month MDQ by Transport   | 0.804    | 0.804    | 0.804    | 0.804    |
| NWP100150S   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100150S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP10030226B | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| NWP10030226B | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP10030226B | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302ME  | Fuel Volume by Transport          | 0        | 7.73E-02 | 0.725534 | 0.374453 |
| NWP100302ME  | First of Month MDQ by Transport   | 50.136   | 50.136   | 50.136   | 50.136   |
| NWP100302ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302MEB | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| NWP100302MEB | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302SMS | Fuel Volume by Transport          | 0.276223 | 8.738484 | 5.576121 | 5.884979 |
| NWP100302SMS | First of Month MDQ by Transport   | 126.024  | 126.024  | 126.024  | 126.024  |
| NWP100302SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302STN | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| NWP100302STN | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z10 | Fuel Volume by Transport          | 0        | 0.0161   | 0.188193 | 0.164528 |
| NWP100302Z10 | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP100302Z10 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |

| Transport    | Data Item                         | 2020     | 2021     | 2022     | 2023     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP100302Z11 | Fuel Volume by Transport          | 1.14E-02 | 0.39969  | 0.838788 | 0.623315 |
| NWP100302Z11 | First of Month MDQ by Transport   | 71.688   | 71.688   | 71.688   | 71.688   |
| NWP100302Z11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z20 | Fuel Volume by Transport          | 0        | 0.320782 | 0.627913 | 0.24811  |
| NWP100302Z20 | First of Month MDQ by Transport   | 77.472   | 77.472   | 77.472   | 77.472   |
| NWP100302Z20 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z24 | Fuel Volume by Transport          | 6.13E-03 | 3.15E-02 | 0.137876 | 0.107202 |
| NWP100302Z24 | First of Month MDQ by Transport   | 11.292   | 11.292   | 11.292   | 11.292   |
| NWP100302Z24 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z26 | First of Month MDQ by Transport   | 25.788   | 25.788   | 25.788   | 25.788   |
| NWP100302Z26 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z35 | Fuel Volume by Transport          | 8.37E-02 | 3.67E-02 | 0.902949 | 1.717729 |
| NWP100302Z35 | First of Month MDQ by Transport   | 62.376   | 62.376   | 62.376   | 62.376   |
| NWP100302Z35 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z3W | Fuel Volume by Transport          | 0        | 0.109508 | 0.732676 | 0.609735 |
| NWP100302Z3W | First of Month MDQ by Transport   | 126.024  | 126.024  | 126.024  | 126.024  |
| NWP100302Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090B3S | Fuel Volume by Transport          | 0        | 0.015166 | 0        | 0        |
| NWP139090B3S | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| NWP139090B3S | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139090B3S | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090B3W | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139090B3W | First of Month MDQ by Transport   | 324.756  | 324.756  | 324.756  | 324.756  |
| NWP139090B3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090DC  | Fuel Volume by Transport          | 6.161688 | 3.631538 | 3.712598 | 1.803438 |
| NWP139090DC  | First of Month MDQ by Transport   | 324.756  | 324.756  | 324.756  | 324.756  |
| NWP139090DC  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090ME  | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139090ME  | First of Month MDQ by Transport   | 73.92    | 73.92    | 73.92    | 73.92    |
| NWP139090ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090Z10 | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139090Z10 | First of Month MDQ by Transport   | 0.348    | 0.348    | 0.348    | 0.348    |
| NWP139090Z10 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090Z11 | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139090Z11 | First of Month MDQ by Transport   | 3.72     | 3.72     | 3.72     | 3.72     |
| NWP139090Z11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090Z26 | First of Month MDQ by Transport   | 107.868  | 107.868  | 107.868  | 107.868  |
| NWP139090Z26 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139382SMS | Fuel Volume by Transport          | 9.798826 | 4.918627 | 6.065215 | 9.680154 |
| NWP139382SMS | First of Month MDQ by Transport   | 74.292   | 74.292   | 74.292   | 74.292   |
| NWP139382SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139382SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139382W   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139382W   | First of Month MDQ by Transport   | 74.292   | 74.292   | 74.292   | 74.292   |
| NWP139382W   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139383SMS | Fuel Volume by Transport          | 1.535217 | 0.718309 | 0.994263 | 1.391271 |

| Transport    | Data Item                         | 2020     | 2021     | 2022     | 2023     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP139383SMS | First of Month MDQ by Transport   | 12.6     | 12.6     | 12.6     | 12.6     |
| NWP139383SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139383SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139383W   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139383W   | First of Month MDQ by Transport   | 12.6     | 12.6     | 12.6     | 12.6     |
| NWP139383W   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139384SMS | Fuel Volume by Transport          | 4.564881 | 2.307279 | 3.703893 | 3.976858 |
| NWP139384SMS | First of Month MDQ by Transport   | 39.108   | 39.108   | 39.108   | 39.108   |
| NWP139384SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139384SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139384W   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139384W   | First of Month MDQ by Transport   | 39.108   | 39.108   | 39.108   | 39.108   |
| NWP139384W   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139624SMS | Fuel Volume by Transport          | 0.16905  | 1.642228 | 0.930375 | 1.163135 |
| NWP139624SMS | First of Month MDQ by Transport   | 42       | 42       | 42       | 42       |
| NWP139624SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139624SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139624Z3W | Fuel Volume by Transport          | 0        | 1.26E-02 | 0.475282 | 0.289356 |
| NWP139624Z3W | First of Month MDQ by Transport   | 42       | 42       | 42       | 42       |
| NWP139624Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139627SMS | Fuel Volume by Transport          | 9.78E-02 | 2.701888 | 1.636742 | 2.289775 |
| NWP139627SMS | First of Month MDQ by Transport   | 72.924   | 72.924   | 72.924   | 72.924   |
| NWP139627SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139627SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139627Z3W | Fuel Volume by Transport          | 0        | 0.092393 | 0.85858  | 0.175181 |
| NWP139627Z3W | First of Month MDQ by Transport   | 72.924   | 72.924   | 72.924   | 72.924   |
| NWP139627Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139630ME  | Fuel Volume by Transport          | 0        | 2.502842 | 0.606846 | 1.141283 |
| NWP139630ME  | First of Month MDQ by Transport   | 89.4     | 89.4     | 89.4     | 89.4     |
| NWP139630ME  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139630ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139630Z24 | Fuel Volume by Transport          | 0        | 1.522056 | 5.23E-02 | 8.49E-02 |
| NWP139630Z24 | First of Month MDQ by Transport   | 57.876   | 57.876   | 57.876   | 57.876   |
| NWP139630Z24 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139637DC  | Fuel Volume by Transport          | 2.246533 | 0.788198 | 2.495947 | 1.565987 |
| NWP139637DC  | First of Month MDQ by Transport   | 30       | 30       | 30       | 30       |
| NWP139637DC  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139637DC  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139637ME  | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139637ME  | First of Month MDQ by Transport   | 32.856   | 32.856   | 32.856   | 32.856   |
| NWP139637ME  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139637ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139637Z11 | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139637Z11 | First of Month MDQ by Transport   | 24.036   | 24.036   | 24.036   | 24.036   |
| NWP139637Z11 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139637Z11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |

| Transport    | Data Item                         | 2020     | 2021     | 2022     | 2023     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP139637Z3W | Fuel Volume by Transport          | 0        | 6.80E-03 | 0        | 0        |
| NWP139637Z3W | First of Month MDQ by Transport   | 30       | 30       | 30       | 30       |
| NWP139637Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140047DC  | Fuel Volume by Transport          | 5.82819  | 5.562895 | 5.965707 | 3.1669   |
| NWP140047DC  | First of Month MDQ by Transport   | 557.736  | 557.736  | 557.736  | 557.736  |
| NWP140047DC  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP140047DC  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140047STN | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| NWP140047Z20 | First of Month MDQ by Transport   | 9.6      | 9.6      | 9.6      | 9.6      |
| NWP140047Z24 | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| NWP140047Z26 | First of Month MDQ by Transport   | 377.736  | 377.736  | 377.736  | 377.736  |
| NWP140047Z3W | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP140047Z3W | First of Month MDQ by Transport   | 557.736  | 557.736  | 557.736  | 557.736  |
| NWP140047Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140047ZME | First of Month MDQ by Transport   | 63.336   | 63.336   | 63.336   | 63.336   |
| NWP140748ME  | Fuel Volume by Transport          | 8.05E-02 | 0.289271 | 0.634383 | 0.212429 |
| NWP140748ME  | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP140748ME  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP140748ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140748Z24 | Fuel Volume by Transport          | 0.074031 | 0.154972 | 0.113935 | 0.507769 |
| NWP140748Z24 | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP140748Z24 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140748Z26 | Fuel Volume by Transport          | 0        | 0.0161   | 0.0161   | 0.0161   |
| NWP140748Z26 | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP140748Z26 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP143078    | Fuel Volume by Transport          | 0.161    | 13.83753 | 2.240443 | 3.731794 |
| NWP143078    | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| NWP143078    | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP143078    | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWPJPIN      | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| NWPJPIN      | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWPPLIN      | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| NWPPLIN      | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWPRLGNTOSTN | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWPSTOSTAN   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| PLOUT        | First of Month MDQ by Transport   | 937.5    | 937.5    | 937.5    | 937.5    |
| PLOUT        | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| ROCKTOSNWPS  | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| RUBY_BND     | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_CHEM    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_GILC    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_KOSMO   | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_LAPI    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_MADR    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_NBEND   | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_PRNG    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |

| Transport    | Data Item                         | 2020     | 2021     | 2022     | 2023     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| RUBY_PRVL    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_REDM    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_SNTF    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_STEA    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY6103600B | First of Month MDQ by Transport   | 90       | 90       | 90       | 90       |
| RUBY6103600B | Rate: D1 by Transport             | 273.75   | 273.75   | 273.75   | 273.75   |
| RUBY6103600B | Rate: Transportation by Transport | 0.12     | 0.12     | 0.12     | 0.12     |
| S100302Z10   | Fuel Volume by Transport          | 0        | 1.09765  | 1.528964 | 1.248672 |
| S100302Z10   | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| S100302Z10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S100302Z11   | Fuel Volume by Transport          | 5.00E-02 | 2.31197  | 2.33326  | 2.351067 |
| S100302Z11   | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| S100302Z11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S100302Z20   | Fuel Volume by Transport          | 0        | 1.473366 | 1.127011 | 1.400636 |
| S100302Z20   | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| S100302Z20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z10   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S132329Z10   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z11   | Fuel Volume by Transport          | 0        | 3.35E-02 | 0        | 0        |
| S132329Z11   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z20   | Fuel Volume by Transport          | 0        | 2.42E-02 | 0        | 0        |
| S132329Z20   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S132329Z3S   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558P3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558P3S   | First of Month MDQ by Transport   | 48       | 48       | 48       | 48       |
| S135558P3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S10   | Fuel Volume by Transport          | 0        | 2.70642  | 0.314045 | 0.804212 |
| S135558S10   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S11   | Fuel Volume by Transport          | 0        | 2.464259 | 0.555185 | 0.56325  |
| S135558S11   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S20   | Fuel Volume by Transport          | 0.158408 | 2.961521 | 0.349266 | 0.419363 |
| S135558S20   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S3S   | Fuel Volume by Transport          | 0        | 1.457651 | 0.326746 | 0.658682 |
| S135558S3S   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139090Z3S   | First of Month MDQ by Transport   | 42.36    | 42.36    | 42.36    | 42.36    |
| S139090Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139382Z3S   | Fuel Volume by Transport          | 0        | 4.78E-02 | 0        | 0        |

| Transport    | Data Item                         | 2020     | 2021     | 2022     | 2023     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| S139382Z3S   | First of Month MDQ by Transport   | 74.292   | 74.292   | 74.292   | 74.292   |
| S139382Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139383Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S139383Z3S   | First of Month MDQ by Transport   | 12.6     | 12.6     | 12.6     | 12.6     |
| S139383Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139384Z3S   | First of Month MDQ by Transport   | 39.108   | 39.108   | 39.108   | 39.108   |
| S139384Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139624Z3S   | Fuel Volume by Transport          | 0        | 0        | 0.249133 | 0.202299 |
| S139624Z3S   | First of Month MDQ by Transport   | 42       | 42       | 42       | 42       |
| S139624Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139627Z3S   | Fuel Volume by Transport          | 0        | 0.078925 | 0.377884 | 0.40825  |
| S139627Z3S   | First of Month MDQ by Transport   | 72.924   | 72.924   | 72.924   | 72.924   |
| S139627Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139637Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S139637Z3S   | First of Month MDQ by Transport   | 30       | 30       | 30       | 30       |
| S139637Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140047Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S140047Z3S   | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| S140047Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140748Z10   | Fuel Volume by Transport          | 0.23871  | 0.52513  | 0.573654 | 0.325586 |
| S140748Z10   | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| S140748Z10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140748Z11   | Fuel Volume by Transport          | 0.170259 | 0.721126 | 0.244739 | 0.277823 |
| S140748Z11   | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| S140748Z11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140748Z20   | Fuel Volume by Transport          | 9.66E-02 | 0.2254   | 0.3542   | 0.597098 |
| S140748Z20   | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| S140748Z20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| STAR_TO_NWPN | Fuel Volume by Transport          | 129.3365 | 22.11439 | 36.00493 | 37.11744 |
| STAR_TO_NWPN | First of Month MDQ by Transport   | 324.66   | 324.66   | 324.66   | 324.66   |
| STAR_TO_NWPN | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| STAR_TO_NWPN | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| WCFI2583B00  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| WCFI2583B00  | Rate: D1 by Transport             | 142.6566 | 142.6566 | 142.6566 | 142.6566 |

| Transport | Data Item                         | 2024     | 2025     | 2026     | 2027     |
|-----------|-----------------------------------|----------|----------|----------|----------|
| FTHLS2023 | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| FTHLS2023 | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| FTHLSFS1  | First of Month MDQ by Transport   | 38.01    | 38.01    | 38.01    | 38.01    |
| FTHLSFS1  | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| FTHLSFS2  | First of Month MDQ by Transport   | 37.512   | 37.512   | 37.512   | 37.512   |
| FTHLSFS2  | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| FTHLSFS3  | First of Month MDQ by Transport   | 258.996  | 258.996  | 258.996  | 258.996  |
| FTHLSFS3  | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| GTN13687  | Fuel Volume by Transport          | 4.44E-04 | 4.81E-04 | 8.18E-04 | 1.67E-03 |
| GTN13687  | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| GTN13687  | Rate: D1 by Transport             | 46.99277 | 46.99277 | 46.99277 | 46.99277 |
| GTN13687  | Rate: Transportation by Transport | 6.38E-02 | 6.38E-02 | 6.38E-02 | 6.38E-02 |
| GTN13688  | Fuel Volume by Transport          | 2.50E-04 | 2.50E-04 | 3.87E-04 | 7.08E-04 |
| GTN13688  | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| GTN13688  | Rate: D1 by Transport             | 46.99277 | 46.99277 | 46.99277 | 46.99277 |
| GTN13688  | Rate: Transportation by Transport | 6.38E-02 | 6.38E-02 | 6.38E-02 | 6.38E-02 |
| GTN17019W | Fuel Volume by Transport          | 6.71E-02 | 6.79E-02 | 7.23E-02 | 6.32E-02 |
| GTN17019W | First of Month MDQ by Transport   | 138.696  | 138.696  | 138.696  | 138.696  |
| GTN17019W | Rate: D1 by Transport             | 26.75282 | 26.75282 | 26.75282 | 26.75282 |
| GTN17019W | Rate: Transportation by Transport | 2.08E-02 | 2.08E-02 | 2.08E-02 | 2.08E-02 |
| GTN17021  | Fuel Volume by Transport          | 3.35E-03 | 3.20E-03 | 2.40E-03 | 2.68E-03 |
| GTN17021  | First of Month MDQ by Transport   | 2.4      | 2.4      | 2.4      | 2.4      |
| GTN17021  | Rate: D1 by Transport             | 50.06817 | 50.06817 | 50.06817 | 50.06817 |
| GTN17021  | Rate: Transportation by Transport | 0.052159 | 0.052159 | 0.052159 | 0.052159 |
| GTN17022  | Fuel Volume by Transport          | 2.80E-03 | 3.26E-03 | 3.39E-03 | 3.29E-03 |
| GTN17022  | First of Month MDQ by Transport   | 2.784    | 2.784    | 2.784    | 2.784    |
| GTN17022  | Rate: D1 by Transport             | 51.6523  | 51.6523  | 51.6523  | 51.6523  |
| GTN17022  | Rate: Transportation by Transport | 0.05429  | 0.05429  | 0.05429  | 0.05429  |
| GTN17023  | Fuel Volume by Transport          | 2.90E-02 | 3.17E-02 | 0.03119  | 3.12E-02 |
| GTN17023  | First of Month MDQ by Transport   | 26.591   | 26.591   | 26.591   | 26.591   |
| GTN17023  | Rate: D1 by Transport             | 69.83419 | 69.83419 | 69.83419 | 69.83419 |
| GTN17023  | Rate: Transportation by Transport | 7.88E-02 | 7.88E-02 | 7.88E-02 | 7.88E-02 |
| GTN17025  | Fuel Volume by Transport          | 3.81E-02 | 4.95E-02 | 4.35E-02 | 0.04455  |
| GTN17025  | First of Month MDQ by Transport   | 39.943   | 39.943   | 39.943   | 39.943   |
| GTN17025  | Rate: D1 by Transport             | 72.20897 | 72.20897 | 72.20897 | 72.20897 |
| GTN17025  | Rate: Transportation by Transport | 0.081965 | 0.081965 | 0.081965 | 0.081965 |
| GTN17026  | Fuel Volume by Transport          | 3.18E-02 | 3.75E-02 | 3.52E-02 | 4.08E-02 |
| GTN17026  | First of Month MDQ by Transport   | 36.118   | 36.118   | 36.118   | 36.118   |
| GTN17026  | Rate: D1 by Transport             | 73.85019 | 73.85019 | 73.85019 | 73.85019 |
| GTN17026  | Rate: Transportation by Transport | 8.42E-02 | 8.42E-02 | 8.42E-02 | 8.42E-02 |
| GTN17028  | Fuel Volume by Transport          | 8.99E-02 | 0.082628 | 8.89E-02 | 0.121023 |
| GTN17028  | First of Month MDQ by Transport   | 127.809  | 127.809  | 127.809  | 127.809  |
| GTN17028  | Rate: D1 by Transport             | 76.16361 | 76.16361 | 76.16361 | 76.16361 |
| GTN17028  | Rate: Transportation by Transport | 8.73E-02 | 8.73E-02 | 8.73E-02 | 8.73E-02 |
| GTN17031  | Fuel Volume by Transport          | 1.47E-02 | 1.92E-02 | 1.66E-02 | 1.61E-02 |
| GTN17031  | First of Month MDQ by Transport   | 32.473   | 32.473   | 32.473   | 32.473   |

| Transport    | Data Item                         | 2024     | 2025     | 2026     | 2027     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| GTN17031     | Rate: D1 by Transport             | 78.25866 | 78.25866 | 78.25866 | 78.25866 |
| GTN17031     | Rate: Transportation by Transport | 9.01E-02 | 9.01E-02 | 9.01E-02 | 9.01E-02 |
| GTN17033     | Fuel Volume by Transport          | 1.40E-04 | 2.39E-04 | 2.34E-04 | 2.25E-04 |
| GTN17033     | First of Month MDQ by Transport   | 0.54     | 0.54     | 0.54     | 0.54     |
| GTN17033     | Rate: D1 by Transport             | 80.358   | 80.358   | 80.358   | 80.358   |
| GTN17033     | Rate: Transportation by Transport | 9.29E-02 | 9.29E-02 | 9.29E-02 | 9.29E-02 |
| GTN17034     | Fuel Volume by Transport          | 2.30E-03 | 2.73E-03 | 2.23E-03 | 2.70E-03 |
| GTN17034     | First of Month MDQ by Transport   | 4.996    | 4.996    | 4.996    | 4.996    |
| GTN17034     | Rate: D1 by Transport             | 82.79414 | 82.79414 | 82.79414 | 82.79414 |
| GTN17034     | Rate: Transportation by Transport | 0.096186 | 0.096186 | 0.096186 | 0.096186 |
| GTN17036     | Fuel Volume by Transport          | 4.24E-04 | 5.51E-04 | 2.85E-04 | 3.83E-04 |
| GTN17036     | First of Month MDQ by Transport   | 0.9      | 0.9      | 0.9      | 0.9      |
| GTN17036     | Rate: D1 by Transport             | 85.43009 | 85.43009 | 85.43009 | 85.43009 |
| GTN17036     | Rate: Transportation by Transport | 9.97E-02 | 9.97E-02 | 9.97E-02 | 9.97E-02 |
| GTN17037     | Fuel Volume by Transport          | 2.59E-02 | 3.86E-02 | 6.11E-02 | 3.17E-02 |
| GTN17037     | First of Month MDQ by Transport   | 122.28   | 122.28   | 122.28   | 122.28   |
| GTN17037     | Rate: D1 by Transport             | 98.70544 | 98.70544 | 98.70544 | 98.70544 |
| GTN17037     | Rate: Transportation by Transport | 0.117592 | 0.117592 | 0.117592 | 0.117592 |
| GTN18507     | Fuel Volume by Transport          | 2.44E-02 | 1.79E-02 | 2.02E-02 | 1.11E-02 |
| GTN18507     | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| GTN18507     | Rate: D1 by Transport             | 98.70544 | 98.70544 | 98.70544 | 98.70544 |
| GTN18507     | Rate: Transportation by Transport | 0.117592 | 0.117592 | 0.117592 | 0.117592 |
| GTN2023      | Fuel Volume by Transport          | 5.97E-02 | 3.90E-02 | 2.63E-02 | 2.92E-02 |
| GTN2023      | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023      | Rate: D1 by Transport             | 98.70544 | 98.70544 | 98.70544 | 98.70544 |
| GTN2023      | Rate: Transportation by Transport | 0.117592 | 0.117592 | 0.117592 | 0.117592 |
| GTN2023BND   | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023CHEM  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023GILC  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023KOSMO | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023LAPI  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023MADR  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023NBEND | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023PRNG  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023PRVL  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023REDM  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023SNTP  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023STEAM | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTNSTANBND   | First of Month MDQ by Transport   | 352.489  | 352.489  | 352.489  | 352.489  |
| GTNSTANCHEM  | First of Month MDQ by Transport   | 225.58   | 225.58   | 225.58   | 225.58   |
| GTNSTANGILC  | First of Month MDQ by Transport   | 229.676  | 229.676  | 229.676  | 229.676  |
| GTNSTANKOSMO | First of Month MDQ by Transport   | 206.32   | 206.32   | 206.32   | 206.32   |
| GTNSTANLAPI  | First of Month MDQ by Transport   | 225.22   | 225.22   | 225.22   | 225.22   |
| GTNSTANMADR  | First of Month MDQ by Transport   | 251.271  | 251.271  | 251.271  | 251.271  |
| GTNSTANNBEND | First of Month MDQ by Transport   | 224.68   | 224.68   | 224.68   | 224.68   |
| GTNSTANPRNG  | First of Month MDQ by Transport   | 224.68   | 224.68   | 224.68   | 224.68   |



| Transport    | Data Item                         | 2024     | 2025     | 2026     | 2027     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| GTNSTANPRVL  | First of Month MDQ by Transport   | 264.623  | 264.623  | 264.623  | 264.623  |
| GTNSTANREDM  | First of Month MDQ by Transport   | 260.798  | 260.798  | 260.798  | 260.798  |
| GTNSTANSNTP  | First of Month MDQ by Transport   | 224.68   | 224.68   | 224.68   | 224.68   |
| GTNSTANSTEA  | First of Month MDQ by Transport   | 257.153  | 257.153  | 257.153  | 257.153  |
| HUNT_TO_NWPN | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| JPOUT        | First of Month MDQ by Transport   | 676.392  | 676.392  | 676.392  | 676.392  |
| MDDOSMSSPLOP | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| MDDOSTN2STAN | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTO24  | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTO26  | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTO30W | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTOME  | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOZ10      | First of Month MDQ by Transport   | 189.048  | 189.048  | 189.048  | 189.048  |
| MDDOZ11      | First of Month MDQ by Transport   | 380.484  | 380.484  | 380.484  | 380.484  |
| MDDOZ20      | First of Month MDQ by Transport   | 674.436  | 674.436  | 674.436  | 674.436  |
| MDDOZ24      | First of Month MDQ by Transport   | 170.964  | 170.964  | 170.964  | 170.964  |
| MDDOZ26      | First of Month MDQ by Transport   | 369.6    | 369.6    | 369.6    | 369.6    |
| MDDOZ3S      | First of Month MDQ by Transport   | 498.024  | 498.024  | 498.024  | 498.024  |
| MDDOZ3W      | First of Month MDQ by Transport   | 754.272  | 754.272  | 754.272  | 754.272  |
| MDDOZME      | First of Month MDQ by Transport   | 434.94   | 434.94   | 434.94   | 434.94   |
| NOVA20030393 | First of Month MDQ by Transport   | 263.676  | 263.676  | 263.676  | 263.676  |
| NOVA20030393 | Rate: D1 by Transport             | 46.4653  | 46.4653  | 46.4653  | 46.4653  |
| NOVA2023     | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| NOVA2023     | Rate: D1 by Transport             | 46.4653  | 46.4653  | 46.4653  | 46.4653  |
| NWP100002N   | Fuel Volume by Transport          | 2.529966 | 2.964599 | 4.061489 | 3.784027 |
| NWP100002N   | First of Month MDQ by Transport   | 1065.732 | 1065.732 | 1065.732 | 1065.732 |
| NWP100002N   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100002N   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100002S   | Fuel Volume by Transport          | 306.5223 | 309.5151 | 298.0148 | 303.2986 |
| NWP100002S   | First of Month MDQ by Transport   | 1059.084 | 1059.084 | 1059.084 | 1059.084 |
| NWP100002S   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100002S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100002STN | Fuel Volume by Transport          | 0.651476 | 1.604975 | 1.602301 | 1.61     |
| NWP100002STN | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP100002STN | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100002STN | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134N11 | Fuel Volume by Transport          | 4.03E-04 | 0        | 0        | 4.03E-04 |
| NWP100134N11 | First of Month MDQ by Transport   | 0.3      | 0.3      | 0.3      | 0.3      |
| NWP100134N11 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134N11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134N20 | Fuel Volume by Transport          | 0        | 0        | 0        | 1.61E-03 |
| NWP100134N20 | First of Month MDQ by Transport   | 1.2      | 1.2      | 1.2      | 1.2      |
| NWP100134N20 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134N20 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134N3S | Fuel Volume by Transport          | 0        | 0        | 0        | 6.44E-04 |
| NWP100134N3S | First of Month MDQ by Transport   | 0.48     | 0.48     | 0.48     | 0.48     |

| Transport    | Data Item                         | 2024     | 2025     | 2026     | 2027     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP100134N3S | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134N3S | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134S11 | Fuel Volume by Transport          | 4.87E-02 | 4.83E-02 | 4.83E-02 | 4.87E-02 |
| NWP100134S11 | First of Month MDQ by Transport   | 0.3      | 0.3      | 0.3      | 0.3      |
| NWP100134S11 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134S11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134S20 | Fuel Volume by Transport          | 0.19481  | 0.1932   | 0.194148 | 0.19642  |
| NWP100134S20 | First of Month MDQ by Transport   | 1.2      | 1.2      | 1.2      | 1.2      |
| NWP100134S20 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134S20 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134S3S | Fuel Volume by Transport          | 7.79E-02 | 7.73E-02 | 7.73E-02 | 7.86E-02 |
| NWP100134S3S | First of Month MDQ by Transport   | 0.48     | 0.48     | 0.48     | 0.48     |
| NWP100134S3S | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134S3S | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100149N   | Fuel Volume by Transport          | 0        | 0        | 7.08E-04 | 7.08E-04 |
| NWP100149N   | First of Month MDQ by Transport   | 0.528    | 0.528    | 0.528    | 0.528    |
| NWP100149N   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100149N   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100149S   | Fuel Volume by Transport          | 6.04E-02 | 5.99E-02 | 5.99E-02 | 6.09E-02 |
| NWP100149S   | First of Month MDQ by Transport   | 0.372    | 0.372    | 0.372    | 0.372    |
| NWP100149S   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100149S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100150N   | Fuel Volume by Transport          | 0        | 0        | 0        | 1.50E-03 |
| NWP100150N   | First of Month MDQ by Transport   | 1.116    | 1.116    | 1.116    | 1.116    |
| NWP100150N   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100150N   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100150S   | Fuel Volume by Transport          | 0.130523 | 0.129444 | 0.130523 | 0.130971 |
| NWP100150S   | First of Month MDQ by Transport   | 0.804    | 0.804    | 0.804    | 0.804    |
| NWP100150S   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100150S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP10030226B | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| NWP10030226B | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP10030226B | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302ME  | Fuel Volume by Transport          | 6.73E-02 | 8.71E-02 | 0        | 8.70E-02 |
| NWP100302ME  | First of Month MDQ by Transport   | 50.136   | 50.136   | 50.136   | 50.136   |
| NWP100302ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302MEB | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| NWP100302MEB | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302SMS | Fuel Volume by Transport          | 9.5135   | 7.852462 | 8.9026   | 8.787671 |
| NWP100302SMS | First of Month MDQ by Transport   | 126.024  | 126.024  | 126.024  | 126.024  |
| NWP100302SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302STN | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| NWP100302STN | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z10 | Fuel Volume by Transport          | 0.0161   | 9.66E-02 | 9.03E-03 | 7.07E-02 |
| NWP100302Z10 | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP100302Z10 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |

| Transport    | Data Item                         | 2024     | 2025     | 2026     | 2027     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP100302Z11 | Fuel Volume by Transport          | 2.64E-02 | 0.415158 | 0.227625 | 4.27E-02 |
| NWP100302Z11 | First of Month MDQ by Transport   | 71.688   | 71.688   | 71.688   | 71.688   |
| NWP100302Z11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z20 | Fuel Volume by Transport          | 0        | 0.540085 | 0.227335 | 0.153727 |
| NWP100302Z20 | First of Month MDQ by Transport   | 77.472   | 77.472   | 77.472   | 77.472   |
| NWP100302Z20 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z24 | Fuel Volume by Transport          | 1.52E-02 | 9.09E-02 | 0.018557 | 7.16E-02 |
| NWP100302Z24 | First of Month MDQ by Transport   | 11.292   | 11.292   | 11.292   | 11.292   |
| NWP100302Z24 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z26 | First of Month MDQ by Transport   | 25.788   | 25.788   | 25.788   | 25.788   |
| NWP100302Z26 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z35 | Fuel Volume by Transport          | 1.34E-02 | 0.411191 | 0.139175 | 0.272592 |
| NWP100302Z35 | First of Month MDQ by Transport   | 62.376   | 62.376   | 62.376   | 62.376   |
| NWP100302Z35 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z3W | Fuel Volume by Transport          | 7.82E-02 | 0.236581 | 0.205727 | 0.244064 |
| NWP100302Z3W | First of Month MDQ by Transport   | 126.024  | 126.024  | 126.024  | 126.024  |
| NWP100302Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090B3S | Fuel Volume by Transport          | 0        | 1.40E-02 | 0        | 0        |
| NWP139090B3S | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| NWP139090B3S | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139090B3S | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090B3W | Fuel Volume by Transport          | 1.63E-02 | 0        | 0        | 0        |
| NWP139090B3W | First of Month MDQ by Transport   | 324.756  | 324.756  | 324.756  | 324.756  |
| NWP139090B3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090DC  | Fuel Volume by Transport          | 4.999149 | 3.453063 | 1.240772 | 2.214136 |
| NWP139090DC  | First of Month MDQ by Transport   | 324.756  | 324.756  | 324.756  | 324.756  |
| NWP139090DC  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090ME  | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139090ME  | First of Month MDQ by Transport   | 73.92    | 73.92    | 73.92    | 73.92    |
| NWP139090ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090Z10 | Fuel Volume by Transport          | 4.67E-04 | 0        | 0        | 0        |
| NWP139090Z10 | First of Month MDQ by Transport   | 0.348    | 0.348    | 0.348    | 0.348    |
| NWP139090Z10 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090Z11 | Fuel Volume by Transport          | 0        | 0        | 0        | 4.99E-03 |
| NWP139090Z11 | First of Month MDQ by Transport   | 3.72     | 3.72     | 3.72     | 3.72     |
| NWP139090Z11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090Z26 | First of Month MDQ by Transport   | 107.868  | 107.868  | 107.868  | 107.868  |
| NWP139090Z26 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139382SMS | Fuel Volume by Transport          | 5.98661  | 8.858549 | 6.736147 | 8.962065 |
| NWP139382SMS | First of Month MDQ by Transport   | 74.292   | 74.292   | 74.292   | 74.292   |
| NWP139382SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139382SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139382W   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139382W   | First of Month MDQ by Transport   | 74.292   | 74.292   | 74.292   | 74.292   |
| NWP139382W   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139383SMS | Fuel Volume by Transport          | 0.380942 | 1.098825 | 1.271407 | 0.884168 |

| Transport    | Data Item                         | 2024     | 2025     | 2026     | 2027     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP139383SMS | First of Month MDQ by Transport   | 12.6     | 12.6     | 12.6     | 12.6     |
| NWP139383SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139383SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139383W   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139383W   | First of Month MDQ by Transport   | 12.6     | 12.6     | 12.6     | 12.6     |
| NWP139383W   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139384SMS | Fuel Volume by Transport          | 0.685437 | 1.941411 | 3.21553  | 1.871489 |
| NWP139384SMS | First of Month MDQ by Transport   | 39.108   | 39.108   | 39.108   | 39.108   |
| NWP139384SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139384SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139384W   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139384W   | First of Month MDQ by Transport   | 39.108   | 39.108   | 39.108   | 39.108   |
| NWP139384W   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139624SMS | Fuel Volume by Transport          | 1.651061 | 1.65479  | 1.53377  | 1.066515 |
| NWP139624SMS | First of Month MDQ by Transport   | 42       | 42       | 42       | 42       |
| NWP139624SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139624SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139624Z3W | Fuel Volume by Transport          | 3.73E-03 | 0        | 6.49E-02 | 7.34E-02 |
| NWP139624Z3W | First of Month MDQ by Transport   | 42       | 42       | 42       | 42       |
| NWP139624Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139627SMS | Fuel Volume by Transport          | 2.873206 | 2.46858  | 2.737691 | 2.784711 |
| NWP139627SMS | First of Month MDQ by Transport   | 72.924   | 72.924   | 72.924   | 72.924   |
| NWP139627SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139627SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139627Z3W | Fuel Volume by Transport          | 0        | 0.308391 | 9.78E-02 | 5.05E-03 |
| NWP139627Z3W | First of Month MDQ by Transport   | 72.924   | 72.924   | 72.924   | 72.924   |
| NWP139627Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139630ME  | Fuel Volume by Transport          | 1.119833 | 0        | 0        | 0        |
| NWP139630ME  | First of Month MDQ by Transport   | 89.4     | 89.4     | 89.4     | 89.4     |
| NWP139630ME  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139630ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139630Z24 | Fuel Volume by Transport          | 0.156599 | 0        | 0        | 0        |
| NWP139630Z24 | First of Month MDQ by Transport   | 57.876   | 57.876   | 57.876   | 57.876   |
| NWP139630Z24 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139637DC  | Fuel Volume by Transport          | 0.705125 | 1.61696  | 2.350831 | 1.291775 |
| NWP139637DC  | First of Month MDQ by Transport   | 30       | 30       | 30       | 30       |
| NWP139637DC  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139637DC  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139637ME  | Fuel Volume by Transport          | 0.044082 | 0        | 0        | 0.044082 |
| NWP139637ME  | First of Month MDQ by Transport   | 32.856   | 32.856   | 32.856   | 32.856   |
| NWP139637ME  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139637ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139637Z11 | Fuel Volume by Transport          | 0        | 3.22E-02 | 0        | 0        |
| NWP139637Z11 | First of Month MDQ by Transport   | 24.036   | 24.036   | 24.036   | 24.036   |
| NWP139637Z11 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139637Z11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |

| Transport    | Data Item                         | 2024     | 2025     | 2026     | 2027     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP139637Z3W | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139637Z3W | First of Month MDQ by Transport   | 30       | 30       | 30       | 30       |
| NWP139637Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140047DC  | Fuel Volume by Transport          | 4.269639 | 1.745436 | 2.323031 | 2.162131 |
| NWP140047DC  | First of Month MDQ by Transport   | 557.736  | 557.736  | 557.736  | 557.736  |
| NWP140047DC  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP140047DC  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140047STN | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| NWP140047Z20 | First of Month MDQ by Transport   | 9.6      | 9.6      | 9.6      | 9.6      |
| NWP140047Z24 | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| NWP140047Z26 | First of Month MDQ by Transport   | 377.736  | 377.736  | 377.736  | 377.736  |
| NWP140047Z3W | Fuel Volume by Transport          | 0        | 0        | 8.94E-02 | 0        |
| NWP140047Z3W | First of Month MDQ by Transport   | 557.736  | 557.736  | 557.736  | 557.736  |
| NWP140047Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140047ZME | First of Month MDQ by Transport   | 63.336   | 63.336   | 63.336   | 63.336   |
| NWP140748ME  | Fuel Volume by Transport          | 0.15958  | 0.329417 | 0.253981 | 0.378162 |
| NWP140748ME  | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP140748ME  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP140748ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140748Z24 | Fuel Volume by Transport          | 0.25692  | 0.17049  | 0.252869 | 0.513219 |
| NWP140748Z24 | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP140748Z24 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140748Z26 | Fuel Volume by Transport          | 8.70E-02 | 0.011265 | 7.67E-02 | 9.66E-02 |
| NWP140748Z26 | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP140748Z26 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP143078    | Fuel Volume by Transport          | 5.725346 | 0        | 0        | 0        |
| NWP143078    | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| NWP143078    | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP143078    | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWPJPIN      | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| NWPJPIN      | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWPPLIN      | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| NWPPLIN      | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWPRLGNTOSTN | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWPSTOSTAN   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| PLOUT        | First of Month MDQ by Transport   | 937.5    | 937.5    | 937.5    | 937.5    |
| PLOUT        | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| ROCKTOSNWPS  | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| RUBY_BND     | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_CHEM    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_GILC    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_KOSMO   | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_LAPI    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_MADR    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_NBEND   | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_PRNG    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |

| Transport    | Data Item                         | 2024     | 2025     | 2026     | 2027     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| RUBY_PRVL    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_REDM    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_SNTF    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_STEA    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY6103600B | First of Month MDQ by Transport   | 90       | 90       | 90       | 90       |
| RUBY6103600B | Rate: D1 by Transport             | 273.75   | 273.75   | 273.75   | 273.75   |
| RUBY6103600B | Rate: Transportation by Transport | 0.12     | 0.12     | 0.12     | 0.12     |
| S100302Z10   | Fuel Volume by Transport          | 1.66715  | 1.950885 | 1.478615 | 1.000454 |
| S100302Z10   | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| S100302Z10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S100302Z11   | Fuel Volume by Transport          | 1.827188 | 1.350613 | 2.323111 | 1.806689 |
| S100302Z11   | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| S100302Z11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S100302Z20   | Fuel Volume by Transport          | 1.500681 | 1.700772 | 1.200545 | 2.195127 |
| S100302Z20   | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| S100302Z20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z10   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S132329Z10   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z11   | Fuel Volume by Transport          | 0        | 0        | 0        | 8.05E-02 |
| S132329Z11   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z20   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S132329Z20   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z3S   | Fuel Volume by Transport          | 4.78E-02 | 0        | 0        | 0        |
| S132329Z3S   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558P3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558P3S   | First of Month MDQ by Transport   | 48       | 48       | 48       | 48       |
| S135558P3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S10   | Fuel Volume by Transport          | 0.763449 | 0        | 0        | 0        |
| S135558S10   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S11   | Fuel Volume by Transport          | 1.345545 | 0        | 0        | 0        |
| S135558S11   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S20   | Fuel Volume by Transport          | 1.046827 | 0        | 0        | 0        |
| S135558S20   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S3S   | Fuel Volume by Transport          | 1.200913 | 0        | 0        | 0        |
| S135558S3S   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139090Z3S   | First of Month MDQ by Transport   | 42.36    | 42.36    | 42.36    | 42.36    |
| S139090Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139382Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |

| Transport    | Data Item                         | 2024     | 2025     | 2026     | 2027     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| S139382Z3S   | First of Month MDQ by Transport   | 74.292   | 74.292   | 74.292   | 74.292   |
| S139382Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139383Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S139383Z3S   | First of Month MDQ by Transport   | 12.6     | 12.6     | 12.6     | 12.6     |
| S139383Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139384Z3S   | First of Month MDQ by Transport   | 39.108   | 39.108   | 39.108   | 39.108   |
| S139384Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139624Z3S   | Fuel Volume by Transport          | 0        | 0        | 5.61E-02 | 0.514859 |
| S139624Z3S   | First of Month MDQ by Transport   | 42       | 42       | 42       | 42       |
| S139624Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139627Z3S   | Fuel Volume by Transport          | 0        | 9.62E-02 | 0.037675 | 8.34E-02 |
| S139627Z3S   | First of Month MDQ by Transport   | 72.924   | 72.924   | 72.924   | 72.924   |
| S139627Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139637Z3S   | Fuel Volume by Transport          | 0        | 4.02E-02 | 0        | 0        |
| S139637Z3S   | First of Month MDQ by Transport   | 30       | 30       | 30       | 30       |
| S139637Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140047Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S140047Z3S   | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| S140047Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140748Z10   | Fuel Volume by Transport          | 0.470675 | 0.461279 | 0.333763 | 0.516567 |
| S140748Z10   | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| S140748Z10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140748Z11   | Fuel Volume by Transport          | 0.811144 | 0.460737 | 0.457993 | 0.139753 |
| S140748Z11   | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| S140748Z11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140748Z20   | Fuel Volume by Transport          | 0.170472 | 0.498813 | 0.5796   | 0.327637 |
| S140748Z20   | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| S140748Z20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| STAR_TO_NWPN | Fuel Volume by Transport          | 37.81556 | 34.75443 | 44.11254 | 40.71117 |
| STAR_TO_NWPN | First of Month MDQ by Transport   | 324.66   | 324.66   | 324.66   | 324.66   |
| STAR_TO_NWPN | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| STAR_TO_NWPN | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| WCFI2583B00  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| WCFI2583B00  | Rate: D1 by Transport             | 142.6566 | 142.6566 | 142.6566 | 142.6566 |

| Transport | Data Item                         | 2028     | 2029     | 2030     | 2031     |
|-----------|-----------------------------------|----------|----------|----------|----------|
| FTHLS2023 | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| FTHLS2023 | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| FTHLSFS1  | First of Month MDQ by Transport   | 38.01    | 38.01    | 38.01    | 38.01    |
| FTHLSFS1  | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| FTHLSFS2  | First of Month MDQ by Transport   | 37.512   | 37.512   | 37.512   | 37.512   |
| FTHLSFS2  | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| FTHLSFS3  | First of Month MDQ by Transport   | 258.996  | 258.996  | 258.996  | 258.996  |
| FTHLSFS3  | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| GTN13687  | Fuel Volume by Transport          | 3.24E-03 | 6.76E-03 | 0.010042 | 1.05E-02 |
| GTN13687  | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| GTN13687  | Rate: D1 by Transport             | 46.99277 | 46.99277 | 46.99277 | 46.99277 |
| GTN13687  | Rate: Transportation by Transport | 6.38E-02 | 6.38E-02 | 6.38E-02 | 6.38E-02 |
| GTN13688  | Fuel Volume by Transport          | 1.11E-03 | 1.62E-03 | 3.46E-03 | 6.37E-03 |
| GTN13688  | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| GTN13688  | Rate: D1 by Transport             | 46.99277 | 46.99277 | 46.99277 | 46.99277 |
| GTN13688  | Rate: Transportation by Transport | 6.38E-02 | 6.38E-02 | 6.38E-02 | 6.38E-02 |
| GTN17019W | Fuel Volume by Transport          | 6.38E-02 | 6.55E-02 | 6.96E-02 | 7.09E-02 |
| GTN17019W | First of Month MDQ by Transport   | 138.696  | 138.696  | 138.696  | 138.696  |
| GTN17019W | Rate: D1 by Transport             | 26.75282 | 26.75282 | 26.75282 | 26.75282 |
| GTN17019W | Rate: Transportation by Transport | 2.08E-02 | 2.08E-02 | 2.08E-02 | 2.08E-02 |
| GTN17021  | Fuel Volume by Transport          | 3.39E-03 | 2.76E-03 | 2.49E-03 | 3.18E-03 |
| GTN17021  | First of Month MDQ by Transport   | 2.4      | 2.4      | 2.4      | 2.4      |
| GTN17021  | Rate: D1 by Transport             | 50.06817 | 50.06817 | 50.06817 | 50.06817 |
| GTN17021  | Rate: Transportation by Transport | 0.052159 | 0.052159 | 0.052159 | 0.052159 |
| GTN17022  | Fuel Volume by Transport          | 2.58E-03 | 3.27E-03 | 2.99E-03 | 2.78E-03 |
| GTN17022  | First of Month MDQ by Transport   | 2.784    | 2.784    | 2.784    | 2.784    |
| GTN17022  | Rate: D1 by Transport             | 51.6523  | 51.6523  | 51.6523  | 51.6523  |
| GTN17022  | Rate: Transportation by Transport | 0.05429  | 0.05429  | 0.05429  | 0.05429  |
| GTN17023  | Fuel Volume by Transport          | 2.82E-02 | 3.09E-02 | 2.76E-02 | 2.65E-02 |
| GTN17023  | First of Month MDQ by Transport   | 26.591   | 26.591   | 26.591   | 26.591   |
| GTN17023  | Rate: D1 by Transport             | 69.83419 | 69.83419 | 69.83419 | 69.83419 |
| GTN17023  | Rate: Transportation by Transport | 7.88E-02 | 7.88E-02 | 7.88E-02 | 7.88E-02 |
| GTN17025  | Fuel Volume by Transport          | 4.26E-02 | 3.98E-02 | 3.32E-02 | 3.44E-02 |
| GTN17025  | First of Month MDQ by Transport   | 39.943   | 39.943   | 39.943   | 39.943   |
| GTN17025  | Rate: D1 by Transport             | 72.20897 | 72.20897 | 72.20897 | 72.20897 |
| GTN17025  | Rate: Transportation by Transport | 0.081965 | 0.081965 | 0.081965 | 0.081965 |
| GTN17026  | Fuel Volume by Transport          | 3.19E-02 | 0.036497 | 3.36E-02 | 3.24E-02 |
| GTN17026  | First of Month MDQ by Transport   | 36.118   | 36.118   | 36.118   | 36.118   |
| GTN17026  | Rate: D1 by Transport             | 73.85019 | 73.85019 | 73.85019 | 73.85019 |
| GTN17026  | Rate: Transportation by Transport | 8.42E-02 | 8.42E-02 | 8.42E-02 | 8.42E-02 |
| GTN17028  | Fuel Volume by Transport          | 0.108172 | 8.06E-02 | 8.63E-02 | 9.89E-02 |
| GTN17028  | First of Month MDQ by Transport   | 127.809  | 127.809  | 127.809  | 127.809  |
| GTN17028  | Rate: D1 by Transport             | 76.16361 | 76.16361 | 76.16361 | 76.16361 |
| GTN17028  | Rate: Transportation by Transport | 8.73E-02 | 8.73E-02 | 8.73E-02 | 8.73E-02 |
| GTN17031  | Fuel Volume by Transport          | 2.33E-02 | 2.15E-02 | 2.01E-02 | 2.67E-02 |
| GTN17031  | First of Month MDQ by Transport   | 32.473   | 32.473   | 32.473   | 32.473   |



| Transport    | Data Item                         | 2028     | 2029     | 2030     | 2031     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| GTN17031     | Rate: D1 by Transport             | 78.25866 | 78.25866 | 78.25866 | 78.25866 |
| GTN17031     | Rate: Transportation by Transport | 9.01E-02 | 9.01E-02 | 9.01E-02 | 9.01E-02 |
| GTN17033     | Fuel Volume by Transport          | 2.41E-04 | 1.49E-04 | 2.32E-04 | 3.04E-04 |
| GTN17033     | First of Month MDQ by Transport   | 0.54     | 0.54     | 0.54     | 0.54     |
| GTN17033     | Rate: D1 by Transport             | 80.358   | 80.358   | 80.358   | 80.358   |
| GTN17033     | Rate: Transportation by Transport | 9.29E-02 | 9.29E-02 | 9.29E-02 | 9.29E-02 |
| GTN17034     | Fuel Volume by Transport          | 2.44E-03 | 2.31E-03 | 2.77E-03 | 3.26E-03 |
| GTN17034     | First of Month MDQ by Transport   | 4.996    | 4.996    | 4.996    | 4.996    |
| GTN17034     | Rate: D1 by Transport             | 82.79414 | 82.79414 | 82.79414 | 82.79414 |
| GTN17034     | Rate: Transportation by Transport | 0.096186 | 0.096186 | 0.096186 | 0.096186 |
| GTN17036     | Fuel Volume by Transport          | 2.74E-04 | 3.15E-04 | 3.22E-04 | 3.83E-04 |
| GTN17036     | First of Month MDQ by Transport   | 0.9      | 0.9      | 0.9      | 0.9      |
| GTN17036     | Rate: D1 by Transport             | 85.43009 | 85.43009 | 85.43009 | 85.43009 |
| GTN17036     | Rate: Transportation by Transport | 9.97E-02 | 9.97E-02 | 9.97E-02 | 9.97E-02 |
| GTN17037     | Fuel Volume by Transport          | 4.19E-02 | 0.065407 | 3.51E-02 | 3.85E-02 |
| GTN17037     | First of Month MDQ by Transport   | 122.28   | 122.28   | 122.28   | 122.28   |
| GTN17037     | Rate: D1 by Transport             | 98.70544 | 98.70544 | 98.70544 | 98.70544 |
| GTN17037     | Rate: Transportation by Transport | 0.117592 | 0.117592 | 0.117592 | 0.117592 |
| GTN18507     | Fuel Volume by Transport          | 1.36E-02 | 1.18E-02 | 0.011929 | 0.033173 |
| GTN18507     | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| GTN18507     | Rate: D1 by Transport             | 98.70544 | 98.70544 | 98.70544 | 98.70544 |
| GTN18507     | Rate: Transportation by Transport | 0.117592 | 0.117592 | 0.117592 | 0.117592 |
| GTN2023      | Fuel Volume by Transport          | 4.04E-02 | 4.28E-02 | 8.09E-02 | 3.82E-02 |
| GTN2023      | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023      | Rate: D1 by Transport             | 98.70544 | 98.70544 | 98.70544 | 98.70544 |
| GTN2023      | Rate: Transportation by Transport | 0.117592 | 0.117592 | 0.117592 | 0.117592 |
| GTN2023BND   | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023CHEM  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023GILC  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023KOSMO | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023LAPI  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023MADR  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023NBEND | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023PRNG  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023PRVL  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023REDM  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023SNTP  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023STEAM | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTNSTANBND   | First of Month MDQ by Transport   | 352.489  | 352.489  | 352.489  | 352.489  |
| GTNSTANCHEM  | First of Month MDQ by Transport   | 225.58   | 225.58   | 225.58   | 225.58   |
| GTNSTANGILC  | First of Month MDQ by Transport   | 229.676  | 229.676  | 229.676  | 229.676  |
| GTNSTANKOSMO | First of Month MDQ by Transport   | 206.32   | 206.32   | 206.32   | 206.32   |
| GTNSTANLAPI  | First of Month MDQ by Transport   | 225.22   | 225.22   | 225.22   | 225.22   |
| GTNSTANMADR  | First of Month MDQ by Transport   | 251.271  | 251.271  | 251.271  | 251.271  |
| GTNSTANNBEND | First of Month MDQ by Transport   | 224.68   | 224.68   | 224.68   | 224.68   |
| GTNSTANPRNG  | First of Month MDQ by Transport   | 224.68   | 224.68   | 224.68   | 224.68   |

| Transport    | Data Item                         | 2028     | 2029     | 2030     | 2031     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| GTNSTANPRVL  | First of Month MDQ by Transport   | 264.623  | 264.623  | 264.623  | 264.623  |
| GTNSTANREDM  | First of Month MDQ by Transport   | 260.798  | 260.798  | 260.798  | 260.798  |
| GTNSTANSNTP  | First of Month MDQ by Transport   | 224.68   | 224.68   | 224.68   | 224.68   |
| GTNSTANSTEA  | First of Month MDQ by Transport   | 257.153  | 257.153  | 257.153  | 257.153  |
| HUNT_TO_NWPN | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| JPOUT        | First of Month MDQ by Transport   | 676.392  | 676.392  | 676.392  | 676.392  |
| MDDOSMSSPLOP | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| MDDOSTN2STAN | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTO24  | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTO26  | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTO30W | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTOME  | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOZ10      | First of Month MDQ by Transport   | 189.048  | 189.048  | 189.048  | 189.048  |
| MDDOZ11      | First of Month MDQ by Transport   | 380.484  | 380.484  | 380.484  | 380.484  |
| MDDOZ20      | First of Month MDQ by Transport   | 674.436  | 674.436  | 674.436  | 674.436  |
| MDDOZ24      | First of Month MDQ by Transport   | 170.964  | 170.964  | 170.964  | 170.964  |
| MDDOZ26      | First of Month MDQ by Transport   | 369.6    | 369.6    | 369.6    | 369.6    |
| MDDOZ3S      | First of Month MDQ by Transport   | 498.024  | 498.024  | 498.024  | 498.024  |
| MDDOZ3W      | First of Month MDQ by Transport   | 754.272  | 754.272  | 754.272  | 754.272  |
| MDDOZME      | First of Month MDQ by Transport   | 434.94   | 434.94   | 434.94   | 434.94   |
| NOVA20030393 | First of Month MDQ by Transport   | 263.676  | 263.676  | 263.676  | 263.676  |
| NOVA20030393 | Rate: D1 by Transport             | 46.4653  | 46.4653  | 46.4653  | 46.4653  |
| NOVA2023     | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| NOVA2023     | Rate: D1 by Transport             | 46.4653  | 46.4653  | 46.4653  | 46.4653  |
| NWP100002N   | Fuel Volume by Transport          | 3.682024 | 4.853576 | 5.229809 | 2.634904 |
| NWP100002N   | First of Month MDQ by Transport   | 1065.732 | 1065.732 | 1065.732 | 1065.732 |
| NWP100002N   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100002N   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100002S   | Fuel Volume by Transport          | 301.2729 | 302.5219 | 301.4068 | 298.2047 |
| NWP100002S   | First of Month MDQ by Transport   | 1059.084 | 1059.084 | 1059.084 | 1059.084 |
| NWP100002S   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100002S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100002STN | Fuel Volume by Transport          | 1.6261   | 1.61     | 1.61     | 1.61     |
| NWP100002STN | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP100002STN | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100002STN | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134N11 | Fuel Volume by Transport          | 4.03E-04 | 0        | 0        | 0        |
| NWP100134N11 | First of Month MDQ by Transport   | 0.3      | 0.3      | 0.3      | 0.3      |
| NWP100134N11 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134N11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134N20 | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP100134N20 | First of Month MDQ by Transport   | 1.2      | 1.2      | 1.2      | 1.2      |
| NWP100134N20 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134N20 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134N3S | Fuel Volume by Transport          | 6.44E-04 | 0        | 6.44E-04 | 6.44E-04 |
| NWP100134N3S | First of Month MDQ by Transport   | 0.48     | 0.48     | 0.48     | 0.48     |

| Transport    | Data Item                         | 2028     | 2029     | 2030     | 2031     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP100134N3S | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134N3S | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134S11 | Fuel Volume by Transport          | 0.049508 | 4.91E-02 | 4.91E-02 | 4.91E-02 |
| NWP100134S11 | First of Month MDQ by Transport   | 0.3      | 0.3      | 0.3      | 0.3      |
| NWP100134S11 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134S11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134S20 | Fuel Volume by Transport          | 0.19803  | 0.19642  | 0.19642  | 0.19642  |
| NWP100134S20 | First of Month MDQ by Transport   | 1.2      | 1.2      | 1.2      | 1.2      |
| NWP100134S20 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134S20 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134S3S | Fuel Volume by Transport          | 7.92E-02 | 7.86E-02 | 7.86E-02 | 7.86E-02 |
| NWP100134S3S | First of Month MDQ by Transport   | 0.48     | 0.48     | 0.48     | 0.48     |
| NWP100134S3S | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134S3S | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100149N   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP100149N   | First of Month MDQ by Transport   | 0.528    | 0.528    | 0.528    | 0.528    |
| NWP100149N   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100149N   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100149S   | Fuel Volume by Transport          | 0.061389 | 6.09E-02 | 6.09E-02 | 6.09E-02 |
| NWP100149S   | First of Month MDQ by Transport   | 0.372    | 0.372    | 0.372    | 0.372    |
| NWP100149S   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100149S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100150N   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP100150N   | First of Month MDQ by Transport   | 1.116    | 1.116    | 1.116    | 1.116    |
| NWP100150N   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100150N   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100150S   | Fuel Volume by Transport          | 0.13268  | 0.131601 | 0.131601 | 0.131601 |
| NWP100150S   | First of Month MDQ by Transport   | 0.804    | 0.804    | 0.804    | 0.804    |
| NWP100150S   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100150S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP10030226B | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| NWP10030226B | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP10030226B | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302ME  | Fuel Volume by Transport          | 0.211603 | 0.111837 | 0.161861 | 0.240804 |
| NWP100302ME  | First of Month MDQ by Transport   | 50.136   | 50.136   | 50.136   | 50.136   |
| NWP100302ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302MEB | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| NWP100302MEB | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302SMS | Fuel Volume by Transport          | 8.115822 | 8.154934 | 8.283352 | 6.895143 |
| NWP100302SMS | First of Month MDQ by Transport   | 126.024  | 126.024  | 126.024  | 126.024  |
| NWP100302SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302STN | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| NWP100302STN | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z10 | Fuel Volume by Transport          | 0.101623 | 6.40E-02 | 0.078081 | 8.79E-02 |
| NWP100302Z10 | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP100302Z10 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |

| Transport    | Data Item                         | 2028     | 2029     | 2030     | 2031     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP100302Z11 | Fuel Volume by Transport          | 0.279015 | 0.317371 | 0.244397 | 0.502704 |
| NWP100302Z11 | First of Month MDQ by Transport   | 71.688   | 71.688   | 71.688   | 71.688   |
| NWP100302Z11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z20 | Fuel Volume by Transport          | 0.445553 | 0.358642 | 0.340238 | 0.893669 |
| NWP100302Z20 | First of Month MDQ by Transport   | 77.472   | 77.472   | 77.472   | 77.472   |
| NWP100302Z20 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z24 | Fuel Volume by Transport          | 0.104073 | 7.70E-02 | 8.91E-02 | 0.126411 |
| NWP100302Z24 | First of Month MDQ by Transport   | 11.292   | 11.292   | 11.292   | 11.292   |
| NWP100302Z24 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z26 | First of Month MDQ by Transport   | 25.788   | 25.788   | 25.788   | 25.788   |
| NWP100302Z26 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z35 | Fuel Volume by Transport          | 0.359213 | 0.39451  | 0.368295 | 0.644684 |
| NWP100302Z35 | First of Month MDQ by Transport   | 62.376   | 62.376   | 62.376   | 62.376   |
| NWP100302Z35 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z3W | Fuel Volume by Transport          | 0.113149 | 0.251761 | 0.164759 | 0.338715 |
| NWP100302Z3W | First of Month MDQ by Transport   | 126.024  | 126.024  | 126.024  | 126.024  |
| NWP100302Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090B3S | Fuel Volume by Transport          | 0        | 0        | 1.29E-02 | 1.32E-02 |
| NWP139090B3S | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| NWP139090B3S | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139090B3S | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090B3W | Fuel Volume by Transport          | 0        | 0        | 0        | 3.32E-02 |
| NWP139090B3W | First of Month MDQ by Transport   | 324.756  | 324.756  | 324.756  | 324.756  |
| NWP139090B3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090DC  | Fuel Volume by Transport          | 2.883755 | 1.74526  | 2.670424 | 2.143602 |
| NWP139090DC  | First of Month MDQ by Transport   | 324.756  | 324.756  | 324.756  | 324.756  |
| NWP139090DC  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090ME  | Fuel Volume by Transport          | 0        | 0        | 0        | 9.92E-02 |
| NWP139090ME  | First of Month MDQ by Transport   | 73.92    | 73.92    | 73.92    | 73.92    |
| NWP139090ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090Z10 | Fuel Volume by Transport          | 0        | 0        | 0        | 4.67E-04 |
| NWP139090Z10 | First of Month MDQ by Transport   | 0.348    | 0.348    | 0.348    | 0.348    |
| NWP139090Z10 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090Z11 | Fuel Volume by Transport          | 4.99E-03 | 0        | 4.99E-03 | 4.99E-03 |
| NWP139090Z11 | First of Month MDQ by Transport   | 3.72     | 3.72     | 3.72     | 3.72     |
| NWP139090Z11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090Z26 | First of Month MDQ by Transport   | 107.868  | 107.868  | 107.868  | 107.868  |
| NWP139090Z26 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139382SMS | Fuel Volume by Transport          | 6.472277 | 7.149797 | 5.377243 | 7.823681 |
| NWP139382SMS | First of Month MDQ by Transport   | 74.292   | 74.292   | 74.292   | 74.292   |
| NWP139382SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139382SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139382W   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139382W   | First of Month MDQ by Transport   | 74.292   | 74.292   | 74.292   | 74.292   |
| NWP139382W   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139383SMS | Fuel Volume by Transport          | 0.694839 | 1.352371 | 1.132635 | 1.146481 |

| Transport    | Data Item                         | 2028     | 2029     | 2030     | 2031     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP139383SMS | First of Month MDQ by Transport   | 12.6     | 12.6     | 12.6     | 12.6     |
| NWP139383SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139383SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139383W   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139383W   | First of Month MDQ by Transport   | 12.6     | 12.6     | 12.6     | 12.6     |
| NWP139383W   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139384SMS | Fuel Volume by Transport          | 3.481373 | 3.619036 | 4.275231 | 2.076418 |
| NWP139384SMS | First of Month MDQ by Transport   | 39.108   | 39.108   | 39.108   | 39.108   |
| NWP139384SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139384SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139384W   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139384W   | First of Month MDQ by Transport   | 39.108   | 39.108   | 39.108   | 39.108   |
| NWP139384W   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139624SMS | Fuel Volume by Transport          | 1.613522 | 1.499153 | 1.422934 | 1.140364 |
| NWP139624SMS | First of Month MDQ by Transport   | 42       | 42       | 42       | 42       |
| NWP139624SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139624SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139624Z3W | Fuel Volume by Transport          | 1.55E-02 | 0.10782  | 0.1127   | 0.351151 |
| NWP139624Z3W | First of Month MDQ by Transport   | 42       | 42       | 42       | 42       |
| NWP139624Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139627SMS | Fuel Volume by Transport          | 2.190908 | 2.547228 | 2.568432 | 2.126372 |
| NWP139627SMS | First of Month MDQ by Transport   | 72.924   | 72.924   | 72.924   | 72.924   |
| NWP139627SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139627SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139627Z3W | Fuel Volume by Transport          | 0.604845 | 0.131955 | 6.57E-02 | 0.61627  |
| NWP139627Z3W | First of Month MDQ by Transport   | 72.924   | 72.924   | 72.924   | 72.924   |
| NWP139627Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139630ME  | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139630ME  | First of Month MDQ by Transport   | 89.4     | 89.4     | 89.4     | 89.4     |
| NWP139630ME  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139630ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139630Z24 | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139630Z24 | First of Month MDQ by Transport   | 57.876   | 57.876   | 57.876   | 57.876   |
| NWP139630Z24 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139637DC  | Fuel Volume by Transport          | 2.069724 | 1.455521 | 1.56975  | 3.177209 |
| NWP139637DC  | First of Month MDQ by Transport   | 30       | 30       | 30       | 30       |
| NWP139637DC  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139637DC  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139637ME  | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139637ME  | First of Month MDQ by Transport   | 32.856   | 32.856   | 32.856   | 32.856   |
| NWP139637ME  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139637ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139637Z11 | Fuel Volume by Transport          | 0.012204 | 1.98E-02 | 3.22E-02 | 3.22E-02 |
| NWP139637Z11 | First of Month MDQ by Transport   | 24.036   | 24.036   | 24.036   | 24.036   |
| NWP139637Z11 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139637Z11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |

| Transport    | Data Item                         | 2028     | 2029     | 2030     | 2031     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP139637Z3W | Fuel Volume by Transport          | 0        | 0        | 0        | 9.34E-03 |
| NWP139637Z3W | First of Month MDQ by Transport   | 30       | 30       | 30       | 30       |
| NWP139637Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140047DC  | Fuel Volume by Transport          | 2.171617 | 1.677681 | 1.522727 | 1.966404 |
| NWP140047DC  | First of Month MDQ by Transport   | 557.736  | 557.736  | 557.736  | 557.736  |
| NWP140047DC  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP140047DC  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140047STN | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| NWP140047Z20 | First of Month MDQ by Transport   | 9.6      | 9.6      | 9.6      | 9.6      |
| NWP140047Z24 | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| NWP140047Z26 | First of Month MDQ by Transport   | 377.736  | 377.736  | 377.736  | 377.736  |
| NWP140047Z3W | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP140047Z3W | First of Month MDQ by Transport   | 557.736  | 557.736  | 557.736  | 557.736  |
| NWP140047Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140047ZME | First of Month MDQ by Transport   | 63.336   | 63.336   | 63.336   | 63.336   |
| NWP140748ME  | Fuel Volume by Transport          | 0.303747 | 0.235883 | 0.280088 | 0.202237 |
| NWP140748ME  | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP140748ME  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP140748ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140748Z24 | Fuel Volume by Transport          | 0.590446 | 0.919464 | 0.626094 | 0.643503 |
| NWP140748Z24 | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP140748Z24 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140748Z26 | Fuel Volume by Transport          | 4.95E-02 | 0        | 0.0322   | 4.00E-02 |
| NWP140748Z26 | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP140748Z26 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP143078    | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP143078    | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| NWP143078    | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP143078    | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWPJPIN      | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| NWPJPIN      | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWPPLIN      | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| NWPPLIN      | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWPRLGNTOSTN | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWPSTOSTAN   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| PLOUT        | First of Month MDQ by Transport   | 937.5    | 937.5    | 937.5    | 937.5    |
| PLOUT        | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| ROCKTOSNWPS  | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| RUBY_BND     | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_CHEM    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_GILC    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_KOSMO   | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_LAPI    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_MADR    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_NBEND   | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_PRNG    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |

| Transport    | Data Item                         | 2028     | 2029     | 2030     | 2031     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| RUBY_PRVL    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_REDM    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_SNTF    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_STEA    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY6103600B | First of Month MDQ by Transport   | 90       | 90       | 90       | 90       |
| RUBY6103600B | Rate: D1 by Transport             | 273.75   | 273.75   | 273.75   | 273.75   |
| RUBY6103600B | Rate: Transportation by Transport | 0.12     | 0.12     | 0.12     | 0.12     |
| S100302Z10   | Fuel Volume by Transport          | 1.85084  | 0.800363 | 1.244056 | 0.950431 |
| S100302Z10   | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| S100302Z10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S100302Z11   | Fuel Volume by Transport          | 1.30059  | 1.600726 | 2.307556 | 2.501135 |
| S100302Z11   | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| S100302Z11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S100302Z20   | Fuel Volume by Transport          | 1.900863 | 2.60118  | 1.450658 | 1.550704 |
| S100302Z20   | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| S100302Z20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z10   | Fuel Volume by Transport          | 0        | 5.71E-02 | 0        | 0        |
| S132329Z10   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z11   | Fuel Volume by Transport          | 8.05E-02 | 2.34E-02 | 8.05E-02 | 1.97E-02 |
| S132329Z11   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z20   | Fuel Volume by Transport          | 0        | 0        | 0        | 0.060754 |
| S132329Z20   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S132329Z3S   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558P3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558P3S   | First of Month MDQ by Transport   | 48       | 48       | 48       | 48       |
| S135558P3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S10   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558S10   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S11   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558S11   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S20   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558S20   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558S3S   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139090Z3S   | First of Month MDQ by Transport   | 42.36    | 42.36    | 42.36    | 42.36    |
| S139090Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139382Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |

| Transport    | Data Item                         | 2028     | 2029     | 2030     | 2031     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| S139382Z3S   | First of Month MDQ by Transport   | 74.292   | 74.292   | 74.292   | 74.292   |
| S139382Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139383Z3S   | Fuel Volume by Transport          | 0        | 1.69E-02 | 0        | 1.69E-02 |
| S139383Z3S   | First of Month MDQ by Transport   | 12.6     | 12.6     | 12.6     | 12.6     |
| S139383Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139384Z3S   | First of Month MDQ by Transport   | 39.108   | 39.108   | 39.108   | 39.108   |
| S139384Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139624Z3S   | Fuel Volume by Transport          | 2.57E-02 | 4.78E-02 | 0.119157 | 0.163275 |
| S139624Z3S   | First of Month MDQ by Transport   | 42       | 42       | 42       | 42       |
| S139624Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139627Z3S   | Fuel Volume by Transport          | 7.75E-02 | 0.194023 | 0.239085 | 0.130564 |
| S139627Z3S   | First of Month MDQ by Transport   | 72.924   | 72.924   | 72.924   | 72.924   |
| S139627Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139637Z3S   | Fuel Volume by Transport          | 4.02E-02 | 0        | 0        | 3.09E-02 |
| S139637Z3S   | First of Month MDQ by Transport   | 30       | 30       | 30       | 30       |
| S139637Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140047Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S140047Z3S   | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| S140047Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140748Z10   | Fuel Volume by Transport          | 0.35606  | 0.447356 | 0.529057 | 0.695895 |
| S140748Z10   | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| S140748Z10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140748Z11   | Fuel Volume by Transport          | 0.510142 | 0.193889 | 0.4347   | 0.227469 |
| S140748Z11   | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| S140748Z11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140748Z20   | Fuel Volume by Transport          | 0.174375 | 0.167609 | 6.21E-02 | 0.155072 |
| S140748Z20   | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| S140748Z20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| STAR_TO_NWPN | Fuel Volume by Transport          | 44.67894 | 42.44823 | 44.33844 | 49.08085 |
| STAR_TO_NWPN | First of Month MDQ by Transport   | 324.66   | 324.66   | 324.66   | 324.66   |
| STAR_TO_NWPN | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| STAR_TO_NWPN | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| WCFI2583B00  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| WCFI2583B00  | Rate: D1 by Transport             | 142.6566 | 142.6566 | 142.6566 | 142.6566 |



| Transport | Data Item                         | 2032     | 2033     | 2034     | 2035     |
|-----------|-----------------------------------|----------|----------|----------|----------|
| FTHLS2023 | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| FTHLS2023 | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| FTHLSFS1  | First of Month MDQ by Transport   | 38.01    | 38.01    | 38.01    | 38.01    |
| FTHLSFS1  | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| FTHLSFS2  | First of Month MDQ by Transport   | 37.512   | 37.512   | 37.512   | 37.512   |
| FTHLSFS2  | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| FTHLSFS3  | First of Month MDQ by Transport   | 258.996  | 258.996  | 258.996  | 258.996  |
| FTHLSFS3  | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| GTN13687  | Fuel Volume by Transport          | 1.53E-02 | 1.48E-02 | 2.21E-02 | 2.65E-02 |
| GTN13687  | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| GTN13687  | Rate: D1 by Transport             | 46.99277 | 46.99277 | 46.99277 | 46.99277 |
| GTN13687  | Rate: Transportation by Transport | 6.38E-02 | 6.38E-02 | 6.38E-02 | 6.38E-02 |
| GTN13688  | Fuel Volume by Transport          | 4.88E-03 | 8.59E-03 | 4.92E-03 | 0.00352  |
| GTN13688  | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| GTN13688  | Rate: D1 by Transport             | 46.99277 | 46.99277 | 46.99277 | 46.99277 |
| GTN13688  | Rate: Transportation by Transport | 6.38E-02 | 6.38E-02 | 6.38E-02 | 6.38E-02 |
| GTN17019W | Fuel Volume by Transport          | 7.35E-02 | 0.069782 | 6.88E-02 | 6.61E-02 |
| GTN17019W | First of Month MDQ by Transport   | 138.696  | 138.696  | 138.696  | 138.696  |
| GTN17019W | Rate: D1 by Transport             | 26.75282 | 26.75282 | 26.75282 | 26.75282 |
| GTN17019W | Rate: Transportation by Transport | 2.08E-02 | 2.08E-02 | 2.08E-02 | 2.08E-02 |
| GTN17021  | Fuel Volume by Transport          | 2.86E-03 | 1.93E-03 | 2.89E-03 | 3.04E-03 |
| GTN17021  | First of Month MDQ by Transport   | 2.4      | 2.4      | 2.4      | 2.4      |
| GTN17021  | Rate: D1 by Transport             | 50.06817 | 50.06817 | 50.06817 | 50.06817 |
| GTN17021  | Rate: Transportation by Transport | 0.052159 | 0.052159 | 0.052159 | 0.052159 |
| GTN17022  | Fuel Volume by Transport          | 3.27E-03 | 2.24E-03 | 2.48E-03 | 3.07E-03 |
| GTN17022  | First of Month MDQ by Transport   | 2.784    | 2.784    | 2.784    | 2.784    |
| GTN17022  | Rate: D1 by Transport             | 51.6523  | 51.6523  | 51.6523  | 51.6523  |
| GTN17022  | Rate: Transportation by Transport | 0.05429  | 0.05429  | 0.05429  | 0.05429  |
| GTN17023  | Fuel Volume by Transport          | 2.86E-02 | 1.99E-02 | 0.020847 | 0.032811 |
| GTN17023  | First of Month MDQ by Transport   | 26.591   | 26.591   | 26.591   | 26.591   |
| GTN17023  | Rate: D1 by Transport             | 69.83419 | 69.83419 | 69.83419 | 69.83419 |
| GTN17023  | Rate: Transportation by Transport | 7.88E-02 | 7.88E-02 | 7.88E-02 | 7.88E-02 |
| GTN17025  | Fuel Volume by Transport          | 3.99E-02 | 3.40E-02 | 0.036238 | 3.55E-02 |
| GTN17025  | First of Month MDQ by Transport   | 39.943   | 39.943   | 39.943   | 39.943   |
| GTN17025  | Rate: D1 by Transport             | 72.20897 | 72.20897 | 72.20897 | 72.20897 |
| GTN17025  | Rate: Transportation by Transport | 0.081965 | 0.081965 | 0.081965 | 0.081965 |
| GTN17026  | Fuel Volume by Transport          | 3.47E-02 | 3.43E-02 | 2.64E-02 | 3.55E-02 |
| GTN17026  | First of Month MDQ by Transport   | 36.118   | 36.118   | 36.118   | 36.118   |
| GTN17026  | Rate: D1 by Transport             | 73.85019 | 73.85019 | 73.85019 | 73.85019 |
| GTN17026  | Rate: Transportation by Transport | 8.42E-02 | 8.42E-02 | 8.42E-02 | 8.42E-02 |
| GTN17028  | Fuel Volume by Transport          | 8.71E-02 | 0.104675 | 8.21E-02 | 9.67E-02 |
| GTN17028  | First of Month MDQ by Transport   | 127.809  | 127.809  | 127.809  | 127.809  |
| GTN17028  | Rate: D1 by Transport             | 76.16361 | 76.16361 | 76.16361 | 76.16361 |
| GTN17028  | Rate: Transportation by Transport | 8.73E-02 | 8.73E-02 | 8.73E-02 | 8.73E-02 |
| GTN17031  | Fuel Volume by Transport          | 1.94E-02 | 1.92E-02 | 1.81E-02 | 2.17E-02 |
| GTN17031  | First of Month MDQ by Transport   | 32.473   | 32.473   | 32.473   | 32.473   |

| Transport    | Data Item                         | 2032     | 2033     | 2034     | 2035     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| GTN17031     | Rate: D1 by Transport             | 78.25866 | 78.25866 | 78.25866 | 78.25866 |
| GTN17031     | Rate: Transportation by Transport | 9.01E-02 | 9.01E-02 | 9.01E-02 | 9.01E-02 |
| GTN17033     | Fuel Volume by Transport          | 2.79E-04 | 2.57E-04 | 2.59E-04 | 3.15E-04 |
| GTN17033     | First of Month MDQ by Transport   | 0.54     | 0.54     | 0.54     | 0.54     |
| GTN17033     | Rate: D1 by Transport             | 80.358   | 80.358   | 80.358   | 80.358   |
| GTN17033     | Rate: Transportation by Transport | 9.29E-02 | 9.29E-02 | 9.29E-02 | 9.29E-02 |
| GTN17034     | Fuel Volume by Transport          | 3.20E-03 | 2.95E-03 | 2.41E-03 | 2.35E-03 |
| GTN17034     | First of Month MDQ by Transport   | 4.996    | 4.996    | 4.996    | 4.996    |
| GTN17034     | Rate: D1 by Transport             | 82.79414 | 82.79414 | 82.79414 | 82.79414 |
| GTN17034     | Rate: Transportation by Transport | 0.096186 | 0.096186 | 0.096186 | 0.096186 |
| GTN17036     | Fuel Volume by Transport          | 4.58E-04 | 3.26E-04 | 4.76E-04 | 3.84E-04 |
| GTN17036     | First of Month MDQ by Transport   | 0.9      | 0.9      | 0.9      | 0.9      |
| GTN17036     | Rate: D1 by Transport             | 85.43009 | 85.43009 | 85.43009 | 85.43009 |
| GTN17036     | Rate: Transportation by Transport | 9.97E-02 | 9.97E-02 | 9.97E-02 | 9.97E-02 |
| GTN17037     | Fuel Volume by Transport          | 3.66E-02 | 4.44E-02 | 3.48E-02 | 4.18E-02 |
| GTN17037     | First of Month MDQ by Transport   | 122.28   | 122.28   | 122.28   | 122.28   |
| GTN17037     | Rate: D1 by Transport             | 98.70544 | 98.70544 | 98.70544 | 98.70544 |
| GTN17037     | Rate: Transportation by Transport | 0.117592 | 0.117592 | 0.117592 | 0.117592 |
| GTN18507     | Fuel Volume by Transport          | 2.74E-02 | 0.032588 | 0.022238 | 3.69E-02 |
| GTN18507     | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| GTN18507     | Rate: D1 by Transport             | 98.70544 | 98.70544 | 98.70544 | 98.70544 |
| GTN18507     | Rate: Transportation by Transport | 0.117592 | 0.117592 | 0.117592 | 0.117592 |
| GTN2023      | Fuel Volume by Transport          | 0.057449 | 4.37E-02 | 0.092125 | 3.29E-02 |
| GTN2023      | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023      | Rate: D1 by Transport             | 98.70544 | 98.70544 | 98.70544 | 98.70544 |
| GTN2023      | Rate: Transportation by Transport | 0.117592 | 0.117592 | 0.117592 | 0.117592 |
| GTN2023BND   | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023CHEM  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023GILC  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023KOSMO | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023LAPI  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023MADR  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023NBEND | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023PRNG  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023PRVL  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023REDM  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023SNTP  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023STEAM | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTNSTANBND   | First of Month MDQ by Transport   | 352.489  | 352.489  | 352.489  | 352.489  |
| GTNSTANCHEM  | First of Month MDQ by Transport   | 225.58   | 225.58   | 225.58   | 225.58   |
| GTNSTANGILC  | First of Month MDQ by Transport   | 229.676  | 229.676  | 229.676  | 229.676  |
| GTNSTANKOSMO | First of Month MDQ by Transport   | 206.32   | 206.32   | 206.32   | 206.32   |
| GTNSTANLAPI  | First of Month MDQ by Transport   | 225.22   | 225.22   | 225.22   | 225.22   |
| GTNSTANMADR  | First of Month MDQ by Transport   | 251.271  | 251.271  | 251.271  | 251.271  |
| GTNSTANNBEND | First of Month MDQ by Transport   | 224.68   | 224.68   | 224.68   | 224.68   |
| GTNSTANPRNG  | First of Month MDQ by Transport   | 224.68   | 224.68   | 224.68   | 224.68   |

| Transport    | Data Item                         | 2032     | 2033     | 2034     | 2035     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| GTNSTANPRVL  | First of Month MDQ by Transport   | 264.623  | 264.623  | 264.623  | 264.623  |
| GTNSTANREDM  | First of Month MDQ by Transport   | 260.798  | 260.798  | 260.798  | 260.798  |
| GTNSTANSNTP  | First of Month MDQ by Transport   | 224.68   | 224.68   | 224.68   | 224.68   |
| GTNSTANSTEA  | First of Month MDQ by Transport   | 257.153  | 257.153  | 257.153  | 257.153  |
| HUNT_TO_NWPN | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| JPOUT        | First of Month MDQ by Transport   | 676.392  | 676.392  | 676.392  | 676.392  |
| MDDOSMSSPLOP | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| MDDOSTN2STAN | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTO24  | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTO26  | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTO30W | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTOME  | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOZ10      | First of Month MDQ by Transport   | 189.048  | 189.048  | 189.048  | 189.048  |
| MDDOZ11      | First of Month MDQ by Transport   | 380.484  | 380.484  | 380.484  | 380.484  |
| MDDOZ20      | First of Month MDQ by Transport   | 674.436  | 674.436  | 674.436  | 674.436  |
| MDDOZ24      | First of Month MDQ by Transport   | 170.964  | 170.964  | 170.964  | 170.964  |
| MDDOZ26      | First of Month MDQ by Transport   | 369.6    | 369.6    | 369.6    | 369.6    |
| MDDOZ3S      | First of Month MDQ by Transport   | 498.024  | 498.024  | 498.024  | 498.024  |
| MDDOZ3W      | First of Month MDQ by Transport   | 754.272  | 754.272  | 754.272  | 754.272  |
| MDDOZME      | First of Month MDQ by Transport   | 434.94   | 434.94   | 434.94   | 434.94   |
| NOVA20030393 | First of Month MDQ by Transport   | 263.676  | 263.676  | 263.676  | 263.676  |
| NOVA20030393 | Rate: D1 by Transport             | 46.4653  | 46.4653  | 46.4653  | 46.4653  |
| NOVA2023     | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| NOVA2023     | Rate: D1 by Transport             | 46.4653  | 46.4653  | 46.4653  | 46.4653  |
| NWP100002N   | Fuel Volume by Transport          | 4.246516 | 4.742086 | 3.811779 | 4.945305 |
| NWP100002N   | First of Month MDQ by Transport   | 1065.732 | 1065.732 | 1065.732 | 1065.732 |
| NWP100002N   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100002N   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100002S   | Fuel Volume by Transport          | 299.5993 | 298.8177 | 296.9393 | 293.2114 |
| NWP100002S   | First of Month MDQ by Transport   | 1059.084 | 1059.084 | 1059.084 | 1059.084 |
| NWP100002S   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100002S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100002STN | Fuel Volume by Transport          | 1.6261   | 1.61     | 1.61     | 1.586519 |
| NWP100002STN | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP100002STN | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100002STN | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134N11 | Fuel Volume by Transport          | 4.03E-04 | 4.03E-04 | 4.03E-04 | 4.03E-04 |
| NWP100134N11 | First of Month MDQ by Transport   | 0.3      | 0.3      | 0.3      | 0.3      |
| NWP100134N11 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134N11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134N20 | Fuel Volume by Transport          | 0        | 0        | 1.61E-03 | 1.61E-03 |
| NWP100134N20 | First of Month MDQ by Transport   | 1.2      | 1.2      | 1.2      | 1.2      |
| NWP100134N20 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134N20 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134N3S | Fuel Volume by Transport          | 0        | 6.44E-04 | 6.44E-04 | 6.44E-04 |
| NWP100134N3S | First of Month MDQ by Transport   | 0.48     | 0.48     | 0.48     | 0.48     |

| Transport    | Data Item                         | 2032     | 2033     | 2034     | 2035     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP100134N3S | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134N3S | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134S11 | Fuel Volume by Transport          | 5.03E-02 | 4.99E-02 | 4.87E-02 | 4.03E-02 |
| NWP100134S11 | First of Month MDQ by Transport   | 0.3      | 0.3      | 0.3      | 0.3      |
| NWP100134S11 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134S11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134S20 | Fuel Volume by Transport          | 0.20125  | 0.19964  | 0.19481  | 0.161    |
| NWP100134S20 | First of Month MDQ by Transport   | 1.2      | 1.2      | 1.2      | 1.2      |
| NWP100134S20 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134S20 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134S3S | Fuel Volume by Transport          | 8.05E-02 | 7.99E-02 | 7.79E-02 | 6.44E-02 |
| NWP100134S3S | First of Month MDQ by Transport   | 0.48     | 0.48     | 0.48     | 0.48     |
| NWP100134S3S | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134S3S | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100149N   | Fuel Volume by Transport          | 0        | 7.08E-04 | 0        | 7.08E-04 |
| NWP100149N   | First of Month MDQ by Transport   | 0.528    | 0.528    | 0.528    | 0.528    |
| NWP100149N   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100149N   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100149S   | Fuel Volume by Transport          | 6.24E-02 | 6.19E-02 | 0.060391 | 4.99E-02 |
| NWP100149S   | First of Month MDQ by Transport   | 0.372    | 0.372    | 0.372    | 0.372    |
| NWP100149S   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100149S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100150N   | Fuel Volume by Transport          | 0        | 0        | 1.50E-03 | 1.50E-03 |
| NWP100150N   | First of Month MDQ by Transport   | 1.116    | 1.116    | 1.116    | 1.116    |
| NWP100150N   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100150N   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100150S   | Fuel Volume by Transport          | 0.134837 | 0.133759 | 0.130523 | 0.10787  |
| NWP100150S   | First of Month MDQ by Transport   | 0.804    | 0.804    | 0.804    | 0.804    |
| NWP100150S   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100150S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP10030226B | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| NWP10030226B | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP10030226B | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302ME  | Fuel Volume by Transport          | 0.380365 | 0.555505 | 0.650957 | 0.676838 |
| NWP100302ME  | First of Month MDQ by Transport   | 50.136   | 50.136   | 50.136   | 50.136   |
| NWP100302ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302MEB | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| NWP100302MEB | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302SMS | Fuel Volume by Transport          | 6.244465 | 6.256131 | 5.272302 | 5.314622 |
| NWP100302SMS | First of Month MDQ by Transport   | 126.024  | 126.024  | 126.024  | 126.024  |
| NWP100302SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302STN | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| NWP100302STN | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z10 | Fuel Volume by Transport          | 0.1127   | 0.235691 | 0.175948 | 0.162753 |
| NWP100302Z10 | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP100302Z10 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |

| Transport    | Data Item                         | 2032     | 2033     | 2034     | 2035     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP100302Z11 | Fuel Volume by Transport          | 0.809371 | 0.927108 | 1.177321 | 1.077978 |
| NWP100302Z11 | First of Month MDQ by Transport   | 71.688   | 71.688   | 71.688   | 71.688   |
| NWP100302Z11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z20 | Fuel Volume by Transport          | 1.152185 | 0.625411 | 0.810551 | 1.159728 |
| NWP100302Z20 | First of Month MDQ by Transport   | 77.472   | 77.472   | 77.472   | 77.472   |
| NWP100302Z20 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z24 | Fuel Volume by Transport          | 0.127713 | 0.181321 | 0.171104 | 0.163657 |
| NWP100302Z24 | First of Month MDQ by Transport   | 11.292   | 11.292   | 11.292   | 11.292   |
| NWP100302Z24 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z26 | First of Month MDQ by Transport   | 25.788   | 25.788   | 25.788   | 25.788   |
| NWP100302Z26 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z35 | Fuel Volume by Transport          | 0.482772 | 0.59079  | 0.692397 | 0.587167 |
| NWP100302Z35 | First of Month MDQ by Transport   | 62.376   | 62.376   | 62.376   | 62.376   |
| NWP100302Z35 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z3W | Fuel Volume by Transport          | 0.42048  | 0.358096 | 0.77947  | 0.587308 |
| NWP100302Z3W | First of Month MDQ by Transport   | 126.024  | 126.024  | 126.024  | 126.024  |
| NWP100302Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090B3S | Fuel Volume by Transport          | 0        | 0        | 2.77E-02 | 1.80E-02 |
| NWP139090B3S | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| NWP139090B3S | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139090B3S | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090B3W | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139090B3W | First of Month MDQ by Transport   | 324.756  | 324.756  | 324.756  | 324.756  |
| NWP139090B3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090DC  | Fuel Volume by Transport          | 4.614482 | 2.188837 | 1.693711 | 4.101531 |
| NWP139090DC  | First of Month MDQ by Transport   | 324.756  | 324.756  | 324.756  | 324.756  |
| NWP139090DC  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090ME  | Fuel Volume by Transport          | 9.92E-02 | 6.95E-02 | 0        | 9.92E-02 |
| NWP139090ME  | First of Month MDQ by Transport   | 73.92    | 73.92    | 73.92    | 73.92    |
| NWP139090ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090Z10 | Fuel Volume by Transport          | 0        | 0        | 4.67E-04 | 0        |
| NWP139090Z10 | First of Month MDQ by Transport   | 0.348    | 0.348    | 0.348    | 0.348    |
| NWP139090Z10 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090Z11 | Fuel Volume by Transport          | 0        | 0        | 4.99E-03 | 4.99E-03 |
| NWP139090Z11 | First of Month MDQ by Transport   | 3.72     | 3.72     | 3.72     | 3.72     |
| NWP139090Z11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090Z26 | First of Month MDQ by Transport   | 107.868  | 107.868  | 107.868  | 107.868  |
| NWP139090Z26 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139382SMS | Fuel Volume by Transport          | 7.512165 | 6.948911 | 8.968012 | 4.968134 |
| NWP139382SMS | First of Month MDQ by Transport   | 74.292   | 74.292   | 74.292   | 74.292   |
| NWP139382SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139382SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139382W   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139382W   | First of Month MDQ by Transport   | 74.292   | 74.292   | 74.292   | 74.292   |
| NWP139382W   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139383SMS | Fuel Volume by Transport          | 0.907863 | 1.132635 | 0.691246 | 1.846728 |

| Transport    | Data Item                         | 2032     | 2033     | 2034     | 2035     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP139383SMS | First of Month MDQ by Transport   | 12.6     | 12.6     | 12.6     | 12.6     |
| NWP139383SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139383SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139383W   | Fuel Volume by Transport          | 1.69E-02 | 0        | 0        | 0        |
| NWP139383W   | First of Month MDQ by Transport   | 12.6     | 12.6     | 12.6     | 12.6     |
| NWP139383W   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139384SMS | Fuel Volume by Transport          | 1.457798 | 2.17129  | 2.921535 | 2.611856 |
| NWP139384SMS | First of Month MDQ by Transport   | 39.108   | 39.108   | 39.108   | 39.108   |
| NWP139384SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139384SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139384W   | Fuel Volume by Transport          | 2.08E-02 | 0        | 0        | 0        |
| NWP139384W   | First of Month MDQ by Transport   | 39.108   | 39.108   | 39.108   | 39.108   |
| NWP139384W   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139624SMS | Fuel Volume by Transport          | 1.205284 | 1.037055 | 1.068659 | 1.164706 |
| NWP139624SMS | First of Month MDQ by Transport   | 42       | 42       | 42       | 42       |
| NWP139624SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139624SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139624Z3W | Fuel Volume by Transport          | 0.169361 | 0.343528 | 0.29923  | 0.250999 |
| NWP139624Z3W | First of Month MDQ by Transport   | 42       | 42       | 42       | 42       |
| NWP139624Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139627SMS | Fuel Volume by Transport          | 2.095304 | 1.826849 | 1.980975 | 2.008523 |
| NWP139627SMS | First of Month MDQ by Transport   | 72.924   | 72.924   | 72.924   | 72.924   |
| NWP139627SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139627SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139627Z3W | Fuel Volume by Transport          | 0.608073 | 0.598254 | 0.639192 | 0.21359  |
| NWP139627Z3W | First of Month MDQ by Transport   | 72.924   | 72.924   | 72.924   | 72.924   |
| NWP139627Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139630ME  | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139630ME  | First of Month MDQ by Transport   | 89.4     | 89.4     | 89.4     | 89.4     |
| NWP139630ME  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139630ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139630Z24 | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139630Z24 | First of Month MDQ by Transport   | 57.876   | 57.876   | 57.876   | 57.876   |
| NWP139630Z24 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139637DC  | Fuel Volume by Transport          | 1.338922 | 3.138913 | 1.56975  | 3.655333 |
| NWP139637DC  | First of Month MDQ by Transport   | 30       | 30       | 30       | 30       |
| NWP139637DC  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139637DC  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139637ME  | Fuel Volume by Transport          | 0        | 0.044082 | 0        | 0.044082 |
| NWP139637ME  | First of Month MDQ by Transport   | 32.856   | 32.856   | 32.856   | 32.856   |
| NWP139637ME  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139637ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139637Z11 | Fuel Volume by Transport          | 3.22E-02 | 3.22E-02 | 3.22E-02 | 3.22E-02 |
| NWP139637Z11 | First of Month MDQ by Transport   | 24.036   | 24.036   | 24.036   | 24.036   |
| NWP139637Z11 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139637Z11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |

| Transport    | Data Item                         | 2032     | 2033     | 2034     | 2035     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP139637Z3W | Fuel Volume by Transport          | 4.02E-02 | 0        | 0        | 0        |
| NWP139637Z3W | First of Month MDQ by Transport   | 30       | 30       | 30       | 30       |
| NWP139637Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140047DC  | Fuel Volume by Transport          | 3.231289 | 3.930771 | 3.959395 | 3.22524  |
| NWP140047DC  | First of Month MDQ by Transport   | 557.736  | 557.736  | 557.736  | 557.736  |
| NWP140047DC  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP140047DC  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140047STN | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| NWP140047Z20 | First of Month MDQ by Transport   | 9.6      | 9.6      | 9.6      | 9.6      |
| NWP140047Z24 | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| NWP140047Z26 | First of Month MDQ by Transport   | 377.736  | 377.736  | 377.736  | 377.736  |
| NWP140047Z3W | Fuel Volume by Transport          | 0        | 0        | 0.413288 | 0        |
| NWP140047Z3W | First of Month MDQ by Transport   | 557.736  | 557.736  | 557.736  | 557.736  |
| NWP140047Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140047ZME | First of Month MDQ by Transport   | 63.336   | 63.336   | 63.336   | 63.336   |
| NWP140748ME  | Fuel Volume by Transport          | 0.284816 | 0.324579 | 0.289525 | 0.46389  |
| NWP140748ME  | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP140748ME  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP140748ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140748Z24 | Fuel Volume by Transport          | 0.599    | 0.663758 | 0.31046  | 0.22144  |
| NWP140748Z24 | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP140748Z24 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140748Z26 | Fuel Volume by Transport          | 9.66E-02 | 0.0483   | 0.3381   | 0        |
| NWP140748Z26 | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP140748Z26 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP143078    | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP143078    | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| NWP143078    | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP143078    | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWPJPIN      | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| NWPJPIN      | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWPPLIN      | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| NWPPLIN      | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWPRLGNTOSTN | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWPSTOSTAN   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| PLOUT        | First of Month MDQ by Transport   | 937.5    | 937.5    | 937.5    | 937.5    |
| PLOUT        | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| ROCKTOSNWPS  | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| RUBY_BND     | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_CHEM    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_GILC    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_KOSMO   | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_LAPI    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_MADR    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_NBEND   | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_PRNG    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |

| Transport    | Data Item                         | 2032     | 2033     | 2034     | 2035     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| RUBY_PRVL    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_REDM    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_Sntp    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_STEA    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY6103600B | First of Month MDQ by Transport   | 90       | 90       | 90       | 90       |
| RUBY6103600B | Rate: D1 by Transport             | 273.75   | 273.75   | 273.75   | 273.75   |
| RUBY6103600B | Rate: Transportation by Transport | 0.12     | 0.12     | 0.12     | 0.12     |
| S100302Z10   | Fuel Volume by Transport          | 1.434867 | 1.59888  | 1.150522 | 0.800363 |
| S100302Z10   | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| S100302Z10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S100302Z11   | Fuel Volume by Transport          | 2.260753 | 1.950885 | 2.000908 | 2.505559 |
| S100302Z11   | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| S100302Z11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S100302Z20   | Fuel Volume by Transport          | 1.356673 | 1.452505 | 1.85084  | 1.672284 |
| S100302Z20   | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| S100302Z20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z10   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S132329Z10   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z11   | Fuel Volume by Transport          | 0        | 8.05E-02 | 0        | 0        |
| S132329Z11   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z20   | Fuel Volume by Transport          | 0        | 0        | 5.32E-02 | 8.05E-02 |
| S132329Z20   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z3S   | Fuel Volume by Transport          | 4.78E-02 | 0        | 2.73E-02 | 0        |
| S132329Z3S   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558P3S   | Fuel Volume by Transport          | 0        | 0        | 2.05E-02 | 0        |
| S135558P3S   | First of Month MDQ by Transport   | 48       | 48       | 48       | 48       |
| S135558P3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S10   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558S10   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S11   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558S11   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S20   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558S20   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558S3S   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139090Z3S   | First of Month MDQ by Transport   | 42.36    | 42.36    | 42.36    | 42.36    |
| S139090Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139382Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |



| Transport    | Data Item                         | 2032     | 2033     | 2034     | 2035     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| S139382Z3S   | First of Month MDQ by Transport   | 74.292   | 74.292   | 74.292   | 74.292   |
| S139382Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139383Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S139383Z3S   | First of Month MDQ by Transport   | 12.6     | 12.6     | 12.6     | 12.6     |
| S139383Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139384Z3S   | First of Month MDQ by Transport   | 39.108   | 39.108   | 39.108   | 39.108   |
| S139384Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139624Z3S   | Fuel Volume by Transport          | 0.280145 | 0.274208 | 0.286902 | 0.239085 |
| S139624Z3S   | First of Month MDQ by Transport   | 42       | 42       | 42       | 42       |
| S139624Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139627Z3S   | Fuel Volume by Transport          | 0.169829 | 0.448103 | 0.253038 | 0.651092 |
| S139627Z3S   | First of Month MDQ by Transport   | 72.924   | 72.924   | 72.924   | 72.924   |
| S139627Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139637Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S139637Z3S   | First of Month MDQ by Transport   | 30       | 30       | 30       | 30       |
| S139637Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140047Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 4.78E-02 |
| S140047Z3S   | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| S140047Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140748Z10   | Fuel Volume by Transport          | 0.484533 | 0.470383 | 0.278843 | 0.347457 |
| S140748Z10   | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| S140748Z10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140748Z11   | Fuel Volume by Transport          | 0.370163 | 0.109709 | 0.186852 | 0.421366 |
| S140748Z11   | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| S140748Z11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140748Z20   | Fuel Volume by Transport          | 0.177388 | 0.37967  | 0.556236 | 0.155847 |
| S140748Z20   | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| S140748Z20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| STAR_TO_NWPN | Fuel Volume by Transport          | 48.75221 | 47.04566 | 48.30641 | 51.35965 |
| STAR_TO_NWPN | First of Month MDQ by Transport   | 324.66   | 324.66   | 324.66   | 324.66   |
| STAR_TO_NWPN | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| STAR_TO_NWPN | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| WCFI2583B00  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| WCFI2583B00  | Rate: D1 by Transport             | 142.6566 | 142.6566 | 142.6566 | 142.6566 |

| Transport | Data Item                         | 2036     | 2037     | 2038     | 2039     |
|-----------|-----------------------------------|----------|----------|----------|----------|
| FTHLS2023 | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| FTHLS2023 | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| FTHLSFS1  | First of Month MDQ by Transport   | 38.01    | 38.01    | 38.01    | 38.01    |
| FTHLSFS1  | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| FTHLSFS2  | First of Month MDQ by Transport   | 37.512   | 37.512   | 37.512   | 37.512   |
| FTHLSFS2  | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| FTHLSFS3  | First of Month MDQ by Transport   | 258.996  | 258.996  | 258.996  | 258.996  |
| FTHLSFS3  | Rate: D1 by Transport             | 24.27283 | 24.27283 | 24.27283 | 24.27283 |
| GTN13687  | Fuel Volume by Transport          | 0.027028 | 2.68E-02 | 2.74E-02 | 3.01E-02 |
| GTN13687  | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| GTN13687  | Rate: D1 by Transport             | 46.99277 | 46.99277 | 46.99277 | 46.99277 |
| GTN13687  | Rate: Transportation by Transport | 6.38E-02 | 6.38E-02 | 6.38E-02 | 6.38E-02 |
| GTN13688  | Fuel Volume by Transport          | 5.51E-03 | 8.19E-03 | 9.33E-03 | 1.03E-02 |
| GTN13688  | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| GTN13688  | Rate: D1 by Transport             | 46.99277 | 46.99277 | 46.99277 | 46.99277 |
| GTN13688  | Rate: Transportation by Transport | 6.38E-02 | 6.38E-02 | 6.38E-02 | 6.38E-02 |
| GTN17019W | Fuel Volume by Transport          | 6.68E-02 | 7.41E-02 | 8.26E-02 | 9.14E-02 |
| GTN17019W | First of Month MDQ by Transport   | 138.696  | 138.696  | 138.696  | 138.696  |
| GTN17019W | Rate: D1 by Transport             | 26.75282 | 26.75282 | 26.75282 | 26.75282 |
| GTN17019W | Rate: Transportation by Transport | 2.08E-02 | 2.08E-02 | 2.08E-02 | 2.08E-02 |
| GTN17021  | Fuel Volume by Transport          | 3.07E-03 | 2.84E-03 | 2.80E-03 | 2.32E-03 |
| GTN17021  | First of Month MDQ by Transport   | 2.4      | 2.4      | 2.4      | 2.4      |
| GTN17021  | Rate: D1 by Transport             | 50.06817 | 50.06817 | 50.06817 | 50.06817 |
| GTN17021  | Rate: Transportation by Transport | 0.052159 | 0.052159 | 0.052159 | 0.052159 |
| GTN17022  | Fuel Volume by Transport          | 2.85E-03 | 3.19E-03 | 2.04E-03 | 2.24E-03 |
| GTN17022  | First of Month MDQ by Transport   | 2.784    | 2.784    | 2.784    | 2.784    |
| GTN17022  | Rate: D1 by Transport             | 51.6523  | 51.6523  | 51.6523  | 51.6523  |
| GTN17022  | Rate: Transportation by Transport | 0.05429  | 0.05429  | 0.05429  | 0.05429  |
| GTN17023  | Fuel Volume by Transport          | 2.67E-02 | 3.62E-02 | 1.61E-02 | 1.48E-02 |
| GTN17023  | First of Month MDQ by Transport   | 26.591   | 26.591   | 26.591   | 26.591   |
| GTN17023  | Rate: D1 by Transport             | 69.83419 | 69.83419 | 69.83419 | 69.83419 |
| GTN17023  | Rate: Transportation by Transport | 7.88E-02 | 7.88E-02 | 7.88E-02 | 7.88E-02 |
| GTN17025  | Fuel Volume by Transport          | 4.07E-02 | 4.56E-02 | 3.29E-02 | 2.64E-02 |
| GTN17025  | First of Month MDQ by Transport   | 39.943   | 39.943   | 39.943   | 39.943   |
| GTN17025  | Rate: D1 by Transport             | 72.20897 | 72.20897 | 72.20897 | 72.20897 |
| GTN17025  | Rate: Transportation by Transport | 0.081965 | 0.081965 | 0.081965 | 0.081965 |
| GTN17026  | Fuel Volume by Transport          | 3.80E-02 | 3.73E-02 | 3.24E-02 | 3.24E-02 |
| GTN17026  | First of Month MDQ by Transport   | 36.118   | 36.118   | 36.118   | 36.118   |
| GTN17026  | Rate: D1 by Transport             | 73.85019 | 73.85019 | 73.85019 | 73.85019 |
| GTN17026  | Rate: Transportation by Transport | 8.42E-02 | 8.42E-02 | 8.42E-02 | 8.42E-02 |
| GTN17028  | Fuel Volume by Transport          | 0.108797 | 0.101339 | 0.130841 | 0.111501 |
| GTN17028  | First of Month MDQ by Transport   | 127.809  | 127.809  | 127.809  | 127.809  |
| GTN17028  | Rate: D1 by Transport             | 76.16361 | 76.16361 | 76.16361 | 76.16361 |
| GTN17028  | Rate: Transportation by Transport | 8.73E-02 | 8.73E-02 | 8.73E-02 | 8.73E-02 |
| GTN17031  | Fuel Volume by Transport          | 0.021772 | 2.68E-02 | 2.00E-02 | 2.47E-02 |
| GTN17031  | First of Month MDQ by Transport   | 32.473   | 32.473   | 32.473   | 32.473   |

| Transport    | Data Item                         | 2036     | 2037     | 2038     | 2039     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| GTN17031     | Rate: D1 by Transport             | 78.25866 | 78.25866 | 78.25866 | 78.25866 |
| GTN17031     | Rate: Transportation by Transport | 9.01E-02 | 9.01E-02 | 9.01E-02 | 9.01E-02 |
| GTN17033     | Fuel Volume by Transport          | 3.24E-04 | 3.20E-04 | 3.62E-04 | 3.44E-04 |
| GTN17033     | First of Month MDQ by Transport   | 0.54     | 0.54     | 0.54     | 0.54     |
| GTN17033     | Rate: D1 by Transport             | 80.358   | 80.358   | 80.358   | 80.358   |
| GTN17033     | Rate: Transportation by Transport | 9.29E-02 | 9.29E-02 | 9.29E-02 | 9.29E-02 |
| GTN17034     | Fuel Volume by Transport          | 2.45E-03 | 3.08E-03 | 3.76E-03 | 3.24E-03 |
| GTN17034     | First of Month MDQ by Transport   | 4.996    | 4.996    | 4.996    | 4.996    |
| GTN17034     | Rate: D1 by Transport             | 82.79414 | 82.79414 | 82.79414 | 82.79414 |
| GTN17034     | Rate: Transportation by Transport | 0.096186 | 0.096186 | 0.096186 | 0.096186 |
| GTN17036     | Fuel Volume by Transport          | 5.06E-04 | 6.38E-04 | 2.21E-04 | 4.84E-04 |
| GTN17036     | First of Month MDQ by Transport   | 0.9      | 0.9      | 0.9      | 0.9      |
| GTN17036     | Rate: D1 by Transport             | 85.43009 | 85.43009 | 85.43009 | 85.43009 |
| GTN17036     | Rate: Transportation by Transport | 9.97E-02 | 9.97E-02 | 9.97E-02 | 9.97E-02 |
| GTN17037     | Fuel Volume by Transport          | 6.01E-02 | 3.42E-02 | 0.03303  | 4.27E-02 |
| GTN17037     | First of Month MDQ by Transport   | 122.28   | 122.28   | 122.28   | 122.28   |
| GTN17037     | Rate: D1 by Transport             | 98.70544 | 98.70544 | 98.70544 | 98.70544 |
| GTN17037     | Rate: Transportation by Transport | 0.117592 | 0.117592 | 0.117592 | 0.117592 |
| GTN18507     | Fuel Volume by Transport          | 2.75E-02 | 0.030363 | 1.58E-02 | 3.25E-02 |
| GTN18507     | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| GTN18507     | Rate: D1 by Transport             | 98.70544 | 98.70544 | 98.70544 | 98.70544 |
| GTN18507     | Rate: Transportation by Transport | 0.117592 | 0.117592 | 0.117592 | 0.117592 |
| GTN2023      | Fuel Volume by Transport          | 1.37E-02 | 2.46E-02 | 5.89E-02 | 5.61E-02 |
| GTN2023      | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023      | Rate: D1 by Transport             | 98.70544 | 98.70544 | 98.70544 | 98.70544 |
| GTN2023      | Rate: Transportation by Transport | 0.117592 | 0.117592 | 0.117592 | 0.117592 |
| GTN2023BND   | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023CHEM  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023GILC  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023KOSMO | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023LAPI  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023MADR  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023NBEND | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023PRNG  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023PRVL  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023REDM  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023SNTP  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTN2023STEAM | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| GTNSTANBND   | First of Month MDQ by Transport   | 352.489  | 352.489  | 352.489  | 352.489  |
| GTNSTANCHEM  | First of Month MDQ by Transport   | 225.58   | 225.58   | 225.58   | 225.58   |
| GTNSTANGILC  | First of Month MDQ by Transport   | 229.676  | 229.676  | 229.676  | 229.676  |
| GTNSTANKOSMO | First of Month MDQ by Transport   | 206.32   | 206.32   | 206.32   | 206.32   |
| GTNSTANLAPI  | First of Month MDQ by Transport   | 225.22   | 225.22   | 225.22   | 225.22   |
| GTNSTANMADR  | First of Month MDQ by Transport   | 251.271  | 251.271  | 251.271  | 251.271  |
| GTNSTANNBEND | First of Month MDQ by Transport   | 224.68   | 224.68   | 224.68   | 224.68   |
| GTNSTANPRNG  | First of Month MDQ by Transport   | 224.68   | 224.68   | 224.68   | 224.68   |

| Transport    | Data Item                         | 2036     | 2037     | 2038     | 2039     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| GTNSTANPRVL  | First of Month MDQ by Transport   | 264.623  | 264.623  | 264.623  | 264.623  |
| GTNSTANREDM  | First of Month MDQ by Transport   | 260.798  | 260.798  | 260.798  | 260.798  |
| GTNSTANSNTP  | First of Month MDQ by Transport   | 224.68   | 224.68   | 224.68   | 224.68   |
| GTNSTANSTEA  | First of Month MDQ by Transport   | 257.153  | 257.153  | 257.153  | 257.153  |
| HUNT_TO_NWPN | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| JPOUT        | First of Month MDQ by Transport   | 676.392  | 676.392  | 676.392  | 676.392  |
| MDDOSMSSPLOP | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| MDDOSTN2STAN | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTO24  | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTO26  | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTO30W | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOSTNTOME  | First of Month MDQ by Transport   | 166.08   | 166.08   | 166.08   | 166.08   |
| MDDOZ10      | First of Month MDQ by Transport   | 189.048  | 189.048  | 189.048  | 189.048  |
| MDDOZ11      | First of Month MDQ by Transport   | 380.484  | 380.484  | 380.484  | 380.484  |
| MDDOZ20      | First of Month MDQ by Transport   | 674.436  | 674.436  | 674.436  | 674.436  |
| MDDOZ24      | First of Month MDQ by Transport   | 170.964  | 170.964  | 170.964  | 170.964  |
| MDDOZ26      | First of Month MDQ by Transport   | 369.6    | 369.6    | 369.6    | 369.6    |
| MDDOZ3S      | First of Month MDQ by Transport   | 498.024  | 498.024  | 498.024  | 498.024  |
| MDDOZ3W      | First of Month MDQ by Transport   | 754.272  | 754.272  | 754.272  | 754.272  |
| MDDOZME      | First of Month MDQ by Transport   | 434.94   | 434.94   | 434.94   | 434.94   |
| NOVA20030393 | First of Month MDQ by Transport   | 263.676  | 263.676  | 263.676  | 263.676  |
| NOVA20030393 | Rate: D1 by Transport             | 46.4653  | 46.4653  | 46.4653  | 46.4653  |
| NOVA2023     | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| NOVA2023     | Rate: D1 by Transport             | 46.4653  | 46.4653  | 46.4653  | 46.4653  |
| NWP100002N   | Fuel Volume by Transport          | 5.354595 | 5.641674 | 6.562315 | 8.200427 |
| NWP100002N   | First of Month MDQ by Transport   | 1065.732 | 1065.732 | 1065.732 | 1065.732 |
| NWP100002N   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100002N   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100002S   | Fuel Volume by Transport          | 288.9327 | 289.3388 | 286.5834 | 287.2744 |
| NWP100002S   | First of Month MDQ by Transport   | 1059.084 | 1059.084 | 1059.084 | 1059.084 |
| NWP100002S   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100002S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100002STN | Fuel Volume by Transport          | 1.4812   | 1.423191 | 1.189159 | 0.1932   |
| NWP100002STN | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP100002STN | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100002STN | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134N11 | Fuel Volume by Transport          | 4.03E-04 | 4.03E-04 | 0        | 4.03E-04 |
| NWP100134N11 | First of Month MDQ by Transport   | 0.3      | 0.3      | 0.3      | 0.3      |
| NWP100134N11 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134N11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134N20 | Fuel Volume by Transport          | 0        | 1.61E-03 | 0        | 1.61E-03 |
| NWP100134N20 | First of Month MDQ by Transport   | 1.2      | 1.2      | 1.2      | 1.2      |
| NWP100134N20 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134N20 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134N3S | Fuel Volume by Transport          | 0        | 6.44E-04 | 0        | 6.44E-04 |
| NWP100134N3S | First of Month MDQ by Transport   | 0.48     | 0.48     | 0.48     | 0.48     |

| Transport    | Data Item                         | 2036     | 2037     | 2038     | 2039     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP100134N3S | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134N3S | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134S11 | Fuel Volume by Transport          | 4.07E-02 | 4.03E-02 | 4.03E-02 | 4.03E-02 |
| NWP100134S11 | First of Month MDQ by Transport   | 0.3      | 0.3      | 0.3      | 0.3      |
| NWP100134S11 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134S11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134S20 | Fuel Volume by Transport          | 0.16261  | 0.161    | 0.161    | 0.161    |
| NWP100134S20 | First of Month MDQ by Transport   | 1.2      | 1.2      | 1.2      | 1.2      |
| NWP100134S20 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134S20 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100134S3S | Fuel Volume by Transport          | 6.50E-02 | 6.44E-02 | 6.44E-02 | 6.44E-02 |
| NWP100134S3S | First of Month MDQ by Transport   | 0.48     | 0.48     | 0.48     | 0.48     |
| NWP100134S3S | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100134S3S | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100149N   | Fuel Volume by Transport          | 0        | 0        | 7.08E-04 | 7.08E-04 |
| NWP100149N   | First of Month MDQ by Transport   | 0.528    | 0.528    | 0.528    | 0.528    |
| NWP100149N   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100149N   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100149S   | Fuel Volume by Transport          | 0.050409 | 4.99E-02 | 4.99E-02 | 4.99E-02 |
| NWP100149S   | First of Month MDQ by Transport   | 0.372    | 0.372    | 0.372    | 0.372    |
| NWP100149S   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100149S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100150N   | Fuel Volume by Transport          | 1.50E-03 | 1.50E-03 | 0        | 1.50E-03 |
| NWP100150N   | First of Month MDQ by Transport   | 1.116    | 1.116    | 1.116    | 1.116    |
| NWP100150N   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100150N   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100150S   | Fuel Volume by Transport          | 0.108949 | 0.10787  | 0.10787  | 0.10787  |
| NWP100150S   | First of Month MDQ by Transport   | 0.804    | 0.804    | 0.804    | 0.804    |
| NWP100150S   | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP100150S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP10030226B | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| NWP10030226B | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP10030226B | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302ME  | Fuel Volume by Transport          | 0.689434 | 0.552549 | 0.300849 | 0.522268 |
| NWP100302ME  | First of Month MDQ by Transport   | 50.136   | 50.136   | 50.136   | 50.136   |
| NWP100302ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302MEB | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| NWP100302MEB | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302SMS | Fuel Volume by Transport          | 5.829079 | 6.822687 | 7.013797 | 6.440673 |
| NWP100302SMS | First of Month MDQ by Transport   | 126.024  | 126.024  | 126.024  | 126.024  |
| NWP100302SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302STN | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| NWP100302STN | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z10 | Fuel Volume by Transport          | 0.196791 | 0.103145 | 7.57E-02 | 0.198239 |
| NWP100302Z10 | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP100302Z10 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |

| Transport    | Data Item                         | 2036     | 2037     | 2038     | 2039     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP100302Z11 | Fuel Volume by Transport          | 1.079337 | 0.782128 | 0.583107 | 0.602562 |
| NWP100302Z11 | First of Month MDQ by Transport   | 71.688   | 71.688   | 71.688   | 71.688   |
| NWP100302Z11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z20 | Fuel Volume by Transport          | 0.751009 | 0.731086 | 0.495298 | 0.738344 |
| NWP100302Z20 | First of Month MDQ by Transport   | 77.472   | 77.472   | 77.472   | 77.472   |
| NWP100302Z20 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z24 | Fuel Volume by Transport          | 0.141392 | 0.159996 | 0.108252 | 8.92E-02 |
| NWP100302Z24 | First of Month MDQ by Transport   | 11.292   | 11.292   | 11.292   | 11.292   |
| NWP100302Z24 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z26 | First of Month MDQ by Transport   | 25.788   | 25.788   | 25.788   | 25.788   |
| NWP100302Z26 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z35 | Fuel Volume by Transport          | 0.820129 | 0.313781 | 0.651164 | 0.623235 |
| NWP100302Z35 | First of Month MDQ by Transport   | 62.376   | 62.376   | 62.376   | 62.376   |
| NWP100302Z35 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP100302Z3W | Fuel Volume by Transport          | 0.22288  | 0.264679 | 0.501851 | 0.515484 |
| NWP100302Z3W | First of Month MDQ by Transport   | 126.024  | 126.024  | 126.024  | 126.024  |
| NWP100302Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090B3S | Fuel Volume by Transport          | 2.67E-02 | 3.86E-02 | 4.34E-02 | 4.53E-02 |
| NWP139090B3S | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| NWP139090B3S | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139090B3S | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090B3W | Fuel Volume by Transport          | 2.12E-02 | 0.048426 | 0        | 0        |
| NWP139090B3W | First of Month MDQ by Transport   | 324.756  | 324.756  | 324.756  | 324.756  |
| NWP139090B3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090DC  | Fuel Volume by Transport          | 1.97312  | 1.220306 | 4.225981 | 2.853086 |
| NWP139090DC  | First of Month MDQ by Transport   | 324.756  | 324.756  | 324.756  | 324.756  |
| NWP139090DC  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090ME  | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139090ME  | First of Month MDQ by Transport   | 73.92    | 73.92    | 73.92    | 73.92    |
| NWP139090ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090Z10 | Fuel Volume by Transport          | 0        | 4.67E-04 | 0        | 0        |
| NWP139090Z10 | First of Month MDQ by Transport   | 0.348    | 0.348    | 0.348    | 0.348    |
| NWP139090Z10 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090Z11 | Fuel Volume by Transport          | 0        | 4.99E-03 | 4.99E-03 | 0        |
| NWP139090Z11 | First of Month MDQ by Transport   | 3.72     | 3.72     | 3.72     | 3.72     |
| NWP139090Z11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139090Z26 | First of Month MDQ by Transport   | 107.868  | 107.868  | 107.868  | 107.868  |
| NWP139090Z26 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139382SMS | Fuel Volume by Transport          | 8.295976 | 7.27994  | 5.65819  | 6.807093 |
| NWP139382SMS | First of Month MDQ by Transport   | 74.292   | 74.292   | 74.292   | 74.292   |
| NWP139382SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139382SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139382W   | Fuel Volume by Transport          | 0        | 0        | 0        | 9.97E-02 |
| NWP139382W   | First of Month MDQ by Transport   | 74.292   | 74.292   | 74.292   | 74.292   |
| NWP139382W   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139383SMS | Fuel Volume by Transport          | 1.755253 | 1.527614 | 0.794535 | 0.979217 |

| Transport    | Data Item                         | 2036     | 2037     | 2038     | 2039     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP139383SMS | First of Month MDQ by Transport   | 12.6     | 12.6     | 12.6     | 12.6     |
| NWP139383SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139383SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139383W   | Fuel Volume by Transport          | 0        | 0        | 0        | 1.69E-02 |
| NWP139383W   | First of Month MDQ by Transport   | 12.6     | 12.6     | 12.6     | 12.6     |
| NWP139383W   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139384SMS | Fuel Volume by Transport          | 4.331967 | 3.175155 | 4.095831 | 2.514629 |
| NWP139384SMS | First of Month MDQ by Transport   | 39.108   | 39.108   | 39.108   | 39.108   |
| NWP139384SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139384SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139384W   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139384W   | First of Month MDQ by Transport   | 39.108   | 39.108   | 39.108   | 39.108   |
| NWP139384W   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139624SMS | Fuel Volume by Transport          | 0.962385 | 1.069072 | 1.265427 | 0.948803 |
| NWP139624SMS | First of Month MDQ by Transport   | 42       | 42       | 42       | 42       |
| NWP139624SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139624SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139624Z3W | Fuel Volume by Transport          | 0.666298 | 0.346633 | 0.307993 | 0.175102 |
| NWP139624Z3W | First of Month MDQ by Transport   | 42       | 42       | 42       | 42       |
| NWP139624Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139627SMS | Fuel Volume by Transport          | 2.322193 | 2.282716 | 1.932441 | 2.531669 |
| NWP139627SMS | First of Month MDQ by Transport   | 72.924   | 72.924   | 72.924   | 72.924   |
| NWP139627SMS | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139627SMS | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139627Z3W | Fuel Volume by Transport          | 0.407562 | 0.399222 | 0.430793 | 0.233918 |
| NWP139627Z3W | First of Month MDQ by Transport   | 72.924   | 72.924   | 72.924   | 72.924   |
| NWP139627Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139630ME  | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139630ME  | First of Month MDQ by Transport   | 89.4     | 89.4     | 89.4     | 89.4     |
| NWP139630ME  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139630ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139630Z24 | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP139630Z24 | First of Month MDQ by Transport   | 57.876   | 57.876   | 57.876   | 57.876   |
| NWP139630Z24 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139637DC  | Fuel Volume by Transport          | 1.770181 | 2.425665 | 1.297882 | 0.776193 |
| NWP139637DC  | First of Month MDQ by Transport   | 30       | 30       | 30       | 30       |
| NWP139637DC  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139637DC  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139637ME  | Fuel Volume by Transport          | 0        | 0.044082 | 0        | 0.044082 |
| NWP139637ME  | First of Month MDQ by Transport   | 32.856   | 32.856   | 32.856   | 32.856   |
| NWP139637ME  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139637ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP139637Z11 | Fuel Volume by Transport          | 1.91E-02 | 3.22E-02 | 0        | 3.22E-02 |
| NWP139637Z11 | First of Month MDQ by Transport   | 24.036   | 24.036   | 24.036   | 24.036   |
| NWP139637Z11 | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP139637Z11 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |

| Transport    | Data Item                         | 2036     | 2037     | 2038     | 2039     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| NWP139637Z3W | Fuel Volume by Transport          | 0        | 4.02E-02 | 0        | 0        |
| NWP139637Z3W | First of Month MDQ by Transport   | 30       | 30       | 30       | 30       |
| NWP139637Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140047DC  | Fuel Volume by Transport          | 1.323677 | 3.035771 | 2.601039 | 5.175523 |
| NWP140047DC  | First of Month MDQ by Transport   | 557.736  | 557.736  | 557.736  | 557.736  |
| NWP140047DC  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP140047DC  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140047STN | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| NWP140047Z20 | First of Month MDQ by Transport   | 9.6      | 9.6      | 9.6      | 9.6      |
| NWP140047Z24 | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| NWP140047Z26 | First of Month MDQ by Transport   | 377.736  | 377.736  | 377.736  | 377.736  |
| NWP140047Z3W | Fuel Volume by Transport          | 0.402395 | 0        | 0.347096 | 0        |
| NWP140047Z3W | First of Month MDQ by Transport   | 557.736  | 557.736  | 557.736  | 557.736  |
| NWP140047Z3W | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140047ZME | First of Month MDQ by Transport   | 63.336   | 63.336   | 63.336   | 63.336   |
| NWP140748ME  | Fuel Volume by Transport          | 0.208833 | 0.248634 | 0.241111 | 0.301965 |
| NWP140748ME  | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP140748ME  | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP140748ME  | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140748Z24 | Fuel Volume by Transport          | 0.294466 | 0.155257 | 0.213975 | 0.197876 |
| NWP140748Z24 | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP140748Z24 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP140748Z26 | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP140748Z26 | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWP140748Z26 | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWP143078    | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| NWP143078    | First of Month MDQ by Transport   | 120      | 120      | 120      | 120      |
| NWP143078    | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| NWP143078    | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWPJPIN      | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| NWPJPIN      | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWPPLIN      | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| NWPPLIN      | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| NWPRLGNTOSTN | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| NWPSTOSTAN   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| PLOUT        | First of Month MDQ by Transport   | 937.5    | 937.5    | 937.5    | 937.5    |
| PLOUT        | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| ROCKTOSNWPS  | First of Month MDQ by Transport   | 1200     | 1200     | 1200     | 1200     |
| RUBY_BND     | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_CHEM    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_GILC    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_KOSMO   | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_LAPI    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_MADR    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_NBEND   | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_PRNG    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |



| Transport    | Data Item                         | 2036     | 2037     | 2038     | 2039     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| RUBY_PRVL    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_REDM    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_SNTF    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY_STEA    | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| RUBY6103600B | First of Month MDQ by Transport   | 90       | 90       | 90       | 90       |
| RUBY6103600B | Rate: D1 by Transport             | 273.75   | 273.75   | 273.75   | 273.75   |
| RUBY6103600B | Rate: Transportation by Transport | 0.12     | 0.12     | 0.12     | 0.12     |
| S100302Z10   | Fuel Volume by Transport          | 1.26606  | 1.245106 | 1.506088 | 1.047764 |
| S100302Z10   | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| S100302Z10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S100302Z11   | Fuel Volume by Transport          | 2.138816 | 2.041117 | 1.398557 | 1.500586 |
| S100302Z11   | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| S100302Z11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S100302Z20   | Fuel Volume by Transport          | 1.315368 | 1.478797 | 1.759468 | 1.582594 |
| S100302Z20   | First of Month MDQ by Transport   | 37.284   | 37.284   | 37.284   | 37.284   |
| S100302Z20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z10   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S132329Z10   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z11   | Fuel Volume by Transport          | 0        | 0.013159 | 0        | 0        |
| S132329Z11   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z20   | Fuel Volume by Transport          | 8.05E-02 | 6.73E-02 | 8.05E-02 | 8.05E-02 |
| S132329Z20   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S132329Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S132329Z3S   | First of Month MDQ by Transport   | 60       | 60       | 60       | 60       |
| S132329Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558P3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558P3S   | First of Month MDQ by Transport   | 48       | 48       | 48       | 48       |
| S135558P3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S10   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558S10   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S11   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558S11   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S20   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558S20   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S135558S3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S135558S3S   | First of Month MDQ by Transport   | 256.8    | 256.8    | 256.8    | 256.8    |
| S135558S3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139090Z3S   | First of Month MDQ by Transport   | 42.36    | 42.36    | 42.36    | 42.36    |
| S139090Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139382Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |

| Transport    | Data Item                         | 2036     | 2037     | 2038     | 2039     |
|--------------|-----------------------------------|----------|----------|----------|----------|
| S139382Z3S   | First of Month MDQ by Transport   | 74.292   | 74.292   | 74.292   | 74.292   |
| S139382Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139383Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S139383Z3S   | First of Month MDQ by Transport   | 12.6     | 12.6     | 12.6     | 12.6     |
| S139383Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139384Z3S   | First of Month MDQ by Transport   | 39.108   | 39.108   | 39.108   | 39.108   |
| S139384Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139624Z3S   | Fuel Volume by Transport          | 2.61E-02 | 0.239085 | 8.14E-02 | 0.530885 |
| S139624Z3S   | First of Month MDQ by Transport   | 42       | 42       | 42       | 42       |
| S139624Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139627Z3S   | Fuel Volume by Transport          | 0.143451 | 0.191268 | 0.509973 | 0.107619 |
| S139627Z3S   | First of Month MDQ by Transport   | 72.924   | 72.924   | 72.924   | 72.924   |
| S139627Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S139637Z3S   | Fuel Volume by Transport          | 0        | 0        | 0        | 0        |
| S139637Z3S   | First of Month MDQ by Transport   | 30       | 30       | 30       | 30       |
| S139637Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140047Z3S   | Fuel Volume by Transport          | 0        | 4.78E-02 | 0        | 0        |
| S140047Z3S   | First of Month MDQ by Transport   | 180      | 180      | 180      | 180      |
| S140047Z3S   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140748Z10   | Fuel Volume by Transport          | 0.448464 | 0.406789 | 0.335879 | 0.322    |
| S140748Z10   | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| S140748Z10   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140748Z11   | Fuel Volume by Transport          | 0.180222 | 0.54172  | 0.513135 | 0.256575 |
| S140748Z11   | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| S140748Z11   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| S140748Z20   | Fuel Volume by Transport          | 0.494116 | 0.2576   | 0.3059   | 0.531584 |
| S140748Z20   | First of Month MDQ by Transport   | 12       | 12       | 12       | 12       |
| S140748Z20   | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| STAR_TO_NWPN | Fuel Volume by Transport          | 60.38127 | 62.06105 | 66.01116 | 67.48381 |
| STAR_TO_NWPN | First of Month MDQ by Transport   | 324.66   | 324.66   | 324.66   | 324.66   |
| STAR_TO_NWPN | Rate: D1 by Transport             | 142.4705 | 142.4705 | 142.4705 | 142.4705 |
| STAR_TO_NWPN | Rate: Transportation by Transport | 9.98E-02 | 9.98E-02 | 9.98E-02 | 9.98E-02 |
| WCFI2583B00  | First of Month MDQ by Transport   | 240      | 240      | 240      | 240      |
| WCFI2583B00  | Rate: D1 by Transport             | 142.6566 | 142.6566 | 142.6566 | 142.6566 |

|           |                                   |          |
|-----------|-----------------------------------|----------|
| Transport | Data Item                         | 2040     |
| FTHLS2023 | First of Month MDQ by Transport   | 120      |
| FTHLS2023 | Rate: D1 by Transport             | 24.27283 |
| FTHLSFS1  | First of Month MDQ by Transport   | 38.01    |
| FTHLSFS1  | Rate: D1 by Transport             | 24.27283 |
| FTHLSFS2  | First of Month MDQ by Transport   | 37.512   |
| FTHLSFS2  | Rate: D1 by Transport             | 24.27283 |
| FTHLSFS3  | First of Month MDQ by Transport   | 258.996  |
| FTHLSFS3  | Rate: D1 by Transport             | 24.27283 |
| GTN13687  | Fuel Volume by Transport          | 3.82E-02 |
| GTN13687  | First of Month MDQ by Transport   | 120      |
| GTN13687  | Rate: D1 by Transport             | 46.99277 |
| GTN13687  | Rate: Transportation by Transport | 6.38E-02 |
| GTN13688  | Fuel Volume by Transport          | 4.26E-03 |
| GTN13688  | First of Month MDQ by Transport   | 60       |
| GTN13688  | Rate: D1 by Transport             | 46.99277 |
| GTN13688  | Rate: Transportation by Transport | 6.38E-02 |
| GTN17019W | Fuel Volume by Transport          | 7.58E-02 |
| GTN17019W | First of Month MDQ by Transport   | 138.696  |
| GTN17019W | Rate: D1 by Transport             | 26.75282 |
| GTN17019W | Rate: Transportation by Transport | 2.08E-02 |
| GTN17021  | Fuel Volume by Transport          | 2.98E-03 |
| GTN17021  | First of Month MDQ by Transport   | 2.4      |
| GTN17021  | Rate: D1 by Transport             | 50.06817 |
| GTN17021  | Rate: Transportation by Transport | 0.052159 |
| GTN17022  | Fuel Volume by Transport          | 2.84E-03 |
| GTN17022  | First of Month MDQ by Transport   | 2.784    |
| GTN17022  | Rate: D1 by Transport             | 51.6523  |
| GTN17022  | Rate: Transportation by Transport | 0.05429  |
| GTN17023  | Fuel Volume by Transport          | 2.77E-02 |
| GTN17023  | First of Month MDQ by Transport   | 26.591   |
| GTN17023  | Rate: D1 by Transport             | 69.83419 |
| GTN17023  | Rate: Transportation by Transport | 7.88E-02 |
| GTN17025  | Fuel Volume by Transport          | 4.51E-02 |
| GTN17025  | First of Month MDQ by Transport   | 39.943   |
| GTN17025  | Rate: D1 by Transport             | 72.20897 |
| GTN17025  | Rate: Transportation by Transport | 0.081965 |
| GTN17026  | Fuel Volume by Transport          | 2.14E-02 |
| GTN17026  | First of Month MDQ by Transport   | 36.118   |
| GTN17026  | Rate: D1 by Transport             | 73.85019 |
| GTN17026  | Rate: Transportation by Transport | 8.42E-02 |
| GTN17028  | Fuel Volume by Transport          | 9.63E-02 |
| GTN17028  | First of Month MDQ by Transport   | 127.809  |
| GTN17028  | Rate: D1 by Transport             | 76.16361 |
| GTN17028  | Rate: Transportation by Transport | 8.73E-02 |
| GTN17031  | Fuel Volume by Transport          | 2.63E-02 |
| GTN17031  | First of Month MDQ by Transport   | 32.473   |

|              |                                   |          |
|--------------|-----------------------------------|----------|
| Transport    | Data Item                         | 2040     |
| GTN17031     | Rate: D1 by Transport             | 78.25866 |
| GTN17031     | Rate: Transportation by Transport | 9.01E-02 |
| GTN17033     | Fuel Volume by Transport          | 3.26E-04 |
| GTN17033     | First of Month MDQ by Transport   | 0.54     |
| GTN17033     | Rate: D1 by Transport             | 80.358   |
| GTN17033     | Rate: Transportation by Transport | 9.29E-02 |
| GTN17034     | Fuel Volume by Transport          | 2.68E-03 |
| GTN17034     | First of Month MDQ by Transport   | 4.996    |
| GTN17034     | Rate: D1 by Transport             | 82.79414 |
| GTN17034     | Rate: Transportation by Transport | 0.096186 |
| GTN17036     | Fuel Volume by Transport          | 4.87E-04 |
| GTN17036     | First of Month MDQ by Transport   | 0.9      |
| GTN17036     | Rate: D1 by Transport             | 85.43009 |
| GTN17036     | Rate: Transportation by Transport | 9.97E-02 |
| GTN17037     | Fuel Volume by Transport          | 3.92E-02 |
| GTN17037     | First of Month MDQ by Transport   | 122.28   |
| GTN17037     | Rate: D1 by Transport             | 98.70544 |
| GTN17037     | Rate: Transportation by Transport | 0.117592 |
| GTN18507     | Fuel Volume by Transport          | 2.18E-02 |
| GTN18507     | First of Month MDQ by Transport   | 120      |
| GTN18507     | Rate: D1 by Transport             | 98.70544 |
| GTN18507     | Rate: Transportation by Transport | 0.117592 |
| GTN2023      | Fuel Volume by Transport          | 6.58E-02 |
| GTN2023      | First of Month MDQ by Transport   | 240      |
| GTN2023      | Rate: D1 by Transport             | 98.70544 |
| GTN2023      | Rate: Transportation by Transport | 0.117592 |
| GTN2023BND   | First of Month MDQ by Transport   | 240      |
| GTN2023CHEM  | First of Month MDQ by Transport   | 240      |
| GTN2023GILC  | First of Month MDQ by Transport   | 240      |
| GTN2023KOSMO | First of Month MDQ by Transport   | 240      |
| GTN2023LAPI  | First of Month MDQ by Transport   | 240      |
| GTN2023MADR  | First of Month MDQ by Transport   | 240      |
| GTN2023NBEND | First of Month MDQ by Transport   | 240      |
| GTN2023PRNG  | First of Month MDQ by Transport   | 240      |
| GTN2023PRVL  | First of Month MDQ by Transport   | 240      |
| GTN2023REDM  | First of Month MDQ by Transport   | 240      |
| GTN2023SNTP  | First of Month MDQ by Transport   | 240      |
| GTN2023STEA  | First of Month MDQ by Transport   | 240      |
| GTNSTANBND   | First of Month MDQ by Transport   | 352.489  |
| GTNSTANCHEM  | First of Month MDQ by Transport   | 225.58   |
| GTNSTANGILC  | First of Month MDQ by Transport   | 229.676  |
| GTNSTANKOSMO | First of Month MDQ by Transport   | 206.32   |
| GTNSTANLAPI  | First of Month MDQ by Transport   | 225.22   |
| GTNSTANMADR  | First of Month MDQ by Transport   | 251.271  |
| GTNSTANNBEND | First of Month MDQ by Transport   | 224.68   |
| GTNSTANPRNG  | First of Month MDQ by Transport   | 224.68   |

| Transport    | Data Item                         | 2040     |
|--------------|-----------------------------------|----------|
| GTNSTANPRVL  | First of Month MDQ by Transport   | 264.623  |
| GTNSTANREDM  | First of Month MDQ by Transport   | 260.798  |
| GTNSTANSNTP  | First of Month MDQ by Transport   | 224.68   |
| GTNSTANSTEA  | First of Month MDQ by Transport   | 257.153  |
| HUNT_TO_NWPN | First of Month MDQ by Transport   | 1200     |
| JPOUT        | First of Month MDQ by Transport   | 676.392  |
| MDDOSMSSPLOP | First of Month MDQ by Transport   | 120      |
| MDDOSTN2STAN | First of Month MDQ by Transport   | 166.08   |
| MDDOSTNTO24  | First of Month MDQ by Transport   | 166.08   |
| MDDOSTNTO26  | First of Month MDQ by Transport   | 166.08   |
| MDDOSTNTO30W | First of Month MDQ by Transport   | 166.08   |
| MDDOSTNTOME  | First of Month MDQ by Transport   | 166.08   |
| MDDOZ10      | First of Month MDQ by Transport   | 189.048  |
| MDDOZ11      | First of Month MDQ by Transport   | 380.484  |
| MDDOZ20      | First of Month MDQ by Transport   | 674.436  |
| MDDOZ24      | First of Month MDQ by Transport   | 170.964  |
| MDDOZ26      | First of Month MDQ by Transport   | 369.6    |
| MDDOZ3S      | First of Month MDQ by Transport   | 498.024  |
| MDDOZ3W      | First of Month MDQ by Transport   | 754.272  |
| MDDOZME      | First of Month MDQ by Transport   | 434.94   |
| NOVA20030393 | First of Month MDQ by Transport   | 263.676  |
| NOVA20030393 | Rate: D1 by Transport             | 46.4653  |
| NOVA2023     | First of Month MDQ by Transport   | 240      |
| NOVA2023     | Rate: D1 by Transport             | 46.4653  |
| NWP100002N   | Fuel Volume by Transport          | 28.60443 |
| NWP100002N   | First of Month MDQ by Transport   | 1065.732 |
| NWP100002N   | Rate: D1 by Transport             | 142.4705 |
| NWP100002N   | Rate: Transportation by Transport | 9.98E-02 |
| NWP100002S   | Fuel Volume by Transport          | 201.783  |
| NWP100002S   | First of Month MDQ by Transport   | 1059.084 |
| NWP100002S   | Rate: D1 by Transport             | 142.4705 |
| NWP100002S   | Rate: Transportation by Transport | 9.98E-02 |
| NWP100002STN | Fuel Volume by Transport          | 1.60E-02 |
| NWP100002STN | First of Month MDQ by Transport   | 12       |
| NWP100002STN | Rate: D1 by Transport             | 142.4705 |
| NWP100002STN | Rate: Transportation by Transport | 9.98E-02 |
| NWP100134N11 | Fuel Volume by Transport          | 4.03E-04 |
| NWP100134N11 | First of Month MDQ by Transport   | 0.3      |
| NWP100134N11 | Rate: D1 by Transport             | 142.4705 |
| NWP100134N11 | Rate: Transportation by Transport | 9.98E-02 |
| NWP100134N20 | Fuel Volume by Transport          | 1.61E-03 |
| NWP100134N20 | First of Month MDQ by Transport   | 1.2      |
| NWP100134N20 | Rate: D1 by Transport             | 142.4705 |
| NWP100134N20 | Rate: Transportation by Transport | 9.98E-02 |
| NWP100134N3S | Fuel Volume by Transport          | 6.44E-04 |
| NWP100134N3S | First of Month MDQ by Transport   | 0.48     |

| Transport    | Data Item                         | 2040     |
|--------------|-----------------------------------|----------|
| NWP100134N3S | Rate: D1 by Transport             | 142.4705 |
| NWP100134N3S | Rate: Transportation by Transport | 9.98E-02 |
| NWP100134S11 | Fuel Volume by Transport          | 4.87E-02 |
| NWP100134S11 | First of Month MDQ by Transport   | 0.3      |
| NWP100134S11 | Rate: D1 by Transport             | 142.4705 |
| NWP100134S11 | Rate: Transportation by Transport | 9.98E-02 |
| NWP100134S20 | Fuel Volume by Transport          | 0.19481  |
| NWP100134S20 | First of Month MDQ by Transport   | 1.2      |
| NWP100134S20 | Rate: D1 by Transport             | 142.4705 |
| NWP100134S20 | Rate: Transportation by Transport | 9.98E-02 |
| NWP100134S3S | Fuel Volume by Transport          | 7.79E-02 |
| NWP100134S3S | First of Month MDQ by Transport   | 0.48     |
| NWP100134S3S | Rate: D1 by Transport             | 142.4705 |
| NWP100134S3S | Rate: Transportation by Transport | 9.98E-02 |
| NWP100149N   | Fuel Volume by Transport          | 7.08E-04 |
| NWP100149N   | First of Month MDQ by Transport   | 0.528    |
| NWP100149N   | Rate: D1 by Transport             | 142.4705 |
| NWP100149N   | Rate: Transportation by Transport | 9.98E-02 |
| NWP100149S   | Fuel Volume by Transport          | 6.04E-02 |
| NWP100149S   | First of Month MDQ by Transport   | 0.372    |
| NWP100149S   | Rate: D1 by Transport             | 142.4705 |
| NWP100149S   | Rate: Transportation by Transport | 9.98E-02 |
| NWP100150N   | Fuel Volume by Transport          | 1.50E-03 |
| NWP100150N   | First of Month MDQ by Transport   | 1.116    |
| NWP100150N   | Rate: D1 by Transport             | 142.4705 |
| NWP100150N   | Rate: Transportation by Transport | 9.98E-02 |
| NWP100150S   | Fuel Volume by Transport          | 0.130523 |
| NWP100150S   | First of Month MDQ by Transport   | 0.804    |
| NWP100150S   | Rate: D1 by Transport             | 142.4705 |
| NWP100150S   | Rate: Transportation by Transport | 9.98E-02 |
| NWP10030226B | First of Month MDQ by Transport   | 37.284   |
| NWP10030226B | Rate: D1 by Transport             | 142.4705 |
| NWP10030226B | Rate: Transportation by Transport | 9.98E-02 |
| NWP100302ME  | Fuel Volume by Transport          | 0.645128 |
| NWP100302ME  | First of Month MDQ by Transport   | 50.136   |
| NWP100302ME  | Rate: Transportation by Transport | 9.98E-02 |
| NWP100302MEB | First of Month MDQ by Transport   | 37.284   |
| NWP100302MEB | Rate: Transportation by Transport | 9.98E-02 |
| NWP100302SMS | Fuel Volume by Transport          | 6.342412 |
| NWP100302SMS | First of Month MDQ by Transport   | 126.024  |
| NWP100302SMS | Rate: Transportation by Transport | 9.98E-02 |
| NWP100302STN | First of Month MDQ by Transport   | 37.284   |
| NWP100302STN | Rate: Transportation by Transport | 9.98E-02 |
| NWP100302Z10 | Fuel Volume by Transport          | 0.169944 |
| NWP100302Z10 | First of Month MDQ by Transport   | 12       |
| NWP100302Z10 | Rate: Transportation by Transport | 9.98E-02 |

| Transport    | Data Item                         | 2040     |
|--------------|-----------------------------------|----------|
| NWP100302Z11 | Fuel Volume by Transport          | 0.794824 |
| NWP100302Z11 | First of Month MDQ by Transport   | 71.688   |
| NWP100302Z11 | Rate: Transportation by Transport | 9.98E-02 |
| NWP100302Z20 | Fuel Volume by Transport          | 0.661396 |
| NWP100302Z20 | First of Month MDQ by Transport   | 77.472   |
| NWP100302Z20 | Rate: Transportation by Transport | 9.98E-02 |
| NWP100302Z24 | Fuel Volume by Transport          | 0.102225 |
| NWP100302Z24 | First of Month MDQ by Transport   | 11.292   |
| NWP100302Z24 | Rate: Transportation by Transport | 9.98E-02 |
| NWP100302Z26 | First of Month MDQ by Transport   | 25.788   |
| NWP100302Z26 | Rate: Transportation by Transport | 9.98E-02 |
| NWP100302Z35 | Fuel Volume by Transport          | 0.723889 |
| NWP100302Z35 | First of Month MDQ by Transport   | 62.376   |
| NWP100302Z35 | Rate: Transportation by Transport | 9.98E-02 |
| NWP100302Z3W | Fuel Volume by Transport          | 0.290234 |
| NWP100302Z3W | First of Month MDQ by Transport   | 126.024  |
| NWP100302Z3W | Rate: Transportation by Transport | 9.98E-02 |
| NWP139090B3S | Fuel Volume by Transport          | 0.161    |
| NWP139090B3S | First of Month MDQ by Transport   | 120      |
| NWP139090B3S | Rate: D1 by Transport             | 142.4705 |
| NWP139090B3S | Rate: Transportation by Transport | 9.98E-02 |
| NWP139090B3W | Fuel Volume by Transport          | 0        |
| NWP139090B3W | First of Month MDQ by Transport   | 324.756  |
| NWP139090B3W | Rate: Transportation by Transport | 9.98E-02 |
| NWP139090DC  | Fuel Volume by Transport          | 2.184514 |
| NWP139090DC  | First of Month MDQ by Transport   | 324.756  |
| NWP139090DC  | Rate: Transportation by Transport | 9.98E-02 |
| NWP139090ME  | Fuel Volume by Transport          | 9.92E-02 |
| NWP139090ME  | First of Month MDQ by Transport   | 73.92    |
| NWP139090ME  | Rate: Transportation by Transport | 9.98E-02 |
| NWP139090Z10 | Fuel Volume by Transport          | 4.67E-04 |
| NWP139090Z10 | First of Month MDQ by Transport   | 0.348    |
| NWP139090Z10 | Rate: Transportation by Transport | 9.98E-02 |
| NWP139090Z11 | Fuel Volume by Transport          | 4.99E-03 |
| NWP139090Z11 | First of Month MDQ by Transport   | 3.72     |
| NWP139090Z11 | Rate: Transportation by Transport | 9.98E-02 |
| NWP139090Z26 | First of Month MDQ by Transport   | 107.868  |
| NWP139090Z26 | Rate: Transportation by Transport | 9.98E-02 |
| NWP139382SMS | Fuel Volume by Transport          | 6.162897 |
| NWP139382SMS | First of Month MDQ by Transport   | 74.292   |
| NWP139382SMS | Rate: D1 by Transport             | 142.4705 |
| NWP139382SMS | Rate: Transportation by Transport | 9.98E-02 |
| NWP139382W   | Fuel Volume by Transport          | 9.97E-02 |
| NWP139382W   | First of Month MDQ by Transport   | 74.292   |
| NWP139382W   | Rate: Transportation by Transport | 9.98E-02 |
| NWP139383SMS | Fuel Volume by Transport          | 1.064876 |

|              |                                   |          |
|--------------|-----------------------------------|----------|
| Transport    | Data Item                         | 2040     |
| NWP139383SMS | First of Month MDQ by Transport   | 12.6     |
| NWP139383SMS | Rate: D1 by Transport             | 142.4705 |
| NWP139383SMS | Rate: Transportation by Transport | 9.98E-02 |
| NWP139383W   | Fuel Volume by Transport          | 1.69E-02 |
| NWP139383W   | First of Month MDQ by Transport   | 12.6     |
| NWP139383W   | Rate: Transportation by Transport | 9.98E-02 |
| NWP139384SMS | Fuel Volume by Transport          | 1.204558 |
| NWP139384SMS | First of Month MDQ by Transport   | 39.108   |
| NWP139384SMS | Rate: D1 by Transport             | 142.4705 |
| NWP139384SMS | Rate: Transportation by Transport | 9.98E-02 |
| NWP139384W   | Fuel Volume by Transport          | 0        |
| NWP139384W   | First of Month MDQ by Transport   | 39.108   |
| NWP139384W   | Rate: Transportation by Transport | 9.98E-02 |
| NWP139624SMS | Fuel Volume by Transport          | 1.293755 |
| NWP139624SMS | First of Month MDQ by Transport   | 42       |
| NWP139624SMS | Rate: D1 by Transport             | 142.4705 |
| NWP139624SMS | Rate: Transportation by Transport | 9.98E-02 |
| NWP139624Z3W | Fuel Volume by Transport          | 0.169767 |
| NWP139624Z3W | First of Month MDQ by Transport   | 42       |
| NWP139624Z3W | Rate: Transportation by Transport | 9.98E-02 |
| NWP139627SMS | Fuel Volume by Transport          | 2.63488  |
| NWP139627SMS | First of Month MDQ by Transport   | 72.924   |
| NWP139627SMS | Rate: D1 by Transport             | 142.4705 |
| NWP139627SMS | Rate: Transportation by Transport | 9.98E-02 |
| NWP139627Z3W | Fuel Volume by Transport          | 7.04E-02 |
| NWP139627Z3W | First of Month MDQ by Transport   | 72.924   |
| NWP139627Z3W | Rate: Transportation by Transport | 9.98E-02 |
| NWP139630ME  | Fuel Volume by Transport          | 0        |
| NWP139630ME  | First of Month MDQ by Transport   | 89.4     |
| NWP139630ME  | Rate: D1 by Transport             | 142.4705 |
| NWP139630ME  | Rate: Transportation by Transport | 9.98E-02 |
| NWP139630Z24 | Fuel Volume by Transport          | 0        |
| NWP139630Z24 | First of Month MDQ by Transport   | 57.876   |
| NWP139630Z24 | Rate: Transportation by Transport | 9.98E-02 |
| NWP139637DC  | Fuel Volume by Transport          | 1.141587 |
| NWP139637DC  | First of Month MDQ by Transport   | 30       |
| NWP139637DC  | Rate: D1 by Transport             | 142.4705 |
| NWP139637DC  | Rate: Transportation by Transport | 9.98E-02 |
| NWP139637ME  | Fuel Volume by Transport          | 0.044082 |
| NWP139637ME  | First of Month MDQ by Transport   | 32.856   |
| NWP139637ME  | Rate: D1 by Transport             | 142.4705 |
| NWP139637ME  | Rate: Transportation by Transport | 9.98E-02 |
| NWP139637Z11 | Fuel Volume by Transport          | 3.22E-02 |
| NWP139637Z11 | First of Month MDQ by Transport   | 24.036   |
| NWP139637Z11 | Rate: D1 by Transport             | 142.4705 |
| NWP139637Z11 | Rate: Transportation by Transport | 9.98E-02 |



|              |                                   |          |
|--------------|-----------------------------------|----------|
| Transport    | Data Item                         | 2040     |
| NWP139637Z3W | Fuel Volume by Transport          | 4.02E-02 |
| NWP139637Z3W | First of Month MDQ by Transport   | 30       |
| NWP139637Z3W | Rate: Transportation by Transport | 9.98E-02 |
| NWP140047DC  | Fuel Volume by Transport          | 7.762767 |
| NWP140047DC  | First of Month MDQ by Transport   | 557.736  |
| NWP140047DC  | Rate: D1 by Transport             | 142.4705 |
| NWP140047DC  | Rate: Transportation by Transport | 9.98E-02 |
| NWP140047STN | First of Month MDQ by Transport   | 256.8    |
| NWP140047Z20 | First of Month MDQ by Transport   | 9.6      |
| NWP140047Z24 | First of Month MDQ by Transport   | 60       |
| NWP140047Z26 | First of Month MDQ by Transport   | 377.736  |
| NWP140047Z3W | Fuel Volume by Transport          | 0        |
| NWP140047Z3W | First of Month MDQ by Transport   | 557.736  |
| NWP140047Z3W | Rate: Transportation by Transport | 9.98E-02 |
| NWP140047ZME | First of Month MDQ by Transport   | 63.336   |
| NWP140748ME  | Fuel Volume by Transport          | 0.511288 |
| NWP140748ME  | First of Month MDQ by Transport   | 12       |
| NWP140748ME  | Rate: D1 by Transport             | 142.4705 |
| NWP140748ME  | Rate: Transportation by Transport | 9.98E-02 |
| NWP140748Z24 | Fuel Volume by Transport          | 0.156347 |
| NWP140748Z24 | First of Month MDQ by Transport   | 12       |
| NWP140748Z24 | Rate: Transportation by Transport | 9.98E-02 |
| NWP140748Z26 | Fuel Volume by Transport          | 0        |
| NWP140748Z26 | First of Month MDQ by Transport   | 12       |
| NWP140748Z26 | Rate: Transportation by Transport | 9.98E-02 |
| NWP143078    | Fuel Volume by Transport          | 0        |
| NWP143078    | First of Month MDQ by Transport   | 120      |
| NWP143078    | Rate: D1 by Transport             | 142.4705 |
| NWP143078    | Rate: Transportation by Transport | 9.98E-02 |
| NWPJPIN      | First of Month MDQ by Transport   | 1200     |
| NWPJPIN      | Rate: Transportation by Transport | 9.98E-02 |
| NWPPLIN      | First of Month MDQ by Transport   | 1200     |
| NWPPLIN      | Rate: Transportation by Transport | 9.98E-02 |
| NWPRLGNTOSTN | First of Month MDQ by Transport   | 12       |
| NWPSTOSTAN   | First of Month MDQ by Transport   | 256.8    |
| PLOUT        | First of Month MDQ by Transport   | 937.5    |
| PLOUT        | Rate: D1 by Transport             | 142.4705 |
| ROCKTOSNWPS  | First of Month MDQ by Transport   | 1200     |
| RUBY_BND     | First of Month MDQ by Transport   | 180      |
| RUBY_CHEM    | First of Month MDQ by Transport   | 180      |
| RUBY_GILC    | First of Month MDQ by Transport   | 180      |
| RUBY_KOSMO   | First of Month MDQ by Transport   | 180      |
| RUBY_LAPI    | First of Month MDQ by Transport   | 180      |
| RUBY_MADR    | First of Month MDQ by Transport   | 180      |
| RUBY_NBEND   | First of Month MDQ by Transport   | 180      |
| RUBY_PRNG    | First of Month MDQ by Transport   | 180      |

|              |                                   |          |
|--------------|-----------------------------------|----------|
| Transport    | Data Item                         | 2040     |
| RUBY_PRVL    | First of Month MDQ by Transport   | 180      |
| RUBY_REDM    | First of Month MDQ by Transport   | 180      |
| RUBY_SNTF    | First of Month MDQ by Transport   | 180      |
| RUBY_STEA    | First of Month MDQ by Transport   | 180      |
| RUBY6103600B | First of Month MDQ by Transport   | 90       |
| RUBY6103600B | Rate: D1 by Transport             | 273.75   |
| RUBY6103600B | Rate: Transportation by Transport | 0.12     |
| S100302Z10   | Fuel Volume by Transport          | 1.150522 |
| S100302Z10   | First of Month MDQ by Transport   | 37.284   |
| S100302Z10   | Rate: Transportation by Transport | 9.98E-02 |
| S100302Z11   | Fuel Volume by Transport          | 1.550704 |
| S100302Z11   | First of Month MDQ by Transport   | 37.284   |
| S100302Z11   | Rate: Transportation by Transport | 9.98E-02 |
| S100302Z20   | Fuel Volume by Transport          | 1.415725 |
| S100302Z20   | First of Month MDQ by Transport   | 37.284   |
| S100302Z20   | Rate: Transportation by Transport | 9.98E-02 |
| S132329Z10   | Fuel Volume by Transport          | 0        |
| S132329Z10   | First of Month MDQ by Transport   | 60       |
| S132329Z10   | Rate: Transportation by Transport | 9.98E-02 |
| S132329Z11   | Fuel Volume by Transport          | 0        |
| S132329Z11   | First of Month MDQ by Transport   | 60       |
| S132329Z11   | Rate: Transportation by Transport | 9.98E-02 |
| S132329Z20   | Fuel Volume by Transport          | 8.05E-02 |
| S132329Z20   | First of Month MDQ by Transport   | 60       |
| S132329Z20   | Rate: Transportation by Transport | 9.98E-02 |
| S132329Z3S   | Fuel Volume by Transport          | 0        |
| S132329Z3S   | First of Month MDQ by Transport   | 60       |
| S132329Z3S   | Rate: Transportation by Transport | 9.98E-02 |
| S135558P3S   | Fuel Volume by Transport          | 4.78E-02 |
| S135558P3S   | First of Month MDQ by Transport   | 48       |
| S135558P3S   | Rate: Transportation by Transport | 9.98E-02 |
| S135558S10   | Fuel Volume by Transport          | 0        |
| S135558S10   | First of Month MDQ by Transport   | 256.8    |
| S135558S10   | Rate: Transportation by Transport | 9.98E-02 |
| S135558S11   | Fuel Volume by Transport          | 0        |
| S135558S11   | First of Month MDQ by Transport   | 256.8    |
| S135558S11   | Rate: Transportation by Transport | 9.98E-02 |
| S135558S20   | Fuel Volume by Transport          | 8.73E-02 |
| S135558S20   | First of Month MDQ by Transport   | 256.8    |
| S135558S20   | Rate: Transportation by Transport | 9.98E-02 |
| S135558S3S   | Fuel Volume by Transport          | 0        |
| S135558S3S   | First of Month MDQ by Transport   | 256.8    |
| S135558S3S   | Rate: Transportation by Transport | 9.98E-02 |
| S139090Z3S   | First of Month MDQ by Transport   | 42.36    |
| S139090Z3S   | Rate: Transportation by Transport | 9.98E-02 |
| S139382Z3S   | Fuel Volume by Transport          | 0        |

| Transport    | Data Item                         | 2040     |
|--------------|-----------------------------------|----------|
| S139382Z3S   | First of Month MDQ by Transport   | 74.292   |
| S139382Z3S   | Rate: Transportation by Transport | 9.98E-02 |
| S139383Z3S   | Fuel Volume by Transport          | 0        |
| S139383Z3S   | First of Month MDQ by Transport   | 12.6     |
| S139383Z3S   | Rate: Transportation by Transport | 9.98E-02 |
| S139384Z3S   | First of Month MDQ by Transport   | 39.108   |
| S139384Z3S   | Rate: Transportation by Transport | 9.98E-02 |
| S139624Z3S   | Fuel Volume by Transport          | 0.191268 |
| S139624Z3S   | First of Month MDQ by Transport   | 42       |
| S139624Z3S   | Rate: Transportation by Transport | 9.98E-02 |
| S139627Z3S   | Fuel Volume by Transport          | 0.167956 |
| S139627Z3S   | First of Month MDQ by Transport   | 72.924   |
| S139627Z3S   | Rate: Transportation by Transport | 9.98E-02 |
| S139637Z3S   | Fuel Volume by Transport          | 0        |
| S139637Z3S   | First of Month MDQ by Transport   | 30       |
| S139637Z3S   | Rate: Transportation by Transport | 9.98E-02 |
| S140047Z3S   | Fuel Volume by Transport          | 0        |
| S140047Z3S   | First of Month MDQ by Transport   | 180      |
| S140047Z3S   | Rate: Transportation by Transport | 9.98E-02 |
| S140748Z10   | Fuel Volume by Transport          | 0.362511 |
| S140748Z10   | First of Month MDQ by Transport   | 12       |
| S140748Z10   | Rate: Transportation by Transport | 9.98E-02 |
| S140748Z11   | Fuel Volume by Transport          | 0.42313  |
| S140748Z11   | First of Month MDQ by Transport   | 12       |
| S140748Z11   | Rate: Transportation by Transport | 9.98E-02 |
| S140748Z20   | Fuel Volume by Transport          | 0.494824 |
| S140748Z20   | First of Month MDQ by Transport   | 12       |
| S140748Z20   | Rate: Transportation by Transport | 9.98E-02 |
| STAR_TO_NWPN | Fuel Volume by Transport          | 121.6437 |
| STAR_TO_NWPN | First of Month MDQ by Transport   | 324.66   |
| STAR_TO_NWPN | Rate: D1 by Transport             | 142.4705 |
| STAR_TO_NWPN | Rate: Transportation by Transport | 9.98E-02 |
| WCFI2583B00  | First of Month MDQ by Transport   | 240      |
| WCFI2583B00  | Rate: D1 by Transport             | 142.6566 |

| CONTRACT<br>NWP - DESCRIPTION   | RECEIPT         | DELIVERY                                  | PIPELINE | COST<br>ALLOCATION | TERMINATION<br>DATE | RATE<br>PER DAY | MDQ    | Jan-20 | Feb-20 | Mar-20 | Apr-20 | May-20 | Jun-20 | Jul-20 | Aug-20 | Sep-20 | Oct-20 | Nov-20 | Dec-20 |
|---|-----------------|---|----------|--------------------|---------------------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|   |                 |   |          |                    |                     |                 |        | 31     | 29     | 31     | 30     | 31     | 30     | 31     | 30     | 31     | 30     | 31     | 30     |
| TF-1 Contract #100002 April 31, 1991  | all rec         | all del                                   | NWP      | Principal          | 10/31/2032          | 0.39033         | 205123 | 205123 | 205123 | 205123 | 205123 | 205123 | 205123 | 205123 | 205123 | 205123 | 205123 | 205123 | 205123 |
| Contract #135384 (JP/Bremerton), March 26, 2007 (permanently released 4/2016) | jackson prairie | bremerton/mt vernon                       | NWP      | Washington         | 10/31/2029          | 0.39033         |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Contract #135558 (Sumas/Prtld), 4/1/2007)                                     | sumas           | stanfield/portland west                   | NWP      | system             | 10/31/2018          | 0.39033         | 25400  |        |        |        |        |        |        |        |        |        |        |        |        |
| Contract #139382 Sumas/Sedro Wooley   | sumas           | sedro wooley                              | NWP      | Washington         | 10/31/2050          | 0.39033         | 6191   | 6191   | 6191   | 6191   | 6191   | 6191   | 6191   | 6191   | 6191   | 6191   | 6191   | 6191   | 6191   |
| Contract #139383 Sumas/Sedro Wooley   | sumas           | sedro wooley                              | NWP      | Washington         | 10/31/2050          | 0.39033         | 1050   | 1050   | 1050   | 1050   | 1050   | 1050   | 1050   | 1050   | 1050   | 1050   | 1050   | 1050   | 1050   |
| Contract #139384 Sumas/Sedro Wooley   | sumas           | sedro wooley                              | NWP      | Washington         | 10/31/2050          | 0.39033         | 3259   | 3259   | 3259   | 3259   | 3259   | 3259   | 3259   | 3259   | 3259   | 3259   | 3259   | 3259   | 3259   |
| Contract #100134 December 1, 1995   | sumas/ignacio   | burbank/yakima/aberdeen                   | NWP      | Washington         | 11/30/2022          | 0.39033         | 330    | 330    | 330    | 330    | 330    | 330    | 330    | 330    | 330    | 330    | 330    | 330    | 330    |
| Contract #100149 March 1, 1996  | sumas/ignacio   | walla walla                               | NWP      | Washington         | 11/30/2022          | 0.39033         | 75     | 75     | 75     | 75     | 75     | 75     | 75     | 75     | 75     | 75     | 75     | 75     | 75     |
| Contract #100150 May 15, 1996   | sumas/ignacio   | menan starch                              | NWP      | Washington         | 11/30/2022          | 0.39033         | 160    | 160    | 160    | 160    | 160    | 160    | 160    | 160    | 160    | 160    | 160    | 160    | 160    |
| Contract #100064 May 8, 1995  | sumas           | hermiston/pasco                           | NWP      | system             | 3/31/2023           | 0.39033         | 1078   | 1078   | 1078   | 1078   | 1078   | 1078   | 1078   | 1078   | 1078   | 1078   | 1078   | 1078   | 1078   |
| Weyer Release Contract #132329 July 1, 2004                                   | sumas           | kern river                                | NWP      | system             | 1/31/2023           | 0.39033         | 5000   | 5000   | 5000   | 5000   | 5000   | 5000   | 5000   | 5000   | 5000   | 5000   | 5000   | 5000   | 5000   |
| Contract #139090 June 2, 2011   | sumas           | plymouth/umatilla/bellingham              | NWP      | system             | 3/31/2052           | 0.39033         | 27063  | 27063  | 27063  | 27063  | 27063  | 27063  | 27063  | 27063  | 27063  | 27063  | 27063  | 27063  | 27063  |
| Contract #139637 January 1, 2013  | sumas           | hermiston/oak harbor/selah                | NWP      | system             | 10/31/2050          | 0.39033         | 7241   | 7241   | 7241   | 7241   | 7241   | 7241   | 7241   | 7241   | 7241   | 7241   | 7241   | 7241   | 7241   |
| Contract #139630 9/1/2012   | stanfield       | durkee/pendleton/mission                  | NWP      | Oregon             | 10/31/2050          | 0.39033         | 7450   | 7450   | 7450   | 7450   | 7450   | 7450   | 7450   | 7450   | 7450   | 7450   | 7450   | 7450   | 7450   |
| Contract #140047 April 1, 2014  | sumas           | bellingham/ferndale                       | NWP      | Washington         | 10/31/2034          | 0.39033         | 15000  | 46478  | 46478  | 46478  | 46478  | 46478  | 46478  | 46478  | 46478  | 46478  | 46478  | 46478  | 46478  |
| Contract #140748 April 1, 2015  | Opal            | Portland West/Scappoose                   | NWP      | Oregon             | 3/31/2031           | 0.39033         | 1000   |        |        |        |        |        |        |        |        |        |        |        |        |
| Contract #140751 November 1, 2015 (segmented, base contract 140748)           | stanfield       | Portland West/Scappoose                   | NWP      | Oregon             | 3/31/2031           | 0.39033         | 1000   | 1000   | 1000   | 1000   | 1000   | 1000   | 1000   | 1000   | 1000   | 1000   | 1000   | 1000   | 1000   |
| Contract #140752 November 1, 2015 (segmented, base contract 140748)           | stanfield       | Portland West/Scappoose                   | NWP      | Oregon             | 3/31/2031           | 0.39033         | 1000   |        |        |        |        |        |        |        |        |        |        |        |        |
| Contract #142548 November 1, 2018   | jackson prairie | stanfield                                 | NWP      | System             | 10/31/2034          | 0.39033         | 8960   | 8960   | 8960   | 8960   |        |        |        |        |        |        |        |        | 8960   |
| Contract #142972 July 1, 2019 (segmented, base contract 100002)               | jackson prairie | Jackson prairie/greys harbor              | NWP      | TBD                | 10/31/2032          | 0.39033         | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 |
| Contract #142973 July 1, 2019 (segmented, base contract 100002)               | pendleton       | pendleton/kennewick/pasco                 | NWP      | TBD                | 10/31/2032          | 0.39033         | 20,000 |        |        |        |        |        |        |        |        |        |        |        | 20,000 |
| Contract #142967 July 1, 2019   | palouse         | plymouth/southridge                       | NWP      | TBD                | 6/30/2029           | 0.39033         | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| Contract #143078 November 1, 2019   | molalla         | Stanfield                                 | NWP      | TBD                | 3/31/2024           | 0.39033         | 10,000 | 10,000 | 10,000 | 10,000 |        |        |        |        |        |        |        |        | 10,000 |
| <b>4/</b>   |                 |   |          |                    |                     |                 |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Clay Basin Park & Loan #135675  | clay basin      | clay basin                                | NWP      | system             | 12/31/2098          | 0.00000         | 0      |        |        |        |        |        |        |        |        |        |        |        |        |
| Jackson Prairie Park & Loan #131179   | jackson prairie | jackson prairie                           | NWP      | system             | 12/31/2098          | 0.00000         | 0      |        |        |        |        |        |        |        |        |        |        |        |        |
| Clay Basin Park & Loan #129152, October 30, 2002                              | clay basin      | clay basin                                | NWP      | system             | 12/31/2049          | 0.00000         | 0      |        |        |        |        |        |        |        |        |        |        |        |        |
| <b>TF-2</b>   |                 |   |          |                    |                     |                 |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Contract #100302 TF-2, April 1, 1994  | jackson prairie | Stanfield, Wenatchee, Langview, Kennewick | NWP      | system             | 10/31/2024          | 0.39033         | 16,789 | 1,656  | 1,656  | 1,656  | 1,656  | 1,656  | 1,656  | 1,656  | 1,656  | 1,656  | 1,656  | 1,656  | 1,656  |
| Contract #100304 TF-2, April 1, 1994  | plymouth        | plymouth                                  | NWP      | system             | 3/31/2024           | 0.39033         | 60,000 | 1,540  | 1,540  | 1,540  | 1,540  | 1,540  | 1,540  | 1,540  | 1,540  | 1,540  | 1,540  | 1,540  | 1,540  |
| Jackson Prairie Expansion Precident Agreement # 135365 SGS-2F                 | jackson prairie | jackson prairie                           | NWP      | system             | 10/31/2060          | 0.04056         | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 |
| Contract # 100401 SGS-2F, November 1, 1998                                    | jackson prairie | jackson prairie                           | NWP      | system             | 10/31/2024          | 0.01562         | 16,789 | 16,789 | 16,789 | 16,789 | 16,789 | 16,789 | 16,789 | 16,789 | 16,789 | 16,789 | 16,789 | 16,789 | 16,789 |
| Contract #100601 LS-2F, March 1, 2007   | plymouth        | plymouth                                  | NWP      | system             | 3/31/2024           | 0.02587         | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 | 60,000 |
| Contract #140857 LS-2F, April 1, 2016   | plymouth        | plymouth                                  | NWP      | system             | 3/31/2024           | 0.02587         | 18,125 | 18,125 | 18,125 | 18,125 | 18,125 | 18,125 | 18,125 | 18,125 | 18,125 | 18,125 | 18,125 | 18,125 | 18,125 |
| Contract #139627 TF-2, September 1, 2012                                      | jackson prairie | bellingham                                | NWP      | Washington         | 3/31/2020           | 0.39033         | 489    | 489    | 489    | 489    |        |        |        |        |        |        |        |        |        |
| Contract #141193 TF-2, April 1, 2016  | plymouth        | plymouth                                  | NWP      | Washington         | 3/31/2023           | 0.39033         | 10,675 | 10,675 | 10,675 | 10,675 | 10,675 | 10,675 | 10,675 | 10,675 | 10,675 | 10,675 | 10,675 | 10,675 | 10,675 |
| Contract #139624 TF-2   | jackson prairie | bellingham                                | NWP      | Washington         | 3/31/2020           | 0.39033         | 282    | 282    | 282    | 282    |        |        |        |        |        |        |        |        |        |
| Contract #139622 SGS-2F   | jackson prairie | jackson prairie                           | NWP      | system             | 3/31/2026           | 0.01562         | 3,500  | 3,500  | 3,500  | 3,500  | 3,500  | 3,500  | 3,500  | 3,500  | 3,500  | 3,500  | 3,500  | 3,500  | 3,500  |
| Contract #139626 SGS-2F   | jackson prairie | jackson prairie                           | NWP      | system             | 3/31/2020           | 0.01562         | 6,077  | 6,077  | 6,077  | 6,077  |        |        |        |        |        |        |        |        |        |
| <b>NWN</b>  |                 |   |          |                    |                     |                 |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Contract Agreement #74 Mist Storage, May 1 2019                               | Mist            | Mist                                      | NWP      | System             | 4/30/2024           | 0.05620         | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 | 30,000 |
| <b>GTN</b>  |                 |   |          |                    |                     |                 |        |        |        |        |        |        |        |        |        |        |        |        |        |
| 2003 Expansion, #17037 (#08488 & #02812 formerly), 5/12/2015                  | kingsgate       | malin                                     | GTN      | Oregon             | 10/31/2028          | 0.27043         | 23,980 | 20,380 | 20,380 | 20,380 | 20,380 | 20,380 |        |        |        |        |        |        | 20,380 |
| Firm Transportation #17019 (#00179, October 7, 1993), 5/12/2015               | kingsgate       | Spokane NPC                               | GTN      | Oregon             | 10/31/2023          | 0.07330         | 11,558 | 11,558 | 11,558 | 11,558 | 11,558 | 11,558 | 11,558 | 11,558 | 11,558 | 11,558 | 11,558 | 11,558 | 11,558 |
| Firm Transportation #17021 (#00179, October 7, 1993), 5/12/2015               | kingsgate       | Kosmos Farm                               | GTN      | Oregon             | 10/31/2023          | 0.13717         | 200    | 200    | 200    | 200    | 200    | 200    | 200    | 200    | 200    | 200    | 200    | 200    | 200    |
| Firm Transportation #17022 (#00179, October 7, 1993), 5/12/2015               | kingsgate       | Stanfield City                            | GTN      | Oregon             | 10/31/2023          | 0.14151         | 232    | 232    | 232    | 232    | 232    | 232    | 232    | 232    | 232    | 232    | 232    | 232    | 232    |
| Firm Transportation #17023 (#00179, October 7, 1993), 5/12/2015               | kingsgate       | Madras                                    | GTN      | Oregon             | 10/31/2023          | 0.19133         | 2,078  | 2,078  | 2,078  | 2,078  | 2,078  | 2,078  | 2,078  | 2,078  | 2,078  | 2,078  | 2,078  | 2,078  | 2,078  |
| Firm Transportation #17025 (#00179, October 7, 1993), 5/12/2015               | kingsgate       | Prineville                                | GTN      | Oregon             | 10/31/2023          | 0.19783         | 2,984  | 2,984  | 2,984  | 2,984  | 2,984  | 2,984  | 2,984  | 2,984  | 2,984  | 2,984  | 2,984  | 2,984  | 2,984  |
| Firm Transportation #17026 (#00179, October 7, 1993), 5/12/2015               | kingsgate       | Redmond                                   | GTN      | Oregon             | 10/31/2023          | 0.20233         | 2,734  | 2,734  | 2,734  | 2,734  | 2,734  | 2,734  | 2,734  | 2,734  | 2,734  | 2,734  | 2,734  | 2,734  | 2,734  |
| Firm Transportation #17028 (#00179, October 7, 1993), 5/12/2015               | kingsgate       | Bend                                      | GTN      | Oregon             | 10/31/2023          | 0.20867         | 8,927  | 8,927  | 8,927  | 8,927  | 8,927  | 8,927  | 8,927  | 8,927  | 8,927  | 8,927  | 8,927  | 8,927  | 8,927  |
| Firm Transportation #17031 (#00179, October 7, 1993), 5/12/2016               | kingsgate       | Stearns                                   | GTN      | Oregon             | 10/31/2023          | 0.21441         | 2,189  | 2,189  | 2,189  | 2,189  | 2,189  | 2,189  | 2,189  | 2,189  | 2,189  | 2,189  | 2,189  | 2,189  | 2,189  |
| Firm Transportation #17033 (#00179, October 7, 1993), 5/12/2015               | kingsgate       | LaPine                                    | GTN      | Oregon             | 10/31/2023          | 0.22016         | 45     | 45     | 45     | 45     | 45     | 45     | 45     | 45     | 45     | 45     | 45     | 45     | 45     |
| Firm Transportation #17034 (#00179, October 7, 1993), 5/12/2015               | kingsgate       | Gilchrist                                 | GTN      | Oregon             | 10/31/2023          | 0.22683         | 313    | 313    | 313    | 313    | 313    | 313    | 313    | 313    | 313    | 313    | 313    | 313    | 313    |
| Firm Transportation #17036 (#00179, October 7, 1993), 5/12/2015               | kingsgate       | Chemult                                   | GTN      | Oregon             | 10/31/2023          | 0.23406         | 75     | 75     | 75     | 75     | 75     | 75     | 75     | 75     | 75     | 75     | 75     | 75     | 75     |
| Firm Transportation #17023 (#00152, December 1, 1997)                         | kingsgate       | Madras                                    | GTN      | Oregon             | 10/31/2023          | 0.19133         | 331    | 331    | 331    | 331    |        |        |        |        |        |        |        |        | 331    |
| Firm Transportation #17025 (#00152, December 1, 1997)                         | kingsgate       | Prineville                                | GTN      | Oregon             | 10/31/2023          | 0.19783         | 827    | 827    | 827    | 827    |        |        |        |        |        |        |        |        | 827    |
| Firm Transportation #17026 (#00152, December 1, 1997)                         | kingsgate       | Redmond                                   | GTN      | Oregon             | 10/31/2023          | 0.20233         | 662    | 662    | 662    | 662    |        |        |        |        |        |        |        |        | 662    |
| Firm Transportation #17028 (#00152, December 1, 1997)                         | kingsgate       | Bend                                      | GTN      | Oregon             | 10/31/2023          | 0.20867         | 4,137  | 4,137  | 4,137  | 4,137  |        |        |        |        |        |        |        |        | 4,137  |
| Firm Transportation #17031 (#00152, December 1, 1997)                         | kingsgate       | Stearns                                   | GTN      | Oregon             | 10/31/2023          | 0.21441         | 1,241  | 1,241  |        |        |        |        |        |        |        |        |        |        |        |

| SCENARIO NAME   | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|---|----------------------------------|----------------------------------|-----------------------------|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|   | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |                             |                        |                                   |                              |                                   |
| Medium Load Growth, Medium Pricing, Average Weather w/ Peak Event, CEC Cap and Trade Carbon Forecast. No new elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario |                                  |                                  |                             |                        |                                   |                              |                                   |
|   | Current Station2                 | JP1                              |                             |                        |                                   |                              |                                   |
|   | Current NOVA                     | JP2                              |                             |                        |                                   |                              |                                   |
|   | Current GTN                      | JP3                              |                             |                        |                                   |                              |                                   |
|   | Current NWP                      | JP4                              |                             |                        |                                   |                              |                                   |
|   | Current Foothills                | PLY-1                            |                             |                        |                                   |                              | OR101-0                           |
|   | Current Ruby                     | PLY-2                            |                             |                        |                                   |                              | OR104-228685                      |
|   |                                  | MIST                             |                             |                        |                                   |                              | OR105-23504                       |
|   |                                  |                                  |                             |                        |                                   |                              | OR111-20366                       |
|   |                                  |                                  |                             |                        |                                   |                              | OR170-19304                       |
| As-Is   | Incremental NGTL                 | Spire Storage                    |                             |                        |                                   |                              | WA502-0                           |
|   | Incremental GTN N-S              | Gill Ranch Storage               | 4,024,090                   | 0.518842               | 369,408                           | 7,755,907,800                | WA503-0                           |
|   | NWP I-5 Mainline EXP             | Wild Goose Storage               |                             |                        |                                   |                              | WA504-0                           |
|   | Incremental Ruby                 | Aeco Hub Storage                 |                             |                        |                                   |                              | WA505-27196                       |
|   | NWP Wen lateral EXP              | Magnum Storage                   |                             |                        |                                   |                              | WA511-43229                       |
|   | Incremental Foothills            | Clay Basin Storage               |                             |                        |                                   |                              | WA512-0                           |
|   | NWP Z20 lateral EXP              |                                  |                             |                        |                                   |                              | WA570-6525                        |
|   | T-South-So Crossing              |                                  |                             |                        |                                   |                              | WA577-599                         |
|   | Trails West (Palomar)            |                                  |                             |                        |                                   |                              |                                   |
|   | Bremerton/Shelton                |                                  |                             |                        |                                   |                              |                                   |
|   | NWP East OR Mainline EXP         |                                  |                             |                        |                                   |                              |                                   |
|   | Incremental GTN S-N              |                                  |                             |                        |                                   |                              |                                   |
|   | Incremental Enbridge             |                                  |                             |                        |                                   |                              |                                   |
|   | Pacific Connector                |                                  |                             |                        |                                   |                              |                                   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Medium Load Growth, Stochastic Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. No new elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    | 4,439,678.25           | 0                                 | 7,783,013,800                | OR101-0                           |
|  | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|  | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|  | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|  | Current Foothills                | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              |                                   |
|  | Current Ruby                     | PLY-2                            | OPAL BASE                                 |                        |                                   |                              |                                   |
|  |                                  | MIST                             | KERN WINTER                               |                        |                                   |                              |                                   |
|  |                                  |                                  | STAT2 BASE                                |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
| GTN Only   | Incremental NGTL                 | Spire Storage                    | Opal Incrm Supply                         | 0.570432               | 0                                 | 7,783,013,800                | WA502-0                           |
|  | Incremental GTN N-S              | Gill Ranch Storage               | Renewable Natural Gas                     |                        |                                   |                              | WA503-0                           |
|  | NWP I-5 Mainline EXP             | Wild Goose Storage               | Resource Mix - 3 Basins                   |                        |                                   |                              | WA504-0                           |
|  | Incremental Ruby                 | Aeco Hub Storage                 | DSM                                       |                        |                                   |                              | WA505-0                           |
|  | NWP Wen lateral EXP              | Magnum Storage                   |   |                        |                                   |                              | WA511-0                           |
|  | Incremental Foothills            | Clay Basin Storage               |   |                        |                                   |                              | WA512-0                           |
|  | NWP Z20 lateral EXP              |                                  |   |                        |                                   |                              | WA570-0                           |
|  | T-South-So Crossing              |                                  |   |                        |                                   |                              | WA577-0                           |
|  | Trails West (Palomar)            |                                  |   |                        |                                   |                              |                                   |
|  | Bremerton/Shelton                |                                  |   |                        |                                   |                              |                                   |
|  | NWP East OR Mainline EXP         |                                  |   |                        |                                   |                              |                                   |
|  | Incremental GTN S-N              |                                  |   |                        |                                   |                              |                                   |
|  | Incremental Enbridge             |                                  |   |                        |                                   |                              |                                   |
|  | Pacific Connector                |                                  |   |                        |                                   |                              |                                   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Medium Load Growth, Stochastic Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. No new elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    | 4,437,640.87           | 0                                 | 7,783,013,800                | OR101-0                           |
|  | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|  | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|  | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|  | Current Foothills                | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              |                                   |
|  | Current Ruby                     | PLY-2                            | OPAL BASE                                 |                        |                                   |                              |                                   |
|  |                                  | MIST                             | KERN WINTER                               |                        |                                   |                              |                                   |
|  |                                  |                                  | STAT2 BASE                                |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
| GTN with Storage   | Incremental NGTL                 | Spire Storage                    | Opal Incrm Supply                         | 0.570170               | 0                                 | 7,783,013,800                | WA502-0                           |
|  | Incremental GTN N-S              | Gill Ranch Storage               | Renewable Natural Gas                     |                        |                                   |                              | WA503-0                           |
|  | NWP I-5 Mainline EXP             | Wild Goose Storage               | Resource Mix - 3 Basins                   |                        |                                   |                              | WA504-0                           |
|  | Incremental Ruby                 | Aeco Hub Storage                 | DSM                                       |                        |                                   |                              | WA505-0                           |
|  | NWP Wen lateral EXP              | Magnum Storage                   |   |                        |                                   |                              | WA511-0                           |
|  | Incremental Foothills            | Clay Basin Storage               |   |                        |                                   |                              | WA512-0                           |
|  | NWP Z20 lateral EXP              |                                  |   |                        |                                   |                              | WA570-0                           |
|  | T-South-So Crossing              |                                  |   |                        |                                   |                              | WA577-0                           |
|  | Trails West (Palomar)            |                                  |   |                        |                                   |                              |                                   |
|  | Bremerton/Shelton                |                                  |   |                        |                                   |                              |                                   |
|  | NWP East OR Mainline EXP         |                                  |   |                        |                                   |                              |                                   |
|  | Incremental GTN S-N              |                                  |   |                        |                                   |                              |                                   |
|  | Incremental Enbridge             |                                  |   |                        |                                   |                              |                                   |
|  | Pacific Connector                |                                  |   |                        |                                   |                              |                                   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|----------------------------------|-----------------------------|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |                             |                        |                                   |                              |                                   |
| Medium Load Growth, Stochastic Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. No new elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario |                                  |                                  |                             |                        |                                   |                              |                                   |
|  | Current Station2                 | JP1                              |                             |                        |                                   |                              |                                   |
|  | Current NOVA                     | JP2                              |                             |                        |                                   |                              |                                   |
|  | Current GTN                      | JP3                              |                             |                        |                                   |                              |                                   |
|  | Current NWP                      | JP4                              |                             |                        |                                   |                              |                                   |
|  | Current Foothills                | PLY-1                            |                             |                        |                                   |                              | OR101-0                           |
|  | Current Ruby                     | PLY-2                            |                             |                        |                                   |                              | OR104-206974                      |
|  |                                  | MIST                             |                             |                        |                                   |                              | OR105-23063                       |
|  |                                  |                                  |                             |                        |                                   |                              | OR111-7525                        |
|  |                                  |                                  |                             |                        |                                   |                              | OR170-0                           |
| NWP Only   | Incremental NGTL                 | Spire Storage                    |                             |                        |                                   |                              | WA502-0                           |
|  | Incremental GTN N-S              | Gill Ranch Storage               | 4,424,827.59                | 0.568524               | 0                                 | 7,783,013,800                | WA503-0                           |
|  | NWP I-5 Mainline EXP             | Wild Goose Storage               |                             |                        |                                   |                              | WA504-0                           |
|  | Incremental Ruby                 | Aeco Hub Storage                 |                             |                        |                                   |                              | WA505-0                           |
|  | NWP Wen lateral EXP              | Magnum Storage                   |                             |                        |                                   |                              | WA511-0                           |
|  | Incremental Foothills            | Clay Basin Storage               |                             |                        |                                   |                              | WA512-0                           |
|  | NWP Z20 lateral EXP              |                                  |                             |                        |                                   |                              | WA570-0                           |
|  | T-South-So Crossing              |                                  |                             |                        |                                   |                              | WA577-0                           |
|  | Trails West (Palomar)            |                                  |                             |                        |                                   |                              |                                   |
|  | NWP East OR Mainline EXP         |                                  |                             |                        |                                   |                              |                                   |
|  | Bremerton Shelton                |                                  |                             |                        |                                   |                              |                                   |
|  | Incremental GTN S-N              |                                  |                             |                        |                                   |                              |                                   |
|  | Incremental Enbridge             |                                  |                             |                        |                                   |                              |                                   |
|  | Pacific Connector                |                                  |                             |                        |                                   |                              |                                   |



| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                    | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|--------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
| Medium Load Growth, Stochastic Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. No new elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario | KEY ELEMENTS IN SENDOUT SCENARIO |                    |   |                        |                                   |                              |                                   |
|  | Current Station2                 | JP1                | AECO Base/Fixed, Winter, Day W/S, Peak    |                        |                                   |                              |                                   |
|  | Current NOVA                     | JP2                | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|  | Current GTN                      | JP3                | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|  | Current NWP                      | JP4                | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|  | Current Foothills                | PLY-1              | KINGSGATE BASE                            |                        |                                   |                              | OR101-0                           |
|  | Current Ruby                     | PLY-2              | OPAL BASE                                 |                        |                                   |                              | OR104-206974                      |
|  |                                  | MIST               | KERN WINTER                               |                        |                                   |                              | OR105-23063                       |
|  |                                  |                    | STAT2 BASE                                |                        |                                   |                              | OR111-7525                        |
|  |                                  |                    |   |                        |                                   |                              | OR170-0                           |
|  |                                  |                    |   |                        |                                   |                              | WA502-0                           |
|  |                                  |                    |   |                        |                                   |                              | WA503-0                           |
|  |                                  |                    |   |                        |                                   |                              | WA504-0                           |
|  |                                  |                    |   |                        |                                   |                              | WA505-0                           |
|  |                                  |                    |   |                        |                                   | WA511-0                      |                                   |
|  |                                  |                    |   |                        |                                   | WA512-0                      |                                   |
|  |                                  |                    |   |                        |                                   | WA570-0                      |                                   |
|  |                                  |                    |   |                        |                                   | WA577-0                      |                                   |
| NWP with Storage   | Incremental NGTL                 | Spire Storage      | Opal Incrm Supply                         | 0.568288               | 0                                 | 7,783,013,800                |                                   |
|  | Incremental GTN N-S              | Gill Ranch Storage | Renewable Natural Gas                     | 4,422,992.03           |                                   |                              |                                   |
|  | NWP I-5 Mainline EXP             | Wild Goose Storage | Resource Mix - 3 Basins                   |                        |                                   |                              |                                   |
|  | Incremental Ruby                 | Aeco Hub Storage   | DSM                                       |                        |                                   |                              |                                   |
|  | NWP Wen lateral EXP              | Magnum Storage     |   |                        |                                   |                              |                                   |
|  | Incremental Foothills            | Clay Basin Storage |   |                        |                                   |                              |                                   |
|  | NWP Z20 lateral EXP              |                    |   |                        |                                   |                              |                                   |
|  | T-South-So Crossing              |                    |   |                        |                                   |                              |                                   |
|  | Trails West (Palomar)            |                    |   |                        |                                   |                              |                                   |
|  | NWP East OR Mainline EXP         |                    |   |                        |                                   |                              |                                   |
|  | Bremerton Shelton                |                    |   |                        |                                   |                              |                                   |
|  | Incremental GTN S-N              |                    |   |                        |                                   |                              |                                   |
|  | Incremental Enbridge             |                    |   |                        |                                   |                              |                                   |
|  | Pacific Connector                |                    |   |                        |                                   |                              |                                   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                    | NPV 20 Year Costs in \$000s | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|--------------------|-----------------------------|------------------------|-----------------------------------|------------------------------|-----------------------------------|
| Medium Load Growth, Stochastic Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. No new elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario | KEY ELEMENTS IN SENDOUT SCENARIO |                    |                             |                        |                                   |                              |                                   |
|  | Current Station2                 | JP1                |                             |                        |                                   |                              |                                   |
|  | Current NOVA                     | JP2                |                             |                        |                                   |                              |                                   |
|  | Current GTN                      | JP3                |                             |                        |                                   |                              |                                   |
|  | Current NWP                      | JP4                |                             |                        |                                   |                              |                                   |
|  | Current Foothills                | PLY-1              |                             |                        |                                   |                              | OR101-0                           |
|  | Current Ruby                     | PLY-2              |                             |                        |                                   |                              | OR104-206974                      |
|  |                                  | MIST               |                             |                        |                                   |                              | OR105-23063                       |
|  |                                  |                    |                             |                        |                                   |                              | OR111-7525                        |
|  |                                  |                    |                             |                        |                                   |                              | OR170-0                           |
|  |                                  |                    |                             |                        |                                   |                              | WA502-0                           |
| Storage Only   | Incremental NGTL                 | Spire Storage      | 4,437,521.62                | 0.570155               | 0                                 | 7,783,013,800                | WA503-0                           |
|  | Incremental GTN N-S              | Gill Ranch Storage |                             |                        |                                   |                              | WA504-0                           |
|  | NWP I-5 Mainline EXP             | Wild Goose Storage |                             |                        |                                   |                              | WA505-0                           |
|  | Incremental Ruby                 | Aeco Hub Storage   |                             |                        |                                   |                              | WA511-0                           |
|  | NWP Wen lateral EXP              | Magnum Storage     |                             |                        |                                   |                              | WA512-0                           |
|  | Incremental Foothills            | Clay Basin Storage |                             |                        |                                   |                              | WA570-0                           |
|  | NWP Z20 lateral EXP              |                    |                             |                        |                                   |                              | WA577-0                           |
|  | T-South-So Crossing              |                    |                             |                        |                                   |                              |                                   |
|  | Trails West (Palomar)            |                    |                             |                        |                                   |                              |                                   |
|  | NWP East OR Mainline EXP         |                    |                             |                        |                                   |                              |                                   |
|  | Bremerton Shelton                |                    |                             |                        |                                   |                              |                                   |
|  | Incremental GTN S-N              |                    |                             |                        |                                   |                              |                                   |
|  | Incremental Enbridge             |                    |                             |                        |                                   |                              |                                   |
|  | Pacific Connector                |                    |                             |                        |                                   |                              |                                   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Medium Load Growth, Stochastic Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. No new elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    |                        |                                   |                              |                                   |
|  | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|  | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|  | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|  | Current Foothills                | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              |                                   |
|  | Current Ruby                     | PLY-2                            | OPAL BASE                                 |                        |                                   |                              |                                   |
|  |                                  | MIST                             | KERN WINTER                               |                        |                                   |                              |                                   |
|  |                                  |                                  | STAT2 BASE                                |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
| All In Less DSM  | <i>Incremental NGTL</i>          | <i>Spire Storage</i>             | <i>Opal Incrm Supply</i>                  | 4,422,989              | 0                                 | 7,783,013,800                | OR105-0                           |
|  | <i>Incremental GTN N-S</i>       | <i>Gill Ranch Storage</i>        | <i>RenewableNaturalGas</i>                |                        |                                   |                              | OR111-0                           |
|  | <i>NWP I-5 Mainline EXP</i>      | <i>Wild Goose Storage</i>        | <i>Resource Mix - 3 Basins</i>            |                        |                                   |                              | OR170-0                           |
|  | <i>Incremental Ruby</i>          | <i>Aeco Hub Storage</i>          | <i>DSM</i>                                |                        |                                   |                              | WA503-0                           |
|  | <i>NWP Wen lateral EXP</i>       | <i>Magnum Storage</i>            |   |                        |                                   |                              | WA504-0                           |
|  | <i>Incremental Foothills</i>     | <i>Clay Basin Storage</i>        |   |                        |                                   |                              | WA505-0                           |
|  | <i>NWP Z20 lateral EXP</i>       |                                  |   |                        |                                   |                              | WA511-0                           |
|  | <i>T-South-So Crossing</i>       |                                  |   |                        |                                   |                              | WA570-0                           |
|  | <i>Bremerton/Shelton</i>         |                                  |   |                        |                                   |                              | WA577-0                           |
|  | <i>Trails West (Palomar)</i>     |                                  |   |                        |                                   |                              |                                   |
|  | <i>NWP East OR Mainline EXP</i>  |                                  |   |                        |                                   |                              |                                   |
|  | <i>Incremental GTN S-N</i>       |                                  |   |                        |                                   |                              |                                   |
|  | <i>Incremental Enbridge</i>      |                                  |   |                        |                                   |                              |                                   |
|  | <i>Pacific Connector</i>         |                                  |   |                        |                                   |                              |                                   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms)   |
|--|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|---|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |   |
| Medium Load Growth, Stochastic Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. No new elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    |                        |                                   |                              |   |
|  | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |   |
|  | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |   |
|  | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |   |
|  | Current Foothills                | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              |   |
|  | Current Ruby                     | PLY-2                            | OPAL BASE                                 |                        |                                   |                              |   |
|  |                                  | MIST                             | KERN WINTER                               |                        |                                   |                              |   |
|  |                                  |                                  | STAT2 BASE                                |                        |                                   |                              |   |
|  |                                  |                                  |   |                        |                                   |                              |   |
|  |                                  |                                  |   |                        |                                   |                              |   |
|  |                                  |                                  |   |                        |                                   |                              |   |
|  |                                  |                                  |   |                        |                                   |                              |   |
|  |                                  |                                  |   |                        |                                   |                              |   |
|  |                                  |                                  |   |                        |                                   |                              |   |
|  |                                  |                                  |   |                        |                                   |                              |   |
| Top Ranking Candidate Portfolio  |                                  |                                  | 4,398,492                                 | 0.565140               | 0                                 | 7,783,013,800                | OR105-0<br>OR111-0<br>OR170-0<br>WA503-0<br>WA504-0<br>WA505-0<br>WA511-0<br>WA570-0<br>WA577-0 |
|  | Incremental NGTL                 | Spire Storage                    | Opal Incrm Supply                         |                        |                                   |                              |   |
|  | Incremental GTN N-S              | Gill Ranch Storage               | RenewableNaturalGas                       |                        |                                   |                              |   |
|  | NWP I-5 Mainline EXP             | Wild Goose Storage               | Resource Mix - 3 Basins                   |                        |                                   |                              |   |
|  | Incremental Ruby                 | Aeco Hub Storage                 | DSM                                       |                        |                                   |                              |   |
|  | NWP Wen lateral EXP              | Magnum Storage                   |   |                        |                                   |                              |   |
|  | Incremental Foothills            | Clay Basin Storage               |   |                        |                                   |                              |   |
|  | NWP Z20 lateral EXP              |                                  |   |                        |                                   |                              |   |
|  | T-South-So Crossing              |                                  |   |                        |                                   |                              |   |
|  | Bremerton/Shelton                |                                  |   |                        |                                   |                              |   |
|  | Trails West (Palomar)            |                                  |   |                        |                                   |                              |   |
|  | NWP East OR Mainline EXP         |                                  |   |                        |                                   |                              |   |
|  | Incremental GTN S-N              |                                  |   |                        |                                   |                              |   |
|  | Incremental Enbridge             |                                  |   |                        |                                   |                              |   |
|  | Pacific Connector                |                                  |   |                        |                                   |                              |   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | <b>Current Station2</b>          | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    | N/A                    | N/A                               | N/A                          | OR101-N/A                         |
|  | <b>Current NOVA</b>              | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|  | <b>Current GTN</b>               | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|  | <b>Current NWP</b>               | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|  | <b>Current Foothills</b>         | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              |                                   |
|  | <b>Current Ruby</b>              | PLY-2                            | OPAL BASE                                 |                        |                                   |                              |                                   |
|  |                                  | MIST                             | KERN WINTER                               |                        |                                   |                              |                                   |
|  |                                  |                                  | STAT2 BASE                                |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
| No Evergreen   | <b>Incremental NGTL</b>          | <b>Spire Storage</b>             | <b>Opal Incrm Supply</b>                  | N/A                    | N/A                               | N/A                          | WA502-N/A                         |
|  | <b>Incremental GTN N-S</b>       | <b>Gill Ranch Storage</b>        | <b>RenewableNaturalGas</b>                |                        |                                   |                              |                                   |
|  | <b>NWP I-5 Mainline EXP</b>      | <b>Wild Goose Storage</b>        | <b>Resource Mix - 3 Basins</b>            |                        |                                   |                              |                                   |
|  | <b>Incremental Ruby</b>          | <b>Aeco Hub Storage</b>          | <b>DSM</b>                                |                        |                                   |                              |                                   |
|  | <b>NWP Wen lateral EXP</b>       | <b>Magnum Storage</b>            |   |                        |                                   |                              |                                   |
|  | <b>Incremental Foothills</b>     | <b>Clay Basin Storage</b>        |   |                        |                                   |                              |                                   |
|  | <b>NWP 220 lateral EXP</b>       |                                  |   |                        |                                   |                              |                                   |
|  | <b>T-South-So Crossing</b>       |                                  |   |                        |                                   |                              |                                   |
|  | <b>Bremerton/Shelton</b>         |                                  |   |                        |                                   |                              |                                   |
|  | <b>Trails West (Palomar)</b>     |                                  |   |                        |                                   |                              |                                   |
|  | <b>NWP East OR Mainline EXP</b>  |                                  |   |                        |                                   |                              |                                   |
| <b>Incremental GTN S-N</b>   |                                  |                                  |   |                        |                                   |                              |                                   |
| <b>Incremental Enbridge</b>  |                                  |                                  |   |                        |                                   |                              |                                   |
| <b>Pacific Connector</b>   |                                  |                                  |   |                        |                                   |                              |                                   |

| KEY ELEMENTS IN SENDOUT SCENARIO |  | NPV 20 Year<br>Costs in \$000s | Average Cost<br>Per Therm | Max Year Unserved<br>Demand (Therms) | Total Served<br>Demand (Therms) | Class of Unserved<br>Demand (Therms) |
|----------------------------------|--|--------------------------------|---------------------------|--------------------------------------|---------------------------------|--------------------------------------|
| SCENARIO NAME                    | High Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited |                                |                           |                                      |                                 |                                      |
| KEY ELEMENTS IN SENDOUT SCENARIO |  |                                |                           |                                      |                                 |                                      |
| Current Station2                 | JP1  |                                |                           |                                      |                                 |                                      |
|                                  | AECO Base/Fixed, Winter, Day W/S, Peak   |                                |                           |                                      |                                 |                                      |
| Current NOVA                     | JP2  |                                |                           |                                      |                                 |                                      |
|                                  | SUMAS Base/Fixed, Winter, Day W/S, Peak  |                                |                           |                                      |                                 |                                      |
| Current GTN                      | JP3  |                                |                           |                                      |                                 |                                      |
|                                  | ROCKIES Base/Fixed, Winter, Day W/S, Peak  |                                |                           |                                      |                                 |                                      |
| Current NWP                      | JP4  |                                |                           |                                      |                                 |                                      |
|                                  | HUNT Base/Fixed, Winter, Day W/S   |                                |                           |                                      |                                 |                                      |
| Current Foothills                | PLY-1  |                                |                           |                                      |                                 | OR101-0                              |
|                                  | KINGSGATE BASE   |                                |                           |                                      |                                 |                                      |
| Current Ruby                     | PLY-2  |                                |                           |                                      |                                 | OR104-65755                          |
|                                  | OPAL BASE  |                                |                           |                                      |                                 |                                      |
|                                  | MIST   |                                |                           |                                      |                                 | OR105-36285                          |
|                                  |  |                                |                           |                                      |                                 | OR111-6695                           |
|                                  |  |                                |                           |                                      |                                 | OR170-2327                           |
| High Growth                      | <i>Incremental NGTL</i>  | 4,627,197                      | 0.547818                  | 146,640                              | 8,446,602,544                   | WA502-0                              |
|                                  | <i>Incremental GTN N-S</i>   |                                |                           |                                      |                                 | WA503-14                             |
|                                  | <i>NWP I-5 Mainline EXP</i>  |                                |                           |                                      |                                 | WA504-0                              |
|                                  | <i>Incremental Ruby</i>  |                                |                           |                                      |                                 | WA505-8867                           |
|                                  | <i>NWP Wen lateral EXP</i>   |                                |                           |                                      |                                 | WA511-22085                          |
|                                  | <i>Incremental Foothills</i>   |                                |                           |                                      |                                 | WA512-2306                           |
|                                  | <i>NWP Z20 lateral EXP</i>   |                                |                           |                                      |                                 | WA570-2306                           |
|                                  | <i>T-South-So Crossing</i>   |                                |                           |                                      |                                 | WA577-0                              |
|                                  | <i>Bremerton/Shelton</i>   |                                |                           |                                      |                                 |                                      |
|                                  | <i>Trails West (Palomar)</i>   |                                |                           |                                      |                                 |                                      |
|                                  | <i>NWP East OR Mainline EXP</i>  |                                |                           |                                      |                                 |                                      |
|                                  | <i>Incremental GTN S-N</i>   |                                |                           |                                      |                                 |                                      |
|                                  | <i>Incremental Enbridge</i>  |                                |                           |                                      |                                 |                                      |
|                                  | <i>Pacific Connector</i>   |                                |                           |                                      |                                 |                                      |
|                                  | <i>Spire Storage</i>   |                                |                           |                                      |                                 |                                      |
|                                  | <i>Gill Ranch Storage</i>  |                                |                           |                                      |                                 |                                      |
|                                  | <i>Wild Goose Storage</i>  |                                |                           |                                      |                                 |                                      |
|                                  | <i>Aeco Hub Storage</i>  |                                |                           |                                      |                                 |                                      |
|                                  | <i>Magnum Storage</i>  |                                |                           |                                      |                                 |                                      |
|                                  | <i>Clay Basin Storage</i>  |                                |                           |                                      |                                 |                                      |
|                                  | <i>Opal InCRM Supply</i>   |                                |                           |                                      |                                 |                                      |
|                                  | <i>Renewable Natural Gas</i>   |                                |                           |                                      |                                 |                                      |
|                                  | <i>Resource Mix - 3 Basins</i>   |                                |                           |                                      |                                 |                                      |
|                                  | <i>DSM</i>   |                                |                           |                                      |                                 |                                      |

| SCENARIO NAME            | KEY ELEMENTS IN SENDOUT SCENARIO  |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--------------------------|---|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|                          | KEY ELEMENTS IN SENDOUT SCENARIO  | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Low Growth               | Low Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in RED mean those elements were excluded from the scenario. Items in BLUE were limited |                                  |   |                        |                                   |                              |                                   |
|                          | Current Station2  | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    | 4,094,227              | 0.571291                          | 0                            | 7,166,617,619                     |
|                          | Current NOVA  | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|                          | Current GTN   | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|                          | Current NWP   | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|                          | Current Foothills   | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              |                                   |
|                          | Current Ruby  | PLY-2                            | OPAL BASE                                 |                        |                                   |                              |                                   |
|                          |   | MIST                             | KERN WINTER                               |                        |                                   |                              |                                   |
|                          |   |                                  | STAT2 BASE                                |                        |                                   |                              |                                   |
|                          |   |                                  |   |                        |                                   |                              |                                   |
|                          | Incremental NGTL  | Spire Storage                    | Opal Incrm Supply                         |                        |                                   |                              |                                   |
|                          | Incremental GTN N-S   | Gill Ranch Storage               | RenewableNaturalGas                       |                        |                                   |                              |                                   |
|                          | NWP I-5 Mainline EXP  | Wild Goose Storage               | Resource Mix - 3 Basins                   |                        |                                   |                              |                                   |
| Incremental Ruby         | Aeco Hub Storage  | DSM                              |   |                        |                                   |                              |                                   |
| NWP Wen lateral EXP      | Magnum Storage  |                                  |   |                        |                                   |                              |                                   |
| Incremental Foothills    | Clay Basin Storage  |                                  |   |                        |                                   |                              |                                   |
| NWP Z20 lateral EXP      |   |                                  |   |                        |                                   |                              |                                   |
| T-South-So Crossing      |   |                                  |   |                        |                                   |                              |                                   |
| Bremerton/Shelton        |   |                                  |   |                        |                                   |                              |                                   |
| Trails West (Palomar)    |   |                                  |   |                        |                                   |                              |                                   |
| NWP East OR Mainline EXP |   |                                  |   |                        |                                   |                              |                                   |
| Incremental GTN S-N      |   |                                  |   |                        |                                   |                              |                                   |
| Incremental Enbridge     |   |                                  |   |                        |                                   |                              |                                   |
| Pacific Connector        |   |                                  |   |                        |                                   |                              |                                   |

| SCENARIO NAME   | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms)   |
|---|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|---|
|   | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |   |
| Medium Load Growth, Stochastic Pricing with 0% Environmental Adder, Average Weather w/ Peak Event, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited |                                  |                                  |   |                        |                                   |                              |   |
| 0% Environmental Adder  | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    | 4,200,421              | 0                                 | 7,773,589,334                | OR101-0<br>OR104-0<br>OR105-0<br>OR111-0<br>OR170-0<br>WA502-0<br>WA503-0<br>WA504-0<br>WA505-0<br>WA511-0<br>WA512-0<br>WA570-0<br>WA577-0 |
|   | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |   |
|   | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |   |
|   | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |   |
|   | Current Foothills                | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              |   |
|   | Current Ruby                     | PLY-2                            | OPAL BASE                                 |                        |                                   |                              |   |
|   |                                  | MIST                             | KERN WINTER                               |                        |                                   |                              |   |
|   |                                  |                                  | STAT2 BASE                                |                        |                                   |                              |   |
|   |                                  |                                  |   |                        |                                   |                              |   |
|   | <i>Incremental NGTL</i>          | <i>Spire Storage</i>             | <i>Opal Incrm Supply</i>                  |                        |                                   |                              |   |
|   | <i>Incremental GTN N-S</i>       | <i>Gill Ranch Storage</i>        | <i>RenewableNaturalGas</i>                |                        |                                   |                              |   |
|   | <i>NWP I-5 Mainline EXP</i>      | <i>Wild Goose Storage</i>        | <i>Resource Mix - 3 Basins</i>            |                        |                                   |                              |   |
|   | <i>Incremental Ruby</i>          | <i>Aeco Hub Storage</i>          | <i>DSM</i>                                |                        |                                   |                              |   |
|   | <i>NWP Wen lateral EXP</i>       | <i>Magnum Storage</i>            |   |                        |                                   |                              |   |
|   | <i>Incremental Foothills</i>     | <i>Clay Basin Storage</i>        |   |                        |                                   |                              |   |
| <i>NWP Z20 lateral EXP</i>  |                                  |                                  |   |                        |                                   |                              |   |
| <i>T-South-So Crossing</i>  |                                  |                                  |   |                        |                                   |                              |   |
| <i>Bremerton/Shelton</i>  |                                  |                                  |   |                        |                                   |                              |   |
| <i>Trails West (Palomar)</i>  |                                  |                                  |   |                        |                                   |                              |   |
| <i>NWP East OR Mainline EXP</i>   |                                  |                                  |   |                        |                                   |                              |   |
| <i>Incremental GTN S-N</i>  |                                  |                                  |   |                        |                                   |                              |   |
| <i>Incremental Enbridge</i>   |                                  |                                  |   |                        |                                   |                              |   |
| <i>Pacific Connector</i>  |                                  |                                  |   |                        |                                   |                              |   |



| SCENARIO NAME            | KEY ELEMENTS IN SENDOUT SCENARIO   |  | NPV 20 Year Costs in \$000s | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms)   |                         |
|--------------------------|--|--|-----------------------------|------------------------|-----------------------------------|------------------------------|---|-------------------------|
|                          | Current Station2   | KEY ELEMENTS IN SENDOUT SCENARIO       |                             |                        |                                   |                              |   |                         |
| 20% Environmental Adder  | Medium Load Growth, Stochastic Pricing with 20% Environmental Adder, Average Weather w/ Peak Event, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | AECO Base/Fixed, Winter, Day W/S, Peak | 4,402,809                   | 0.566380               | 0                                 | 7,773,589,334                | OR101-0<br>OR104-0<br>OR105-0<br>OR111-0<br>OR170-0<br>WA502-0<br>WA503-0<br>WA504-0<br>WA505-0<br>WA511-0<br>WA512-0<br>WA570-0<br>WA577-0 |                         |
|                          | Current Station2   | JP1                                    |                             |                        |                                   |                              |   |                         |
|                          | Current NOVA   | JP2                                    |                             |                        |                                   |                              |   |                         |
|                          | Current GTN  | JP3                                    |                             |                        |                                   |                              |   |                         |
|                          | Current NWP  | JP4                                    |                             |                        |                                   |                              |   |                         |
|                          | Current Foothills  | PLY-1                                  |                             |                        |                                   |                              |   |                         |
|                          | Current Ruby   | PLY-2                                  |                             |                        |                                   |                              |   |                         |
|                          |  | MIST                                   |                             |                        |                                   |                              |   |                         |
|                          |  | STAT2 BASE                             |                             |                        |                                   |                              |   |                         |
|                          | Incremental NGTL   | Spire Storage                          |                             |                        |                                   |                              |   | Opal Incrm Supply       |
|                          | Incremental GTN N-S  | Gill Ranch Storage                     |                             |                        |                                   |                              |   | RenewableNaturalGas     |
|                          | NWP I-5 Mainline EXP   | Wild Goose Storage                     |                             |                        |                                   |                              |   | Resource Mix - 3 Basins |
|                          | Incremental Ruby   | Aeco Hub Storage                       |                             |                        |                                   |                              |   | DSM                     |
|                          | NWP Wen lateral EXP  | Magnum Storage                         |                             |                        |                                   |                              |   |                         |
| Incremental Foothills    | Clay Basin Storage   |  |                             |                        |                                   |                              |   |                         |
| NWP Z20 lateral EXP      |  |  |                             |                        |                                   |                              |   |                         |
| T-South-So Crossing      |  |  |                             |                        |                                   |                              |   |                         |
| Bremerton/Shelton        |  |  |                             |                        |                                   |                              |   |                         |
| Trails West (Palomar)    |  |  |                             |                        |                                   |                              |   |                         |
| NWP East OR Mainline EXP |  |  |                             |                        |                                   |                              |   |                         |
| Incremental GTN S-N      |  |  |                             |                        |                                   |                              |   |                         |
| Incremental Enbridge     |  |  |                             |                        |                                   |                              |   |                         |
| Pacific Connector        |  |  |                             |                        |                                   |                              |   |                         |

| SCENARIO NAME            | KEY ELEMENTS IN SENDOUT SCENARIO   |  | NPV 20 Year Costs in \$000s | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms)   |                         |
|--------------------------|--|--|-----------------------------|------------------------|-----------------------------------|------------------------------|---|-------------------------|
|                          | KEY ELEMENTS IN SENDOUT SCENARIO   | KEY ELEMENTS IN SENDOUT SCENARIO       |                             |                        |                                   |                              |   |                         |
| 30% Environmental Adder  | Medium Load Growth, Stochastic Pricing with 30% Environmental Adder, Average Weather w/ Peak Event, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | AECO Base/Fixed, Winter, Day W/S, Peak | 4,498,902                   | 0.578742               | 0                                 | 7,773,589,334                | OR101-0<br>OR104-0<br>OR105-0<br>OR111-0<br>OR170-0<br>WA502-0<br>WA503-0<br>WA504-0<br>WA505-0<br>WA511-0<br>WA512-0<br>WA570-0<br>WA577-0 |                         |
|                          | Current Station2   | JP1                                    |                             |                        |                                   |                              |   |                         |
|                          | Current NOVA   | JP2                                    |                             |                        |                                   |                              |   |                         |
|                          | Current GTN  | JP3                                    |                             |                        |                                   |                              |   |                         |
|                          | Current NWP  | JP4                                    |                             |                        |                                   |                              |   |                         |
|                          | Current Foothills  | PLY-1                                  |                             |                        |                                   |                              |   |                         |
|                          | Current Ruby   | PLY-2                                  |                             |                        |                                   |                              |   |                         |
|                          |  | MIST                                   |                             |                        |                                   |                              |   |                         |
|                          |  | STAT2 BASE                             |                             |                        |                                   |                              |   |                         |
|                          | Incremental NGTL   | Spire Storage                          |                             |                        |                                   |                              |   | Opal Incrm Supply       |
|                          | Incremental GTN N-S  | Gill Ranch Storage                     |                             |                        |                                   |                              |   | RenewableNaturalGas     |
|                          | NWP I-5 Mainline EXP   | Wild Goose Storage                     |                             |                        |                                   |                              |   | Resource Mix - 3 Basins |
|                          | Incremental Ruby   | Aeco Hub Storage                       |                             |                        |                                   |                              |   | DSM                     |
|                          | NWP Wen lateral EXP  | Magnum Storage                         |                             |                        |                                   |                              |   |                         |
| Incremental Foothills    | Clay Basin Storage   |  |                             |                        |                                   |                              |   |                         |
| NWP Z20 lateral EXP      |  |  |                             |                        |                                   |                              |   |                         |
| T-South-So Crossing      |  |  |                             |                        |                                   |                              |   |                         |
| Bremerton/Shelton        |  |  |                             |                        |                                   |                              |   |                         |
| Trails West (Palomar)    |  |  |                             |                        |                                   |                              |   |                         |
| NWP East OR Mainline EXP |  |  |                             |                        |                                   |                              |   |                         |
| Incremental GTN S-N      |  |  |                             |                        |                                   |                              |   |                         |
| Incremental Enbridge     |  |  |                             |                        |                                   |                              |   |                         |
| Pacific Connector        |  |  |                             |                        |                                   |                              |   |                         |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s                   | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1                              | <b>AECO Base/Fixed, Winter, Day W/S, Peak</b> | 4,441,634              | 1,451,758                         | 7,749,929,144                | OR101-49082                       |
|  | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak       |                        |                                   |                              |                                   |
|  | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak     |                        |                                   |                              |                                   |
|  | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S              |                        |                                   |                              |                                   |
|  | Current Foothills                | PLY-1                            | <b>KINGSGATE BASE</b>                         |                        |                                   |                              |                                   |
|  | Current Ruby                     | PLY-2                            | OPAL BASE                                     |                        |                                   |                              |                                   |
|  |                                  | MIST                             | KERN WINTER                                   |                        |                                   |                              |                                   |
|  |                                  |                                  | STAT2 BASE                                    |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
| No Alberta   | Incremental NGTL                 | <b>Spire Storage</b>             | <b>Opal Incrm Supply</b>                      | 0.573119               | 1,451,758                         | 7,749,929,144                | WA502-0                           |
|  | Incremental GTN N-S              | <b>Gill Ranch Storage</b>        | <b>RenewableNaturalGas</b>                    |                        |                                   |                              |                                   |
|  | NWP I-5 Mainline EXP             | <b>Wild Goose Storage</b>        | <b>Resource Mix - 3 Basins</b>                |                        |                                   |                              |                                   |
|  | Incremental Ruby                 | <b>Aeco Hub Storage</b>          | <b>DSM</b>                                    |                        |                                   |                              |                                   |
|  | NWP Wen lateral EXP              | <b>Magnum Storage</b>            |   |                        |                                   |                              |                                   |
|  | Incremental Foothills            | <b>Clay Basin Storage</b>        |   |                        |                                   |                              |                                   |
|  | NWP Z20 lateral EXP              |                                  |   |                        |                                   |                              |                                   |
|  | T-South-So Crossing              |                                  |   |                        |                                   |                              |                                   |
|  | Bremerton/Shelton                |                                  |   |                        |                                   |                              |                                   |
|  | Trails West (Palomar)            |                                  |   |                        |                                   |                              |                                   |
|  | NWP East OR Mainline EXP         |                                  |   |                        |                                   |                              |                                   |
|  | Incremental GTN S-N              |                                  |   |                        |                                   |                              |                                   |
|  | Incremental Enbridge             |                                  |   |                        |                                   |                              |                                   |
|  | Pacific Connector                |                                  |   |                        |                                   |                              |                                   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s                    | Average Cost Per Therm         | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |           |
|--|----------------------------------|----------------------------------|--|--------------------------------|-----------------------------------|------------------------------|-----------------------------------|-----------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |  |                                |                                   |                              |                                   |           |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak         |                                |                                   |                              |                                   |           |
|  | Current NOVA                     | JP2                              | <b>SUMAS Base/Fixed, Winter, Day W/S, Peak</b> |                                |                                   |                              |                                   |           |
|  | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak      |                                |                                   |                              |                                   |           |
|  | Current NWP                      | JP4                              | <b>HUNT Base/Fixed, Winter, Day W/S</b>        |                                |                                   |                              |                                   |           |
|  | Current Foothills                | PLY-1                            | KINGSGATE BASE                                 |                                |                                   |                              | OR101-N/A                         |           |
|  | Current Ruby                     | PLY-2                            | OPAL BASE                                      |                                |                                   |                              | OR104-N/A                         |           |
|  |                                  | MIST                             | KERN WINTER                                    |                                |                                   |                              | OR105-N/A                         |           |
|  |                                  |                                  | <b>STAT2 BASE</b>                              |                                |                                   |                              | OR111-N/A                         |           |
|  |                                  |                                  |  |                                |                                   |                              | OR170-N/A                         |           |
|  | No BC                            | Incremental NGTL                 | <b>Spire Storage</b>                           | <b>Opal Incrm Supply</b>       | N/A                               | N/A                          | N/A                               | WA502-N/A |
|  |                                  | Incremental GTN N-S              | <b>Gill Ranch Storage</b>                      | <b>RenewableNaturalGas</b>     |                                   |                              |                                   | WA503-N/A |
|  |                                  | NWP I-5 Mainline EXP             | <b>Wild Goose Storage</b>                      | <b>Resource Mix - 3 Basins</b> |                                   |                              |                                   | WA504-N/A |
|  |                                  | Incremental Ruby                 | <b>Aeco Hub Storage</b>                        | <b>DSM</b>                     |                                   |                              |                                   | WA505-N/A |
|  |                                  | NWP Wen lateral EXP              | <b>Magnum Storage</b>                          |                                |                                   |                              |                                   | WA511-N/A |
| Incremental Foothills  |                                  | <b>Clay Basin Storage</b>        |  |                                |                                   |                              | WA512-N/A                         |           |
| NWP Z20 lateral EXP  |                                  |                                  |  |                                |                                   |                              | WA570-N/A                         |           |
| T-South-So Crossing<br>Bremerton/Shelton<br>Trails West (Palomar)<br>NWP East OR Mainline EXP<br>Incremental GTN S-N<br>Incremental Enbridge<br>Pacific Connector  |                                  |                                  |  |                                |                                   | WA577-N/A                    |                                   |           |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm  | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |               |
|--|----------------------------------|----------------------------------|---|-------------------------|-----------------------------------|------------------------------|-----------------------------------|---------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                         |                                   |                              |                                   |               |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    |                         |                                   |                              |                                   |               |
|  | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                         |                                   |                              |                                   |               |
|  | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                         |                                   |                              |                                   |               |
|  | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                         |                                   |                              |                                   |               |
|  | Current Foothills                | PLY-1                            | KINGSGATE BASE                            |                         |                                   |                              | OR101-0                           |               |
|  | Current Ruby                     | PLY-2                            | OPAL BASE                                 |                         |                                   |                              | OR104-120342                      |               |
|  |                                  | MIST                             | KERN WINTER                               |                         |                                   |                              | OR105-305339                      |               |
|  |                                  |                                  | STAT2 BASE                                |                         |                                   |                              | OR111-397521                      |               |
|  |                                  |                                  |   |                         |                                   |                              | OR170-826035                      |               |
|  |                                  |                                  |   |                         |                                   |                              | WA502-0                           |               |
|  | No Rockies                       |                                  |   | 4,543,428               | 0.595693                          | 15,463,739                   | 7,627,136,025                     | WA503-1019    |
|  |                                  | Incremental NGTL                 | Spire Storage                             | Opal Incrm Supply       |                                   |                              |                                   | WA504-1695034 |
|  |                                  | Incremental GTN N-S              | Gill Ranch Storage                        | Renewable Natural Gas   |                                   |                              |                                   | WA505-4426039 |
|  |                                  | NWP I-5 Mainline EXP             | Wild Goose Storage                        | Resource Mix - 3 Basins |                                   |                              |                                   | WA511-6773300 |
|  |                                  | Incremental Ruby                 | Aeco Hub Storage                          | DSM                     |                                   |                              |                                   | WA512-0       |
|  | NWP Wen lateral EXP              | Magnum Storage                   |   |                         |                                   |                              | WA570-675201                      |               |
|  | Incremental Foothills            | Clay Basin Storage               |   |                         |                                   |                              | WA577-243909                      |               |
|  | NWP Z20 lateral EXP              |                                  |   |                         |                                   |                              |                                   |               |
|  | T-South-So Crossing              |                                  |   |                         |                                   |                              |                                   |               |
|  | Bremerton/Shelton                |                                  |   |                         |                                   |                              |                                   |               |
|  | Trails West (Palomar)            |                                  |   |                         |                                   |                              |                                   |               |
|  | NWP East OR Mainline EXP         |                                  |   |                         |                                   |                              |                                   |               |
|  | Incremental GTN S-N              |                                  |   |                         |                                   |                              |                                   |               |
|  | Incremental Enbridge             |                                  |   |                         |                                   |                              |                                   |               |
|  | Pacific Connector                |                                  |   |                         |                                   |                              |                                   |               |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|----------------------------------|-----------------------------|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |                             |                        |                                   |                              |                                   |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1                              | N/A                         | N/A                    | N/A                               | N/A                          | OR101-N/A                         |
|  | Current NOVA                     | JP2                              |                             |                        |                                   |                              |                                   |
|  | Current GTN                      | JP3                              |                             |                        |                                   |                              |                                   |
|  | Current NWP                      | JP4                              |                             |                        |                                   |                              |                                   |
|  | Current Foothills                | PLY-1                            |                             |                        |                                   |                              |                                   |
|  | Current Ruby                     | PLY-2                            |                             |                        |                                   |                              |                                   |
|  |                                  | MIST                             |                             |                        |                                   |                              |                                   |
|  |                                  |                                  |                             |                        |                                   |                              |                                   |
|  |                                  |                                  |                             |                        |                                   |                              |                                   |
|  |                                  |                                  |                             |                        |                                   |                              |                                   |
|  |                                  |                                  |                             |                        |                                   |                              |                                   |
|  |                                  |                                  |                             |                        |                                   |                              |                                   |
|  |                                  |                                  |                             |                        |                                   |                              |                                   |
|  |                                  |                                  |                             |                        |                                   |                              |                                   |
| No Canada  | Incremental NGTL                 | Spire Storage                    | N/A                         | N/A                    | N/A                               | N/A                          | WA502-N/A                         |
|  | Incremental GTN N-S              | Gill Ranch Storage               |                             |                        |                                   |                              |                                   |
|  | NWP I-5 Mainline EXP             | Wild Goose Storage               |                             |                        |                                   |                              |                                   |
|  | Incremental Ruby                 | Aeco Hub Storage                 |                             |                        |                                   |                              |                                   |
|  | NWP Wen lateral EXP              | Magnum Storage                   |                             |                        |                                   |                              |                                   |
|  | Incremental Foothills            | Clay Basin Storage               |                             |                        |                                   |                              |                                   |
|  | NWP Z20 lateral EXP              |                                  |                             |                        |                                   |                              |                                   |
|  | T-South-So Crossing              |                                  |                             |                        |                                   |                              |                                   |
|  | Bremerton/Shelton                |                                  |                             |                        |                                   |                              |                                   |
|  | Trails West (Palomar)            |                                  |                             |                        |                                   |                              |                                   |
|  | NWP East OR Mainline EXP         |                                  |                             |                        |                                   |                              |                                   |
|  | Incremental GTN S-N              |                                  |                             |                        |                                   |                              |                                   |
|  | Incremental Enbridge             |                                  |                             |                        |                                   |                              |                                   |
|  | Pacific Connector                |                                  |                             |                        |                                   |                              |                                   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms)   |
|--|----------------------------------|----------------------------------|-----------------------------|------------------------|-----------------------------------|------------------------------|---|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |                             |                        |                                   |                              |   |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1                              |                             |                        |                                   |                              |   |
|  | Current NOVA                     | JP2                              |                             |                        |                                   |                              |   |
|  | Current GTN                      | JP3                              |                             |                        |                                   |                              |   |
|  | Current NWP                      | JP4                              |                             |                        |                                   |                              |   |
|  | Current Foothills                | PLY-1                            |                             |                        |                                   |                              |   |
|  | Current Ruby                     | PLY-2                            |                             |                        |                                   |                              |   |
|  |                                  | MIST                             |                             |                        |                                   |                              |   |
|  |                                  |                                  |                             |                        |                                   |                              |   |
|  |                                  |                                  |                             |                        |                                   |                              |   |
|  |                                  |                                  |                             |                        |                                   |                              |   |
|  |                                  |                                  |                             |                        |                                   |                              |   |
|  |                                  |                                  |                             |                        |                                   |                              |   |
|  |                                  |                                  |                             |                        |                                   |                              |   |
|  |                                  |                                  |                             |                        |                                   |                              |   |
| Limit Alberta  | Incremental NGTL                 | Spire Storage                    |                             |                        |                                   |                              |   |
|  | Incremental GTN N-S              | Gill Ranch Storage               |                             |                        |                                   |                              |   |
|  | NWP I-5 Mainline EXP             | Wild Goose Storage               |                             |                        |                                   |                              |   |
|  | Incremental Ruby                 | Aeco Hub Storage                 |                             |                        |                                   |                              |   |
|  | NWP Wen lateral EXP              | Magnum Storage                   |                             |                        |                                   |                              |   |
|  | Incremental Foothills            | Clay Basin Storage               |                             |                        |                                   |                              |   |
|  | NWP Z20 lateral EXP              |                                  |                             |                        |                                   |                              |   |
|  | T-South-So Crossing              |                                  |                             |                        |                                   |                              |   |
|  | Bremerton/Shelton                |                                  |                             |                        |                                   |                              |   |
|  | Trails West (Palomar)            |                                  |                             |                        |                                   |                              |   |
|  | NWP East OR Mainline EXP         |                                  |                             |                        |                                   |                              |   |
|  | Incremental GTN S-N              |                                  |                             |                        |                                   |                              |   |
|  | Incremental Enbridge             |                                  |                             |                        |                                   |                              |   |
|  | Pacific Connector                |                                  |                             |                        |                                   |                              |   |
|  |                                  |                                  | 4,234,825                   | 0.545579               | 0                                 | 7,762,076,607                | OR101-0<br>OR104-0<br>OR105-0<br>OR111-0<br>OR170-0<br>WA502-0<br>WA503-0<br>WA504-0<br>WA505-0<br>WA511-0<br>WA512-0<br>WA570-0<br>WA577-0 |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s                    | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms)   |
|--|----------------------------------|----------------------------------|--|------------------------|-----------------------------------|------------------------------|---|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |  |                        |                                   |                              |   |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak         | 4,470,642              | 0.575999                          | 7,761,545,524                |   |
|  | Current NOVA                     | JP2                              | <i>SUMAS Base/Fixed, Winter, Day W/S, Peak</i> |                        |                                   |                              |   |
|  | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak      |                        |                                   |                              |   |
|  | Current NWP                      | JP4                              | <i>HUNT Base/Fixed, Winter, Day W/S</i>        |                        |                                   |                              |   |
|  | Current Foothills                | PLY-1                            | KINGSGATE BASE                                 |                        |                                   |                              |   |
|  | Current Ruby                     | PLY-2                            | OPAL BASE                                      |                        |                                   |                              |   |
|  |                                  | MIST                             | KERN WINTER                                    |                        |                                   |                              |   |
|  |                                  |                                  | <i>STATZ BASE</i>                              |                        |                                   |                              |   |
|  |                                  |                                  |  |                        |                                   |                              |   |
|  | Incremental NGTL                 | <i>Spire Storage</i>             | <i>Opal Incrm Supply</i>                       |                        |                                   |                              |   |
|  | Incremental GTN N-S              | <i>Gill Ranch Storage</i>        | <i>RenewableNaturalGas</i>                     |                        |                                   |                              |   |
|  | <i>NWP I-5 Mainline EXP</i>      | <i>Wild Goose Storage</i>        | <i>Resource Mix - 3 Basins</i>                 |                        |                                   |                              |   |
|  | <i>Incremental Ruby</i>          | <i>Aeco Hub Storage</i>          | <i>DSM</i>                                     |                        |                                   |                              |   |
|  | <i>NWP Wen lateral EXP</i>       | <i>Magnum Storage</i>            |  |                        |                                   |                              |   |
| <i>Incremental Foothills</i>   | <i>Clay Basin Storage</i>        |                                  |  |                        |                                   |                              |   |
| <i>NWP Z20 lateral EXP</i>   |                                  |                                  |  |                        |                                   |                              |   |
| <i>T-South-So Crossing</i>   |                                  |                                  |  |                        |                                   |                              |   |
| <i>Bremerton/Shelton</i>   |                                  |                                  |  |                        |                                   |                              |   |
| <i>Trails West (Palomar)</i>   |                                  |                                  |  |                        |                                   |                              |   |
| <i>NWP East OR Mainline EXP</i>  |                                  |                                  |  |                        |                                   |                              |   |
| <i>Incremental GTN S-N</i>   |                                  |                                  |  |                        |                                   |                              |   |
| <i>Incremental Enbridge</i>  |                                  |                                  |  |                        |                                   |                              |   |
| <i>Pacific Connector</i>   |                                  |                                  |  |                        |                                   |                              |   |
| Limit BC   |                                  |                                  | 4,470,642                                      | 0.575999               | 0                                 | 7,761,545,524                | OR101-0<br>OR104-0<br>OR105-0<br>OR111-0<br>OR170-0<br>WA502-0<br>WA503-0<br>WA504-0<br>WA505-0<br>WA511-0<br>WA512-0<br>WA570-0<br>WA577-0 |



| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    |                        |                                   |                              |                                   |
|  | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|  | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|  | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|  | Current Foothills                | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              | OR101-0                           |
|  | Current Ruby                     | PLY-2                            | OPAL BASE                                 |                        |                                   |                              | OR104-0                           |
|  |                                  | MIST                             | KERN WINTER                               |                        |                                   |                              | OR105-0                           |
|  |                                  |                                  | STAT2 BASE                                |                        |                                   |                              | OR111-0                           |
|  |                                  |                                  |   |                        |                                   |                              | OR170-0                           |
|  |                                  |                                  |   |                        |                                   |                              | WA502-0                           |
|  |                                  |                                  |   |                        |                                   |                              | WA503-0                           |
|  |                                  |                                  |   |                        |                                   |                              | WA504-0                           |
|  |                                  |                                  |   |                        |                                   |                              | WA505-0                           |
|  |                                  |                                  |   |                        |                                   |                              | WA511-0                           |
|  |                                  |                                  |   |                        |                                   | WA512-0                      |                                   |
|  |                                  |                                  |   |                        |                                   | WA570-0                      |                                   |
|  |                                  |                                  |   |                        |                                   | WA577-0                      |                                   |
| Limit Rockies  | Incremental NGTL                 | Spire Storage                    | Opal Incrm Supply                         | 4,259,653              | 0                                 | 7,762,076,607                |                                   |
|  | Incremental GTN N-S              | Gill Ranch Storage               | Renewable Natural Gas                     |                        |                                   |                              |                                   |
|  | NWP I-5 Mainline EXP             | Wild Goose Storage               | Resource Mix - 3 Basins                   |                        |                                   |                              |                                   |
|  | Incremental Ruby                 | Aeco Hub Storage                 | DSM                                       |                        |                                   |                              |                                   |
|  | NWP Wen lateral EXP              | Magnum Storage                   |   |                        |                                   |                              |                                   |
|  | Incremental Foothills            | Clay Basin Storage               |   |                        |                                   |                              |                                   |
|  | NWP Z20 lateral EXP              |                                  |   |                        |                                   |                              |                                   |
|  | T-South-So Crossing              |                                  |   |                        |                                   |                              |                                   |
|  | Bremerton/Shelton                |                                  |   |                        |                                   |                              |                                   |
|  | Trails West (Palomar)            |                                  |   |                        |                                   |                              |                                   |
|  | NWP East OR Mainline EXP         |                                  |   |                        |                                   |                              |                                   |
|  | Incremental GTN S-N              |                                  |   |                        |                                   |                              |                                   |
|  | Incremental Enbridge             |                                  |   |                        |                                   |                              |                                   |
|  | Pacific Connector                |                                  |   |                        |                                   |                              |                                   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO  |   | NPV 20 Year Costs in \$000s  | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|---|---|--|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | Current Station2  | JP1   |  |                        |                                   |                              |                                   |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited |   | <b>AECO Base/Fixed, Winter, Day W/S, Peak</b>   |  |                        |                                   |                              |                                   |
|  |   | <b>SUMAS Base/Fixed, Winter, Day W/S, Peak</b>  |  |                        |                                   |                              |                                   |
|  |   | <b>ROCKIES Base/Fixed, Winter, Day W/S, Peak</b>  |  |                        |                                   |                              |                                   |
|  |   | <b>HUNT Base/Fixed, Winter, Day W/S</b>   |  |                        |                                   |                              |                                   |
|  |   | <b>KINGSGATE BASE</b>   |  |                        |                                   |                              | OR101-0                           |
|  |   | <b>OPAL BASE</b>  |  |                        |                                   |                              | OR104-0                           |
|  |   | <b>KERN WINTER</b>  |  |                        |                                   |                              | OR105-0                           |
|  |   | <b>STAT2 BASE</b>   |  |                        |                                   |                              | OR111-0                           |
|  |   |   |  |                        |                                   |                              | OR170-0                           |
|  |   |   |  |                        |                                   |                              | WA502-0                           |
|  |   |   |  |                        |                                   |                              | WA503-0                           |
|  |   |   |  |                        |                                   |                              | WA504-0                           |
|  |   |   |  |                        |                                   |                              | WA505-0                           |
|  |   |   |  |                        |                                   |                              | WA511-0                           |
|  |   |   |  |                        |                                   |                              | WA512-0                           |
|  |   |   |  |                        |                                   |                              | WA570-0                           |
|  |   |   |  |                        |                                   |                              | WA577-0                           |
| Limit Canada   | <b>Incremental NGTL</b><br><b>Incremental GTN N-S</b><br><b>NWP I-5 Mainline EXP</b><br><b>Incremental Ruby</b><br><b>NWP Wen lateral EXP</b><br><b>Incremental Foothills</b><br><b>NWP Z20 lateral EXP</b><br><b>T-South-So Crossing</b><br><b>Bremerton/Shelton</b><br><b>Trails West (Palomar)</b><br><b>NWP East OR Mainline EXP</b><br><b>Incremental GTN S-N</b><br><b>Incremental Enbridge</b><br><b>Pacific Connector</b> | <b>Spire Storage</b><br><b>Gill Ranch Storage</b><br><b>Wild Goose Storage</b><br><b>Aeco Hub Storage</b><br><b>Magnum Storage</b><br><b>Clay Basin Storage</b> | <b>Opal Incrm Supply</b><br><b>RenewableNaturalGas</b><br><b>Resource Mix - 3 Basins</b><br><b>DSM</b> | 4,419,800              | 0                                 | 7,762,044,013                |                                   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|----------------------------------|-----------------------------|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |                             |                        |                                   |                              |                                   |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited |                                  |                                  |                             |                        |                                   |                              |                                   |
|  | <b>Current Station2</b>          | <b>JP1</b>                       |                             |                        |                                   |                              |                                   |
|  | <b>Current NOVA</b>              | <b>JP2</b>                       |                             |                        |                                   |                              |                                   |
|  | <b>Current GTN</b>               | <b>JP3</b>                       |                             |                        |                                   |                              |                                   |
|  | <b>Current NWP</b>               | <b>JP4</b>                       |                             |                        |                                   |                              |                                   |
|  | <b>Current Foothills</b>         | <b>PLY-1</b>                     |                             |                        |                                   |                              | OR101-0                           |
|  | <b>Current Ruby</b>              | <b>PLY-2</b>                     |                             |                        |                                   |                              | OR104-0                           |
|  |                                  | <b>MIST</b>                      |                             |                        |                                   |                              | OR105-0                           |
|  |                                  |                                  |                             |                        |                                   |                              | OR111-0                           |
|  |                                  |                                  |                             |                        |                                   |                              | OR170-0                           |
|  |                                  |                                  |                             |                        |                                   |                              | WA502-0                           |
| No JP  | <b>Incremental NGTL</b>          | <b>Spire Storage</b>             | 4,421,787                   | 0.569666               | 0                                 | 7,762,076,607                | WA503-0                           |
|  | <b>Incremental GTN N-S</b>       | <b>Gill Ranch Storage</b>        |                             |                        |                                   |                              | WA504-0                           |
|  | <b>NWP I-5 Mainline EXP</b>      | <b>Wild Goose Storage</b>        |                             |                        |                                   |                              | WA505-0                           |
|  | <b>Incremental Ruby</b>          | <b>Aeco Hub Storage</b>          |                             |                        |                                   |                              | WA511-0                           |
|  | <b>NWP Wen lateral EXP</b>       | <b>Magnum Storage</b>            |                             |                        |                                   |                              | WA512-0                           |
|  | <b>Incremental Foothills</b>     | <b>Clay Basin Storage</b>        |                             |                        |                                   |                              | WA570-0                           |
|  | <b>NWP Z20 lateral EXP</b>       |                                  |                             |                        |                                   |                              | WA577-0                           |
|  | <b>T-South-So Crossing</b>       |                                  |                             |                        |                                   |                              |                                   |
|  | <b>Bremerton/Shelton</b>         |                                  |                             |                        |                                   |                              |                                   |
|  | <b>Trails West (Palomar)</b>     |                                  |                             |                        |                                   |                              |                                   |
|  | <b>NWP East OR Mainline EXP</b>  |                                  |                             |                        |                                   |                              |                                   |
|  | <b>Incremental GTN S-N</b>       |                                  |                             |                        |                                   |                              |                                   |
|  | <b>Incremental Enbridge</b>      |                                  |                             |                        |                                   |                              |                                   |
|  | <b>Pacific Connector</b>         |                                  |                             |                        |                                   |                              |                                   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO       |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|--|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO       | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                       | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    | 0.564889               | 87,933                            | 7,761,865,356                |                                   |
|  | Current NOVA                           | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|  | Current GTN                            | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|  | Current NWP                            | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|  | Current Foothills                      | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              |                                   |
|  | Current Ruby                           | PLY-2                            | OPAL BASE                                 |                        |                                   |                              |                                   |
|  |  | MIST                             | KERN WINTER                               |                        |                                   |                              |                                   |
|  |  |                                  | STAT2 BASE                                |                        |                                   |                              |                                   |
|  |  |                                  |   |                        |                                   |                              |                                   |
|  |  |                                  |   |                        |                                   |                              |                                   |
|  |  |                                  |   |                        |                                   |                              |                                   |
|  |  |                                  |   |                        |                                   |                              |                                   |
|  |  |                                  |   |                        |                                   |                              |                                   |
| No Ply   | Incremental NGTL                       | Spire Storage                    | Opal Incrm Supply                         | 0.564889               | 87,933                            | 7,761,865,356                |                                   |
|  | Incremental GTN N-S                    | Gill Ranch Storage               | RenewableNaturalGas                       |                        |                                   |                              |                                   |
|  | NWP I-5 Mainline EXP                   | Wild Goose Storage               | Resource Mix - 3 Basins                   |                        |                                   |                              |                                   |
|  | Incremental Ruby                       | Aeco Hub Storage                 | DSM                                       |                        |                                   |                              |                                   |
|  | NWP Wen lateral EXP                    | Magnum Storage                   |   |                        |                                   |                              |                                   |
|  | Incremental Foothills                  | Clay Basin Storage               |   |                        |                                   |                              |                                   |
|  | NWP Z20 lateral EXP                    |                                  |   |                        |                                   |                              |                                   |
|  | T-South-So Crossing                    |                                  |   |                        |                                   |                              |                                   |
|  | Bremerton/Shelton                      |                                  |   |                        |                                   |                              |                                   |
|  | Trails West (Palomar)                  |                                  |   |                        |                                   |                              |                                   |
|  | NWP East OR Mainline EXP               |                                  |   |                        |                                   |                              |                                   |
|  | Incremental GTN S-N                    |                                  |   |                        |                                   |                              |                                   |
|  | Incremental Enbridge Pacific Connector |                                  |   |                        |                                   |                              |                                   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    | 4,339,958              | 0.559123                          | 7,762,076,607                |                                   |
|  | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|  | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|  | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|  | Current Foothills                | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              |                                   |
|  | Current Ruby                     | PLY-2                            | OPAL BASE                                 |                        |                                   |                              |                                   |
|  |                                  | MIST                             | KERN WINTER                               |                        |                                   |                              |                                   |
|  |                                  |                                  | STAT2 BASE                                |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
|  |                                  |                                  |   |                        |                                   |                              |                                   |
| No Mist  | Incremental NGTL                 | Spire Storage                    | Opal Incrm Supply                         |                        |                                   |                              |                                   |
|  | Incremental GTN N-S              | Gill Ranch Storage               | RenewableNaturalGas                       |                        |                                   |                              |                                   |
|  | NWP I-5 Mainline EXP             | Wild Goose Storage               | Resource Mix - 3 Basins                   |                        |                                   |                              |                                   |
|  | Incremental Ruby                 | Aeco Hub Storage                 | DSM                                       |                        |                                   |                              |                                   |
|  | NWP Wen lateral EXP              | Magnum Storage                   |   |                        |                                   |                              |                                   |
|  | Incremental Foothills            | Clay Basin Storage               |   |                        |                                   |                              |                                   |
|  | NWP Z20 lateral EXP              |                                  |   |                        |                                   |                              |                                   |
|  | T-South-So Crossing              |                                  |   |                        |                                   |                              |                                   |
|  | Bremerton/Shelton                |                                  |   |                        |                                   |                              |                                   |
|  | Trails West (Palomar)            |                                  |   |                        |                                   |                              |                                   |
|  | NWP East OR Mainline EXP         |                                  |   |                        |                                   |                              |                                   |
|  | Incremental GTN S-N              |                                  |   |                        |                                   |                              |                                   |
|  | Incremental Enbridge             |                                  |   |                        |                                   |                              |                                   |
|  | Pacific Connector                |                                  |   |                        |                                   |                              |                                   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | <b>JP1</b>                       | AECO Base/Fixed, Winter, Day W/S, Peak    |                        |                                   |                              |                                   |
|  | Current NOVA                     | <b>JP2</b>                       | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|  | Current GTN                      | <b>JP3</b>                       | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|  | Current NWP                      | <b>JP4</b>                       | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|  | Current Foothills                | <b>PLY-1</b>                     | KINGSGATE BASE                            |                        |                                   |                              | OR101-0                           |
|  | Current Ruby                     | <b>PLY-2</b>                     | OPAL BASE                                 |                        |                                   |                              | OR104-307201                      |
|  |                                  | <b>MIST</b>                      | KERN WINTER                               |                        |                                   |                              | OR105-30529                       |
|  |                                  |                                  | STAT2 BASE                                |                        |                                   |                              | OR111-18710                       |
|  |                                  |                                  |   |                        |                                   |                              | OR170-19919                       |
|  |                                  |                                  |   |                        |                                   |                              | WA502-0                           |
|  |                                  |                                  |   |                        |                                   |                              | WA503-0                           |
|  |                                  |                                  |   |                        |                                   |                              | WA504-802631                      |
|  |                                  |                                  |   |                        |                                   |                              | WA505-81166                       |
|  |                                  |                                  |   |                        |                                   | WA511-89318                  |                                   |
|  |                                  |                                  |   |                        |                                   | WA512-146                    |                                   |
|  |                                  |                                  |   |                        |                                   | WA570-6115                   |                                   |
|  |                                  |                                  |   |                        |                                   | WA577-388                    |                                   |
| No Storage   | <b>Incremental NGTL</b>          | <b>Spire Storage</b>             | <b>Opal Incrm Supply</b>                  | 0.673719               | 1,356,123                         | 7,310,977,075                |                                   |
|  | <b>Incremental GTN N-S</b>       | <b>Gill Ranch Storage</b>        | <b>RenewableNaturalGas</b>                |                        |                                   |                              |                                   |
|  | <b>NWP I-5 Mainline EXP</b>      | <b>Wild Goose Storage</b>        | <b>Resource Mix - 3 Basins</b>            |                        |                                   |                              |                                   |
|  | <b>Incremental Ruby</b>          | <b>Aeco Hub Storage</b>          | <b>DSM</b>                                |                        |                                   |                              |                                   |
|  | <b>NWP Wen lateral EXP</b>       | <b>Magnum Storage</b>            |   |                        |                                   |                              |                                   |
|  | <b>Incremental Foothills</b>     | <b>Clay Basin Storage</b>        |   |                        |                                   |                              |                                   |
|  | <b>NWP Z20 lateral EXP</b>       |                                  |   |                        |                                   |                              |                                   |
|  | <b>T-South-So Crossing</b>       |                                  |   |                        |                                   |                              |                                   |
|  | <b>Bremerton/Shelton</b>         |                                  |   |                        |                                   |                              |                                   |
|  | <b>Trails West (Palomar)</b>     |                                  |   |                        |                                   |                              |                                   |
|  | <b>NWP East OR Mainline EXP</b>  |                                  |   |                        |                                   |                              |                                   |
|  | <b>Incremental GTN S-N</b>       |                                  |   |                        |                                   |                              |                                   |
|  | <b>Incremental Enbridge</b>      |                                  |   |                        |                                   |                              |                                   |
|  | <b>Pacific Connector</b>         |                                  |   |                        |                                   |                              |                                   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    |                        |                                   |                              |                                   |
|  | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|  | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|  | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|  | Current Foothills                | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              | OR101-0                           |
|  | Current Ruby                     | PLY-2                            | OPAL BASE                                 |                        |                                   |                              | OR104-0                           |
|  |                                  | MIST                             | KERN WINTER                               |                        |                                   |                              | OR105-0                           |
|  |                                  |                                  | STAT2 BASE                                |                        |                                   |                              | OR111-0                           |
|  |                                  |                                  |   |                        |                                   |                              | OR170-0                           |
|  | Incremental NGTL                 | Spire Storage                    | Opal Incrm Supply                         |                        |                                   |                              | WA502-0                           |
|  | Incremental GTN N-S              | Gill Ranch Storage               | Renewable Natural Gas                     |                        |                                   |                              | WA503-0                           |
|  | NWP I-5 Mainline EXP             | Wild Goose Storage               | Resource Mix - 3 Basins                   |                        |                                   |                              | WA504-0                           |
|  | Incremental Ruby                 | Aeco Hub Storage                 | DSM                                       |                        |                                   |                              | WA505-0                           |
|  | NWP Wen lateral EXP              | Magnum Storage                   |   |                        |                                   |                              | WA511-0                           |
| Incremental Foothills  | Clay Basin Storage               |                                  |   |                        |                                   | WA512-0                      |                                   |
| NWP Z20 lateral EXP  |                                  |                                  |   |                        |                                   | WA570-0                      |                                   |
| T-South-So Crossing  |                                  |                                  |   |                        |                                   | WA577-0                      |                                   |
| Bremerton/Shelton  |                                  |                                  |   |                        |                                   |                              |                                   |
| Trails West (Palomar)  |                                  |                                  |   |                        |                                   |                              |                                   |
| NWP East OR Mainline EXP   |                                  |                                  |   |                        |                                   |                              |                                   |
| Incremental GTN S-N  |                                  |                                  |   |                        |                                   |                              |                                   |
| Incremental Enbridge   |                                  |                                  |   |                        |                                   |                              |                                   |
| Pacific Connector  |                                  |                                  |   |                        |                                   |                              |                                   |
| Limit JP   |                                  |                                  | 4,397,880                                 | 0.566585               | 0                                 | 7,762,076,607                |                                   |





| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    |                        |                                   |                              |                                   |
|  | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|  | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|  | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|  | Current Foothills                | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              | OR101-0                           |
|  | Current Ruby                     | PLY-2                            | OPAL BASE                                 |                        |                                   |                              | OR104-0                           |
|  |                                  | MIST                             | KERN WINTER                               |                        |                                   |                              | OR105-0                           |
|  |                                  |                                  | STAT2 BASE                                |                        |                                   |                              | OR111-0                           |
|  |                                  |                                  |   |                        |                                   |                              | OR170-0                           |
|  | Incremental NGTL                 | Spire Storage                    | Opal Incrm Supply                         |                        |                                   |                              | WA502-0                           |
|  | Incremental GTN N-S              | Gill Ranch Storage               | Renewable Natural Gas                     |                        |                                   |                              | WA503-0                           |
|  | NWP I-5 Mainline EXP             | Wild Goose Storage               | Resource Mix - 3 Basins                   |                        |                                   |                              | WA504-0                           |
|  | Incremental Ruby                 | Aeco Hub Storage                 | DSM                                       |                        |                                   |                              | WA505-0                           |
| NWP Wen lateral EXP  | Magnum Storage                   |                                  |   |                        |                                   | WA511-0                      |                                   |
| Incremental Foothills  | Clay Basin Storage               |                                  |   |                        |                                   | WA512-0                      |                                   |
| NWP Z20 lateral EXP  |                                  |                                  |   |                        |                                   | WA570-0                      |                                   |
| T-South-So Crossing  |                                  |                                  |   |                        |                                   | WA577-0                      |                                   |
| Bremerton/Shelton  |                                  |                                  |   |                        |                                   |                              |                                   |
| Trails West (Palomar)  |                                  |                                  |   |                        |                                   |                              |                                   |
| NWP East OR Mainline EXP   |                                  |                                  |   |                        |                                   |                              |                                   |
| Incremental GTN S-N  |                                  |                                  |   |                        |                                   |                              |                                   |
| Incremental Enbridge   |                                  |                                  |   |                        |                                   |                              |                                   |
| Pacific Connector  |                                  |                                  |   |                        |                                   |                              |                                   |
| Limit Mist   |                                  |                                  | 4,338,902                                 | 0.558987               | 0                                 | 7,762,076,607                |                                   |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|--|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Medium Load Growth, Medium Pricing, Stochastic Weather, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    |                        |                                   |                              |                                   |
|  | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|  | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|  | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|  | Current Foothills                | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              | OR101-0                           |
|  | Current Ruby                     | PLY-2                            | OPAL BASE                                 |                        |                                   |                              | OR104-207358                      |
|  |                                  | MIST                             | KERN WINTER                               |                        |                                   |                              | OR105-30529                       |
|  |                                  |                                  | STAT2 BASE                                |                        |                                   |                              | OR111-18710                       |
|  |                                  |                                  |   |                        |                                   |                              | OR170-19919                       |
|  |                                  |                                  |   |                        |                                   |                              | WA502-0                           |
|  |                                  |                                  |   |                        |                                   |                              | WA503-0                           |
|  |                                  |                                  |   |                        |                                   |                              | WA504-504863                      |
|  |                                  |                                  |   |                        |                                   |                              | WA505-81166                       |
|  |                                  |                                  |   |                        |                                   | WA511-89318                  |                                   |
|  |                                  |                                  |   |                        |                                   | WA512-141                    |                                   |
|  |                                  |                                  |   |                        |                                   | WA570-6115                   |                                   |
|  |                                  |                                  |   |                        |                                   | WA577-388                    |                                   |
| Limit All Storage  | Incremental NGTL                 | Spire Storage                    | Opal Incrm Supply                         | 0.673719               | 958,508                           | 7,310,977,075                |                                   |
|  | Incremental GTN N-S              | Gill Ranch Storage               | RenewableNaturalGas                       |                        |                                   |                              |                                   |
|  | NWP I-5 Mainline EXP             | Wild Goose Storage               | Resource Mix - 3 Basins                   |                        |                                   |                              |                                   |
|  | Incremental Ruby                 | Aeco Hub Storage                 | DSM                                       |                        |                                   |                              |                                   |
|  | NWP Wen lateral EXP              | Magnum Storage                   |   |                        |                                   |                              |                                   |
|  | Incremental Foothills            | Clay Basin Storage               |   |                        |                                   |                              |                                   |
|  | NWP Z20 lateral EXP              |                                  |   |                        |                                   |                              |                                   |
|  | T-South-So Crossing              |                                  |   |                        |                                   |                              |                                   |
|  | Bremerton/Shelton                |                                  |   |                        |                                   |                              |                                   |
|  | Trails West (Palomar)            |                                  |   |                        |                                   |                              |                                   |
|  | NWP East OR Mainline EXP         |                                  |   |                        |                                   |                              |                                   |
|  | Incremental GTN S-N              |                                  |   |                        |                                   |                              |                                   |
|  | Incremental Enbridge             |                                  |   |                        |                                   |                              |                                   |
|  | Pacific Connector                |                                  |   |                        |                                   |                              |                                   |

| SCENARIO NAME   | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|---|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|   | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Medium Load Growth, High Pricing Environment, Average Weather w/ Peak Event, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    | 4,348,336              | 0                                 | 7,773,589,334                | OR101-0                           |
|   | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|   | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|   | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|   | Current Foothills                | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              |                                   |
|   | Current Ruby                     | PLY-2                            | OPAL BASE                                 |                        |                                   |                              |                                   |
|   |                                  | MIST                             | KERN WINTER                               |                        |                                   |                              |                                   |
|   |                                  |                                  | STAT2 BASE                                |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
| High Price  | Incremental NGTL                 | Spire Storage                    | Opal Incrm Supply                         | 0.559373               | 0                                 | 7,773,589,334                | WA502-0                           |
|   | Incremental GTN N-S              | Gill Ranch Storage               | RenewableNaturalGas                       |                        |                                   |                              |                                   |
|   | NWP I-5 Mainline EXP             | Wild Goose Storage               | Resource Mix - 3 Basins                   |                        |                                   |                              |                                   |
|   | Incremental Ruby                 | Aeco Hub Storage                 | DSM                                       |                        |                                   |                              |                                   |
|   | NWP Wen lateral EXP              | Magnum Storage                   |   |                        |                                   |                              |                                   |
|   | Incremental Foothills            | Clay Basin Storage               |   |                        |                                   |                              |                                   |
|   | NWP Z20 lateral EXP              |                                  |   |                        |                                   |                              |                                   |
|   | T-South-So Crossing              |                                  |   |                        |                                   |                              |                                   |
|   | Bremerton/Shelton                |                                  |   |                        |                                   |                              |                                   |
|   | Trails West (Palomar)            |                                  |   |                        |                                   |                              |                                   |
|   | NWP East OR Mainline EXP         |                                  |   |                        |                                   |                              |                                   |
|   | Incremental GTN S-N              |                                  |   |                        |                                   |                              |                                   |
|   | Incremental Enbridge             |                                  |   |                        |                                   |                              |                                   |
|   | Pacific Connector                |                                  |   |                        |                                   |                              |                                   |

| SCENARIO NAME   | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|---|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|   | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Medium Load Growth, Stochastic Pricing, Average Weather w/ Peak Event, SCC w/ 3% Discount Rate Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    | 4,291,633              | 0.552079                          | 0                            | 7,773,589,334                     |
|   | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|   | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|   | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|   | Current Foothills                | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              |                                   |
|   | Current Ruby                     | PLY-2                            | OPAL BASE                                 |                        |                                   |                              |                                   |
|   |                                  | MIST                             | KERN WINTER                               |                        |                                   |                              |                                   |
|   |                                  |                                  | STAT2 BASE                                |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
| SCC   | Incremental NGTL                 | Spire Storage                    | Opal Incrm Supply                         |                        |                                   |                              |                                   |
|   | Incremental GTN N-S              | Gill Ranch Storage               | RenewableNaturalGas                       |                        |                                   |                              |                                   |
|   | NWP I-5 Mainline EXP             | Wild Goose Storage               | Resource Mix - 3 Basins                   |                        |                                   |                              |                                   |
|   | Incremental Ruby                 | Aeco Hub Storage                 | DSM                                       |                        |                                   |                              |                                   |
|   | NWP Wen lateral EXP              | Magnum Storage                   |   |                        |                                   |                              |                                   |
|   | Incremental Foothills            | Clay Basin Storage               |   |                        |                                   |                              |                                   |
|   | NWP Z20 lateral EXP              |                                  |   |                        |                                   |                              |                                   |
|   | T-South-So Crossing              |                                  |   |                        |                                   |                              |                                   |
|   | Bremerton/Shelton                |                                  |   |                        |                                   |                              |                                   |
|   | Trails West (Palomar)            |                                  |   |                        |                                   |                              |                                   |
|   | NWP East OR Mainline EXP         |                                  |   |                        |                                   |                              |                                   |
|   | Incremental GTN S-N              |                                  |   |                        |                                   |                              |                                   |
|   | Incremental Enbridge             |                                  |   |                        |                                   |                              |                                   |
|   | Pacific Connector                |                                  |   |                        |                                   |                              |                                   |

| SCENARIO NAME   | KEY ELEMENTS IN SENDOUT SCENARIO   |   | NPV 20 Year<br>Costs in \$000s   | Average Cost<br>Per Therm | Max Year Unserved<br>Demand (Therms) | Total Served<br>Demand (Therms) | Class of Unserved<br>Demand (Therms) |  |
|---|--|---|--|---------------------------|--------------------------------------|---------------------------------|--------------------------------------|--|
|   | KEY ELEMENTS IN SENDOUT SCENARIO   | KEY ELEMENTS IN SENDOUT SCENARIO  |  |                           |                                      |                                 |                                      |  |
| Medium Load Growth, Stochastic Pricing, Average Weather w/ Peak Event, Market Choice Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited |  |   |  |                           |                                      |                                 |                                      |  |
|   | Current Station2   | JP1   |  |                           |                                      |                                 |                                      |  |
|   | Current NOVA   | JP2   |  |                           |                                      |                                 |                                      |  |
|   | Current GTN  | JP3   |  |                           |                                      |                                 |                                      |  |
|   | Current NWP  | JP4   |  |                           |                                      |                                 |                                      |  |
|   | Current Foothills  | PLY-1   |  |                           |                                      |                                 | OR101-0                              |  |
|   | Current Ruby   | PLY-2   |  |                           |                                      |                                 | OR104-0                              |  |
|   |  | MIST  |  |                           |                                      |                                 | OR105-0                              |  |
|   |  |   |  |                           |                                      |                                 | OR111-0                              |  |
|   |  |   |  |                           |                                      |                                 | OR170-0                              |  |
|   |  |   |  |                           |                                      |                                 | WA502-0                              |  |
|   |  |   |  |                           |                                      |                                 | WA503-0                              |  |
|   |  |   |  |                           |                                      |                                 | WA504-0                              |  |
|   |  |   |  |                           |                                      |                                 | WA505-0                              |  |
|   |  |   |  |                           |                                      |                                 | WA511-0                              |  |
|   |  |   |  |                           |                                      |                                 | WA512-0                              |  |
|   |  |   |  |                           |                                      |                                 | WA570-0                              |  |
|   |  |   |  |                           |                                      |                                 | WA577-0                              |  |
| Market choice   | Incremental NGTL<br>Incremental GTN N-S<br>NWP I-5 Mainline EXP<br>Incremental Ruby<br>NWP Wen lateral EXP<br>Incremental Foothills<br>NWP Z20 lateral EXP<br>T-South-So Crossing<br>Breerton/Shelton<br>Trails West (Palomar)<br>NWP East OR Mainline EXP<br>Incremental GTN S-N<br>Incremental Enbridge<br>Pacific Connector | Spire Storage<br>Gill Ranch Storage<br>Wild Goose Storage<br>AeCo Hub Storage<br>Magnum Storage<br>Clay Basin Storage | Opal InCRM Supply<br>Renewable Natural Gas<br>Resource Mix - 3 Basins<br>DSM | 4,219,313                 | 0.542775                             | 0                               | 7,773,589,334                        |  |

| SCENARIO NAME            | KEY ELEMENTS IN SENDOUT SCENARIO   |  | NPV 20 Year Costs in \$000s | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms)   |                         |
|--------------------------|--|--|-----------------------------|------------------------|-----------------------------------|------------------------------|---|-------------------------|
|                          | KEY ELEMENTS IN SENDOUT SCENARIO   | KEY ELEMENTS IN SENDOUT SCENARIO       |                             |                        |                                   |                              |   |                         |
| Stochastic Carbon        | Medium Load Growth, Stochastic Pricing, Average Weather w/ Peak Event, Stochastic Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | AECO Base/Fixed, Winter, Day W/S, Peak | 4,193,098                   | 0.539403               | 0                                 | 7,773,589,334                | OR101-0<br>OR104-0<br>OR105-0<br>OR111-0<br>OR170-0<br>WA502-0<br>WA503-0<br>WA504-0<br>WA505-0<br>WA511-0<br>WA512-0<br>WA570-0<br>WA577-0 |                         |
|                          | Current Station2   | JP1                                    |                             |                        |                                   |                              |   |                         |
|                          | Current NOVA   | JP2                                    |                             |                        |                                   |                              |   |                         |
|                          | Current GTN  | JP3                                    |                             |                        |                                   |                              |   |                         |
|                          | Current NWP  | JP4                                    |                             |                        |                                   |                              |   |                         |
|                          | Current Foothills  | PLY-1                                  |                             |                        |                                   |                              |   |                         |
|                          | Current Ruby   | PLY-2                                  |                             |                        |                                   |                              |   |                         |
|                          |  | MIST                                   |                             |                        |                                   |                              |   |                         |
|                          |  | STAT2 BASE                             |                             |                        |                                   |                              |   |                         |
|                          | Incremental NGTL   | Spire Storage                          |                             |                        |                                   |                              |   | Opal Incrm Supply       |
|                          | Incremental GTN N-S  | Gill Ranch Storage                     |                             |                        |                                   |                              |   | RenewableNaturalGas     |
|                          | NWP I-5 Mainline EXP   | Wild Goose Storage                     |                             |                        |                                   |                              |   | Resource Mix - 3 Basins |
|                          | Incremental Ruby   | Aeco Hub Storage                       |                             |                        |                                   |                              |   | DSM                     |
|                          | NWP Wen lateral EXP  | Magnum Storage                         |                             |                        |                                   |                              |   |                         |
| Incremental Foothills    | Clay Basin Storage   |  |                             |                        |                                   |                              |   |                         |
| NWP Z20 lateral EXP      |  |  |                             |                        |                                   |                              |   |                         |
| T-South-So Crossing      |  |  |                             |                        |                                   |                              |   |                         |
| Bremerton/Shelton        |  |  |                             |                        |                                   |                              |   |                         |
| Trails West (Palomar)    |  |  |                             |                        |                                   |                              |   |                         |
| NWP East OR Mainline EXP |  |  |                             |                        |                                   |                              |   |                         |
| Incremental GTN S-N      |  |  |                             |                        |                                   |                              |   |                         |
| Incremental Enbridge     |  |  |                             |                        |                                   |                              |   |                         |
| Pacific Connector        |  |  |                             |                        |                                   |                              |   |                         |

| SCENARIO NAME  | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms)   |
|--|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|---|
|  | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |   |
| Medium Load Growth, Stochastic Pricing, Average Weather w/ Peak Event, No Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    | 4,067,388              | 0                                 | 7,773,589,334                | OR101-0<br>OR104-0<br>OR105-0<br>OR111-0<br>OR170-0<br>WA502-0<br>WA503-0<br>WA504-0<br>WA505-0<br>WA511-0<br>WA512-0<br>WA570-0<br>WA577-0 |
|  | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |   |
|  | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |   |
|  | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |   |
|  | Current Foothills                | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              |   |
|  | Current Ruby                     | PLY-2                            | OPAL BASE                                 |                        |                                   |                              |   |
|  |                                  | MIST                             | KERN WINTER                               |                        |                                   |                              |   |
|  |                                  |                                  | STAT2 BASE                                |                        |                                   |                              |   |
|  |                                  |                                  |   |                        |                                   |                              |   |
|  |                                  |                                  |   |                        |                                   |                              |   |
|  |                                  |                                  |   |                        |                                   |                              |   |
|  |                                  |                                  |   |                        |                                   |                              |   |
|  |                                  |                                  |   |                        |                                   |                              |   |
|  |                                  |                                  |   |                        |                                   |                              |   |
| No Carbon  | Incremental NGTL                 | Spire Storage                    | Opal Incrm Supply                         |                        |                                   |                              |   |
|  | Incremental GTN N-S              | Gill Ranch Storage               | RenewableNaturalGas                       |                        |                                   |                              |   |
|  | NWP I-5 Mainline EXP             | Wild Goose Storage               | Resource Mix - 3 Basins                   |                        |                                   |                              |   |
|  | Incremental Ruby                 | Aeco Hub Storage                 | DSM                                       |                        |                                   |                              |   |
|  | NWP Wen lateral EXP              | Magnum Storage                   |   |                        |                                   |                              |   |
|  | Incremental Foothills            | Clay Basin Storage               |   |                        |                                   |                              |   |
|  | NWP Z20 lateral EXP              |                                  |   |                        |                                   |                              |   |
|  | T-South-So Crossing              |                                  |   |                        |                                   |                              |   |
|  | Bremerton/Shelton                |                                  |   |                        |                                   |                              |   |
|  | Trails West (Palomar)            |                                  |   |                        |                                   |                              |   |
|  | NWP East OR Mainline EXP         |                                  |   |                        |                                   |                              |   |
|  | Incremental GTN S-N              |                                  |   |                        |                                   |                              |   |
|  | Incremental Enbridge             |                                  |   |                        |                                   |                              |   |
|  | Pacific Connector                |                                  |   |                        |                                   |                              |   |

| SCENARIO NAME   | KEY ELEMENTS IN SENDOUT SCENARIO |   | NPV 20 Year Costs in \$000s | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms)   |
|---|----------------------------------|---|-----------------------------|------------------------|-----------------------------------|------------------------------|---|
|   | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO  |                             |                        |                                   |                              |   |
| Medium Load Growth, Medium Pricing, Average Weather w/ Peak Event, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1   | 4,275,469                   | 0.549999               | 0                                 | 7,773,589,335                | OR101-0<br>OR104-0<br>OR105-0<br>OR111-0<br>OR170-0<br>WA502-0<br>WA503-0<br>WA504-0<br>WA505-0<br>WA511-0<br>WA512-0<br>WA570-0<br>WA577-0 |
|   | Current NOVA                     | JP2   |                             |                        |                                   |                              |   |
|   | Current GTN                      | JP3   |                             |                        |                                   |                              |   |
|   | Current NWP                      | JP4   |                             |                        |                                   |                              |   |
|   | Current Foothills                | PLY-1   |                             |                        |                                   |                              |   |
|   | Current Ruby                     | PLY-2   |                             |                        |                                   |                              |   |
|   |                                  | MIST  |                             |                        |                                   |                              |   |
|   |                                  |   |                             |                        |                                   |                              |   |
|   |                                  |   |                             |                        |                                   |                              |   |
|   |                                  |   |                             |                        |                                   |                              |   |
|   |                                  |   |                             |                        |                                   |                              |   |
|   |                                  |   |                             |                        |                                   |                              |   |
|   |                                  |   |                             |                        |                                   |                              |   |
|   |                                  |   |                             |                        |                                   |                              |   |
|   | RNG #1                           | Incremental NGTL<br>Incremental GTN N-S<br>NWP I-5 Mainline EXP<br>Incremental Ruby<br>NWP Wen lateral EXP<br>Incremental Foothills<br>NWP Z20 lateral EXP<br>T-South-So Crossing<br>Bremerton/Shelton<br>Trails West (Palomar)<br>NWP East OR Mainline EXP<br>Incremental GTN S-N<br>Incremental Enbridge<br>Pacific Connector |                             |                        |                                   |                              |   |



| SCENARIO NAME   | KEY ELEMENTS IN SENDOUT SCENARIO |                                  | NPV 20 Year Costs in \$000s               | Average Cost Per Therm | Max Year Unserved Demand (Therms) | Total Served Demand (Therms) | Class of Unserved Demand (Therms) |
|---|----------------------------------|----------------------------------|---|------------------------|-----------------------------------|------------------------------|-----------------------------------|
|   | KEY ELEMENTS IN SENDOUT SCENARIO | KEY ELEMENTS IN SENDOUT SCENARIO |   |                        |                                   |                              |                                   |
| Medium Load Growth, Medium Pricing, Average Weather w/ Peak Event, CEC Cap and Trade Carbon Forecast. All elements considered. All items in <b>RED</b> mean those elements were excluded from the scenario. Items in <b>BLUE</b> were limited | Current Station2                 | JP1                              | AECO Base/Fixed, Winter, Day W/S, Peak    | 0.549733               | 0                                 | 7,773,589,335                |                                   |
|   | Current NOVA                     | JP2                              | SUMAS Base/Fixed, Winter, Day W/S, Peak   |                        |                                   |                              |                                   |
|   | Current GTN                      | JP3                              | ROCKIES Base/Fixed, Winter, Day W/S, Peak |                        |                                   |                              |                                   |
|   | Current NWP                      | JP4                              | HUNT Base/Fixed, Winter, Day W/S          |                        |                                   |                              |                                   |
|   | Current Foothills                | PLY-1                            | KINGSGATE BASE                            |                        |                                   |                              |                                   |
|   | Current Ruby                     | PLY-2                            | OPAL BASE                                 |                        |                                   |                              |                                   |
|   |                                  | MIST                             | KERN WINTER                               |                        |                                   |                              |                                   |
|   |                                  |                                  | STAT2 BASE                                |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   |                                  |                                  |   |                        |                                   |                              |                                   |
|   | RNG #2                           | Incremental NGTL                 | Spire Storage                             |                        |                                   |                              |                                   |
|   | Incremental GTN N-S              | Gill Ranch Storage               | Renewable Natural Gas                     |                        |                                   |                              |                                   |
|   | NWP I-5 Mainline EXP             | Wild Goose Storage               | Resource Mix - 3 Basins                   |                        |                                   |                              |                                   |
|   | Incremental Ruby                 | Aeco Hub Storage                 | DSM                                       |                        |                                   |                              |                                   |
|   | NWP Wen lateral EXP              | Magnum Storage                   |   |                        |                                   |                              |                                   |
|   | Incremental Foothills            | Clay Basin Storage               |   |                        |                                   |                              |                                   |
|   | NWP Z20 lateral EXP              |                                  |   |                        |                                   |                              |                                   |
|   | T-South-So Crossing              |                                  |   |                        |                                   |                              |                                   |
|   | Bremerton/Shelton                |                                  |   |                        |                                   |                              |                                   |
|   | Trails West (Palomar)            |                                  |   |                        |                                   |                              |                                   |
|   | NWP East OR Mainline EXP         |                                  |   |                        |                                   |                              |                                   |
|   | Incremental GTN S-N              |                                  |   |                        |                                   |                              |                                   |
|   | Incremental Enbridge             |                                  |   |                        |                                   |                              |                                   |
|   | Pacific Connector                |                                  |   |                        |                                   |                              |                                   |

## Appendix F

### Capacity Requirements & Peak Day Planning

2020 OR IRP

## Appendix F - Introduction

The purpose of this document is to illustrate the flexibility of Cascade's system, and to identify where Cascade needs to pick up incremental transportation rights.

Cascade can realign the transportation Maximum Daily Delivery Obligation(s)(MDDOs) in the Company's contracts to citygates in the same zone on the Northwest Pipeline (NWP) system. GTN has citygate specific MDDOs where they cannot be realigned. GTN does have a few contracts that can be delivered to any of the citygates on their system.

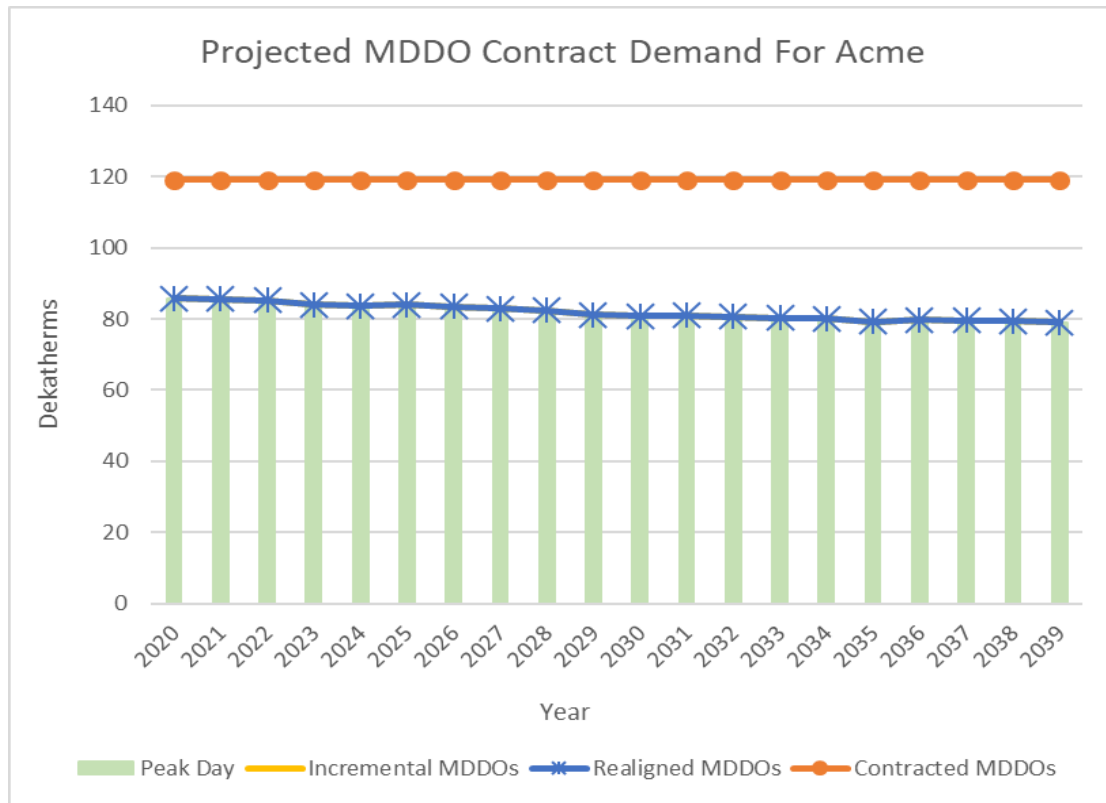
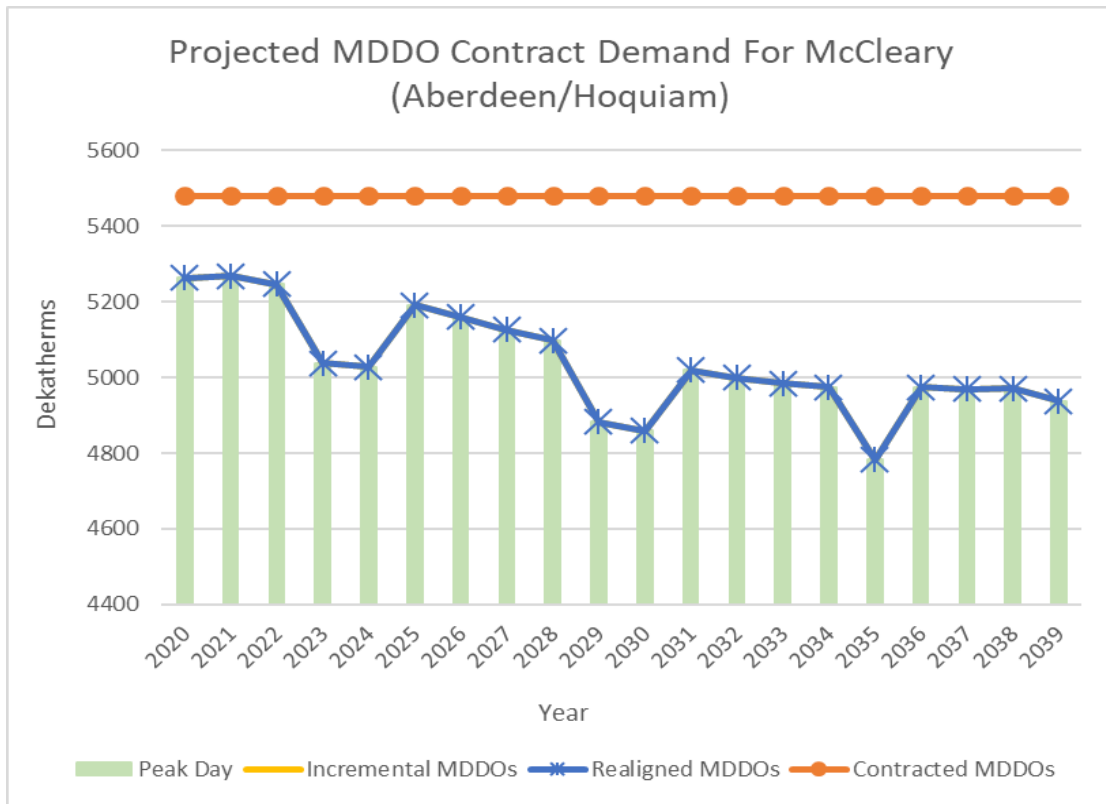
In the first series of charts, below, the Company analyzes each of the citygates in Oregon and Washington. The Company also aggregates the gates by zone, by state, and finally the entire system. In these charts, the green bars indicate what the Company forecasts demand to be in a peak day environment for a 20-year time horizon. The orange line shows how many therms can contractually be moved to that area with location specific MDDOs. The blue line shows the total amount of therms that are utilized by realigning certain contracts that do not specify a fixed location where the therms need to go and adding those MDDOs to the fixed contracts. These flexible contracts are assigned using the Company's optimization software, SENDOUT. Finally, the yellow line illustrates how much demand Cascade can serve by adding incremental transportation agreements to its existing transportation portfolio. The space between the blue line and yellow line, if any, shows exactly how much additional transport the Company believes will need to be acquired, and when it needs to be picked up.

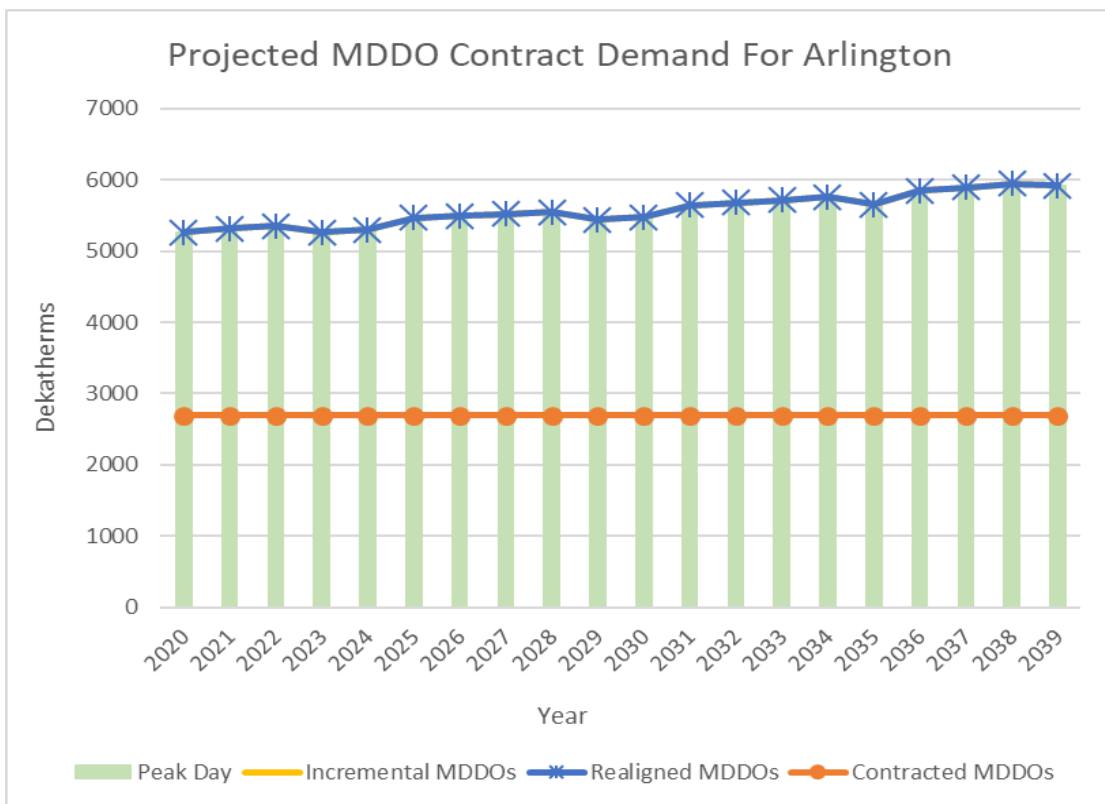
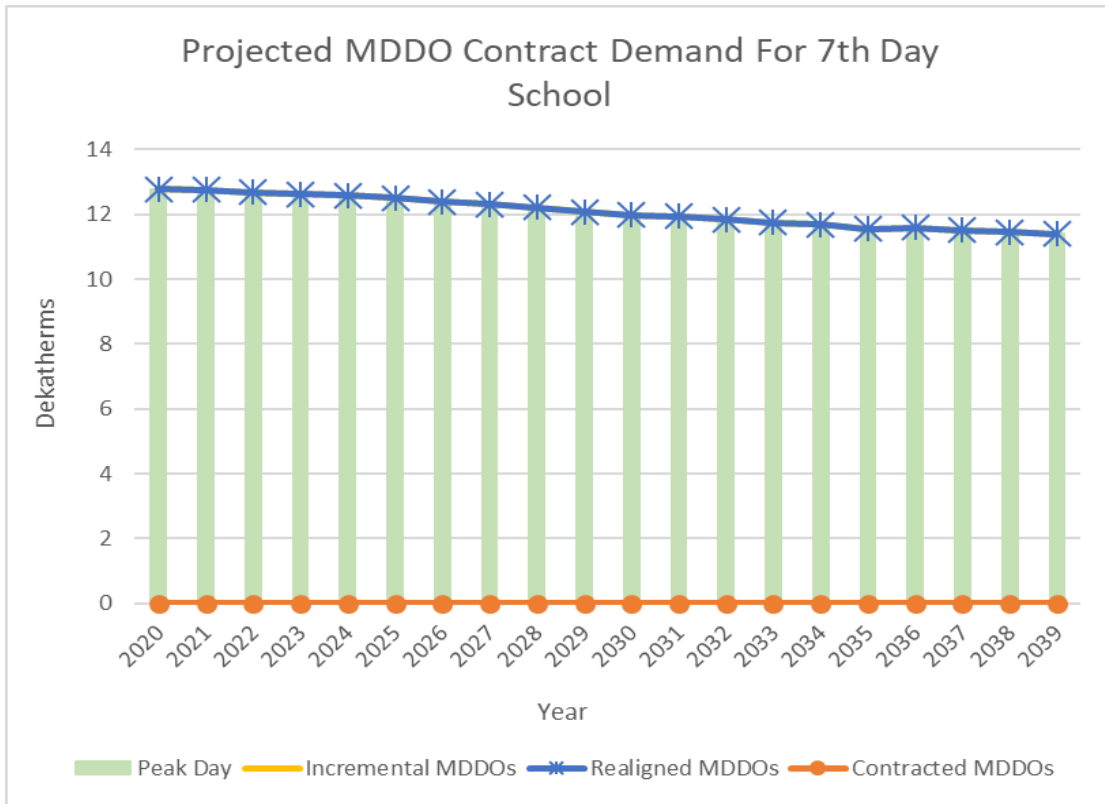
As mentioned above, Cascade has the ability to realign certain MDDOs on the zonal level to help serve demand in areas where there is not a direct contract to that citygate. To that end, certain citygates within NWP will utilize MDDOs above or below their contracted level. Some examples of this are described below:

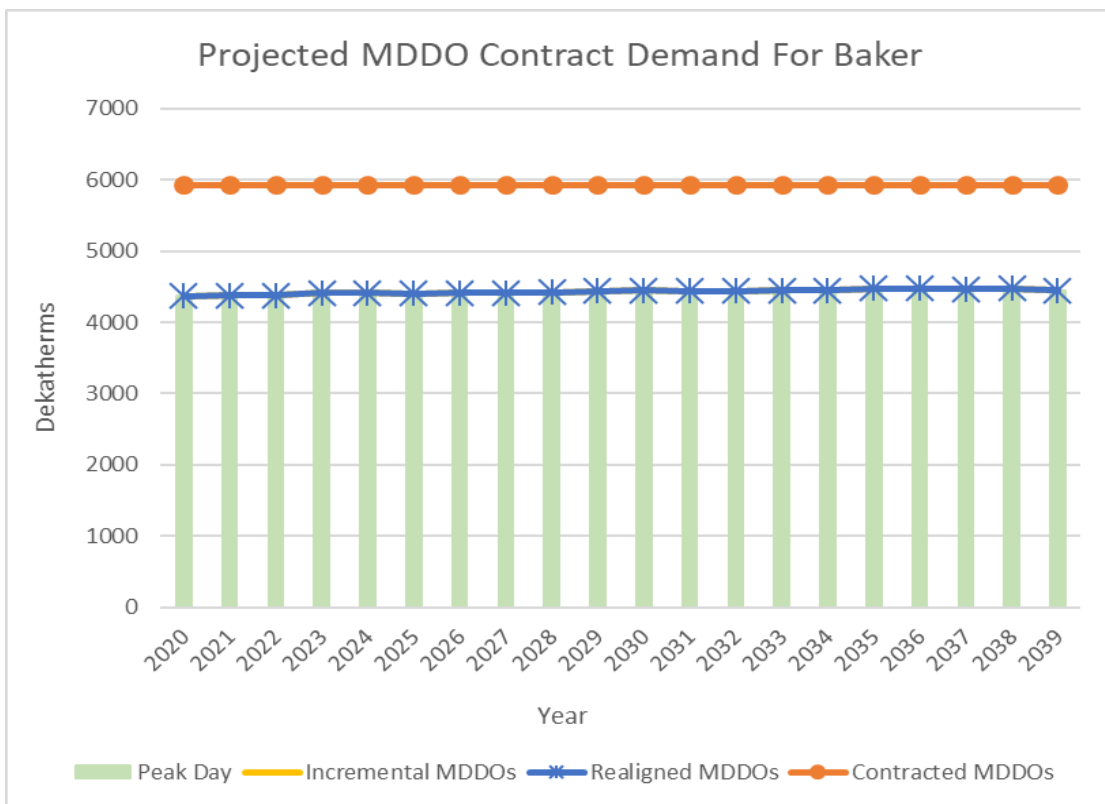
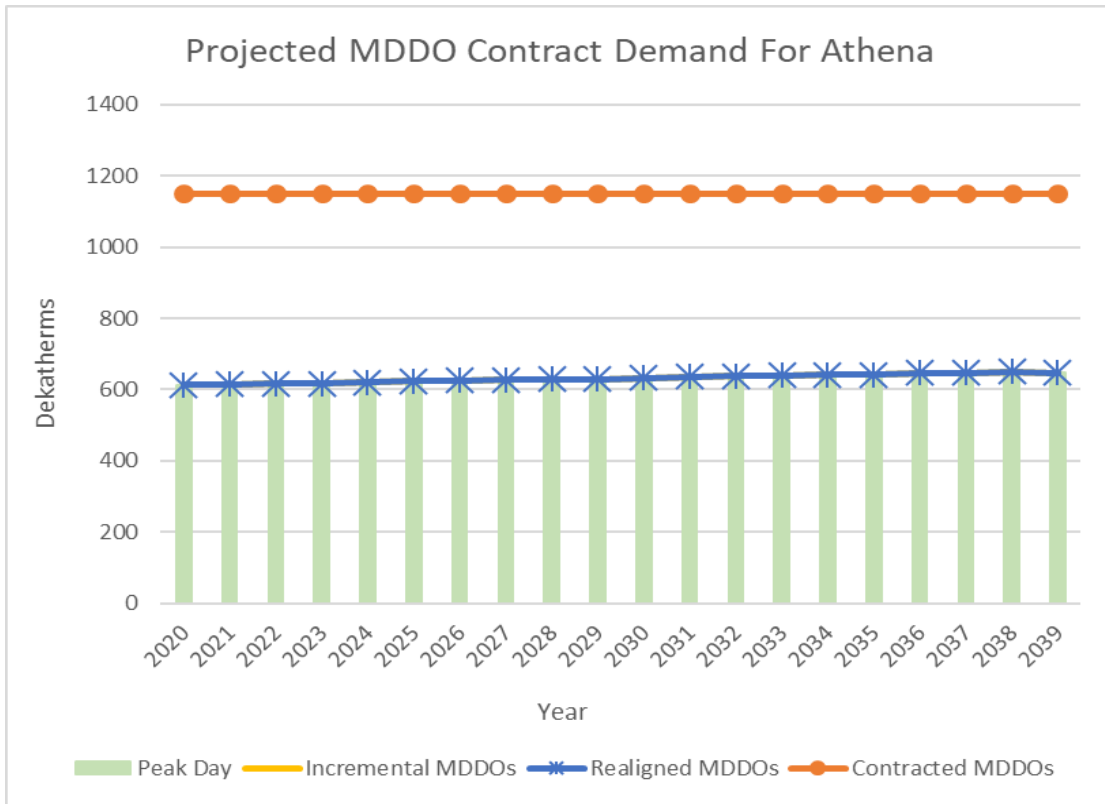
Citygates where utilized MDDOs are below contracted MDDOs: This occurs when the Company has the capacity to send more gas to a citygate than what they forecast is needed over the 20-year planning horizon. Ideally, this transportation capacity is moved to another citygate within that zone, but in certain situations these MDDOs are unable to be utilized if they are not needed elsewhere. Examples: Pendleton and Umatilla.

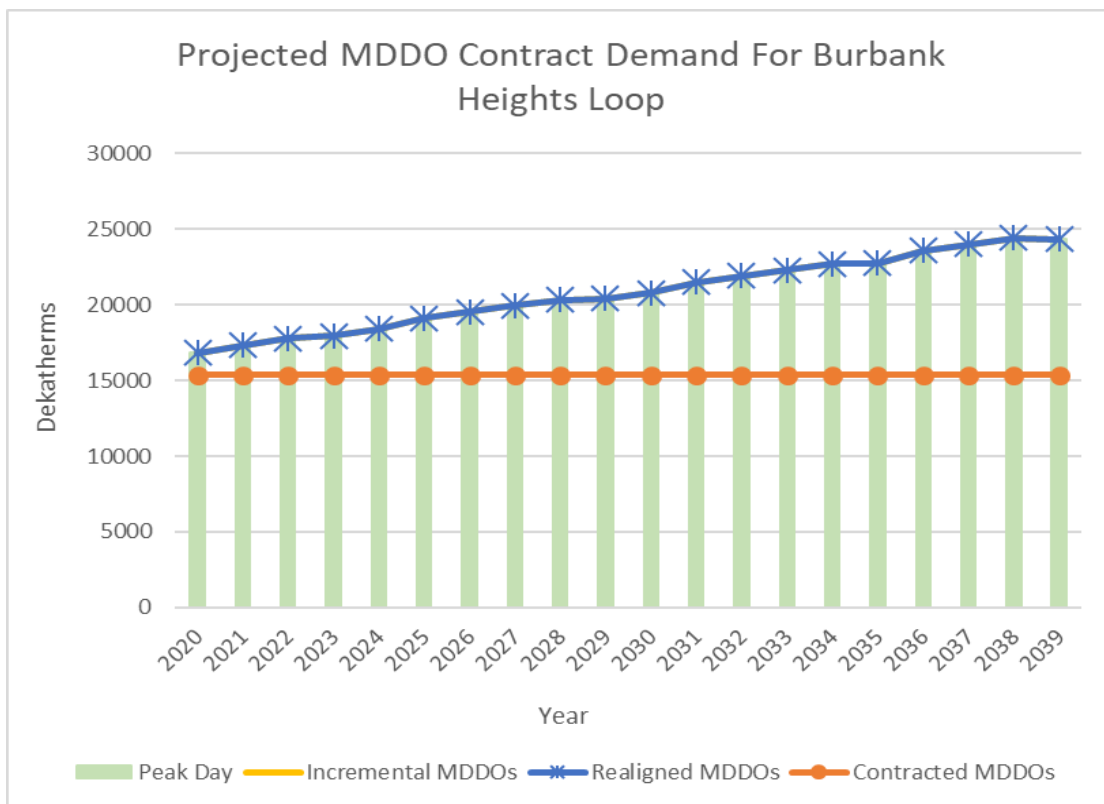
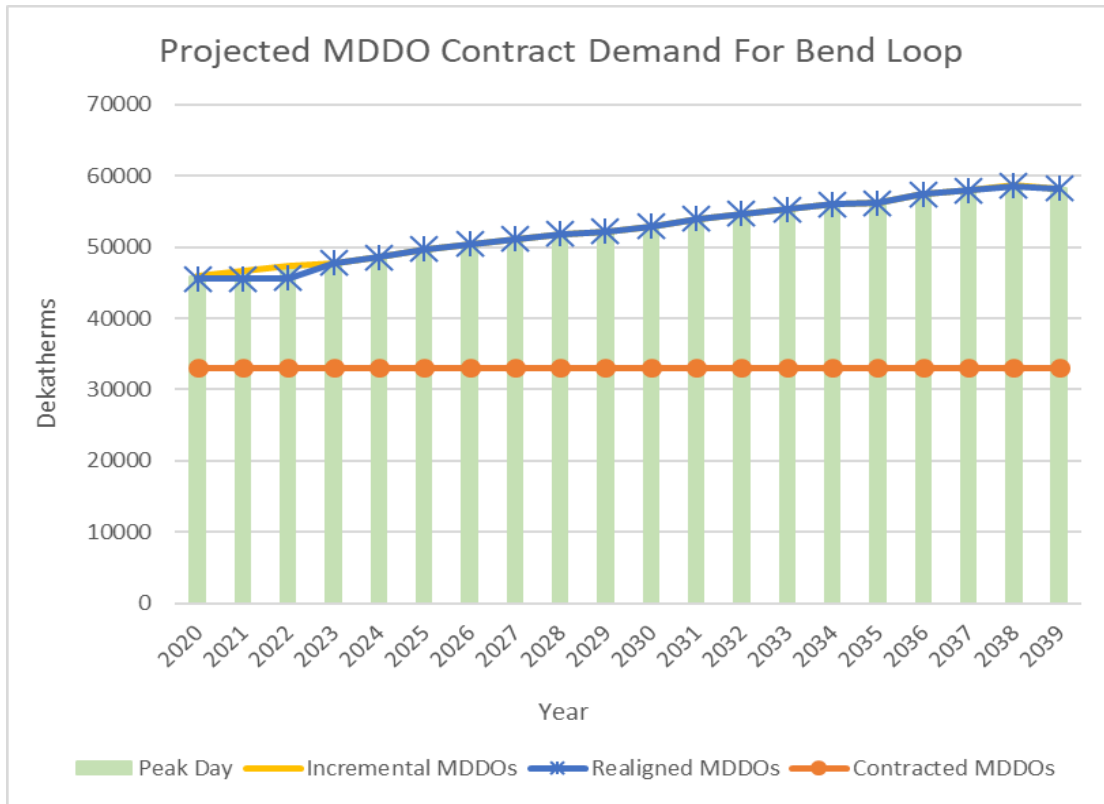
Citygates where utilized MDDOs are above contracted MDDOs: This occurs when the Company projects that there is not enough capacity in existing contracts to serve projected demand over the 20-year planning horizon, but there is excess capacity at a citygate within the same zone. It is important to distinguish that this is not an acquisition of additional capacity, but a realignment of excess capacity within the same zone. Examples: Bend Loop and Redmond.

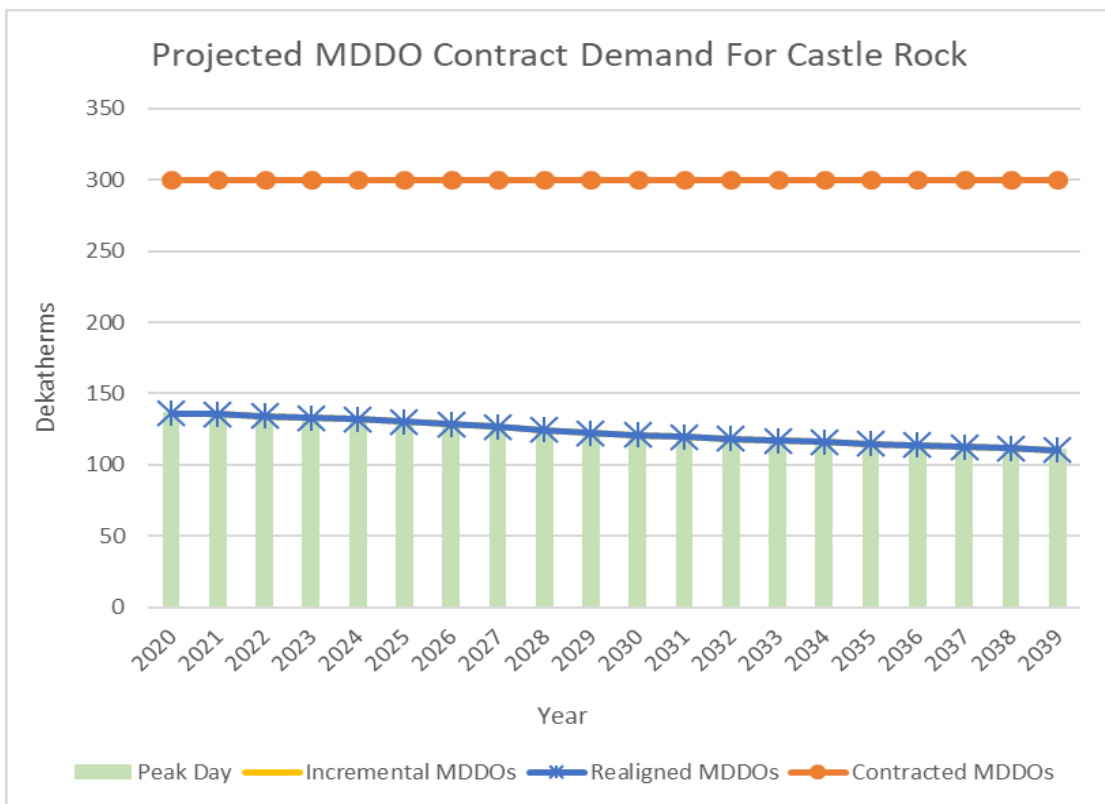
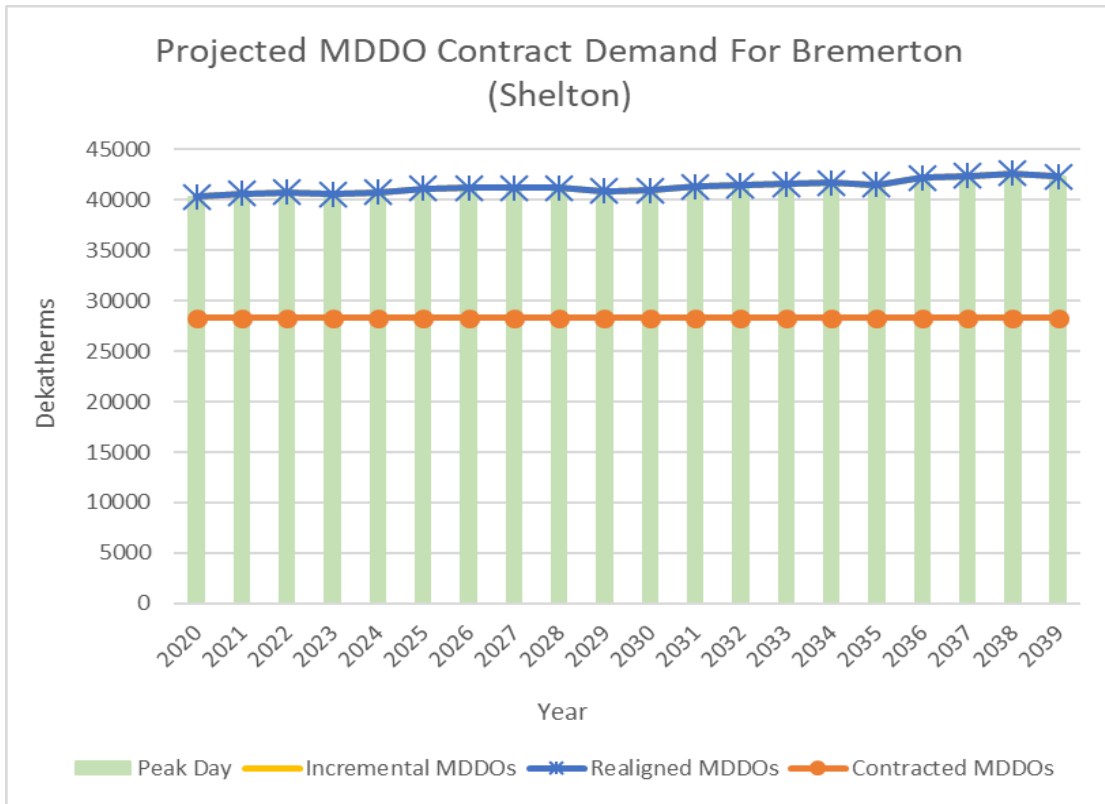
Citygates where utilized MDDOs are both above and below contracted MDDOs: In certain situations, a citygate may start the planning horizon with excess capacity but grow to a point where Cascade expects a shortfall with current contracts. In these circumstances, the Company illustrates the citygate first sharing the excess MDDOs with other locations that need it, but later pulling capacity from other areas with excess transportation contracts.



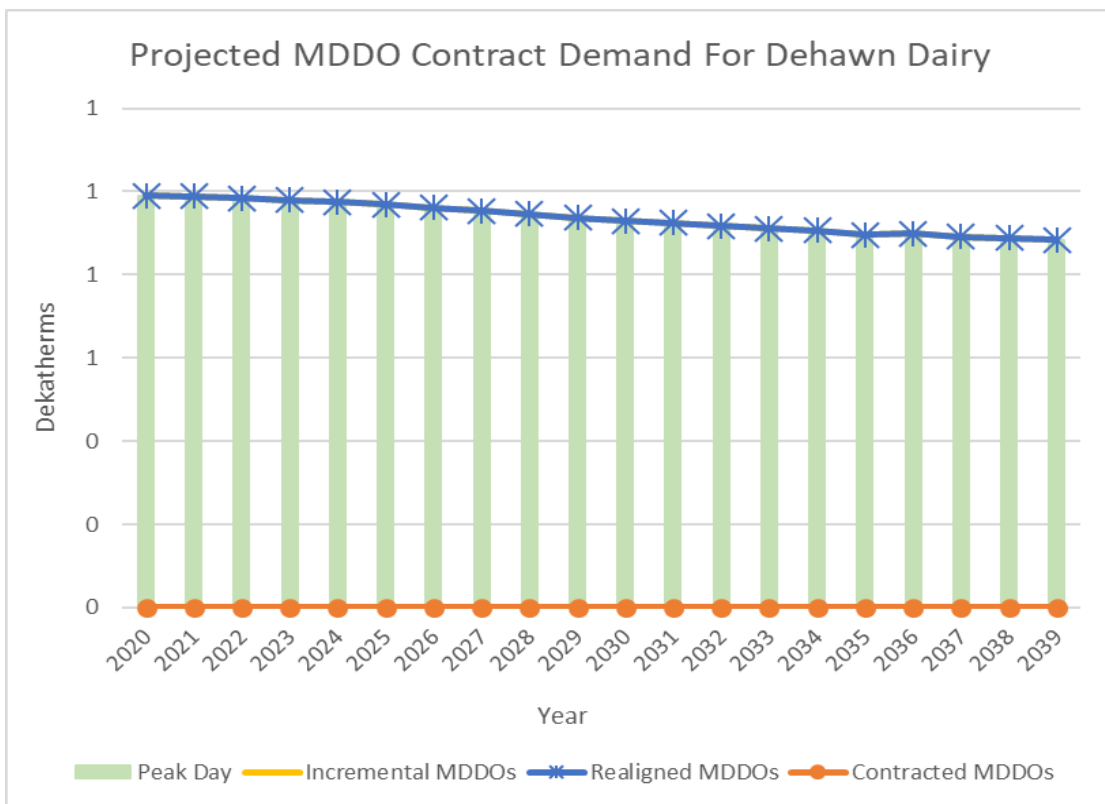
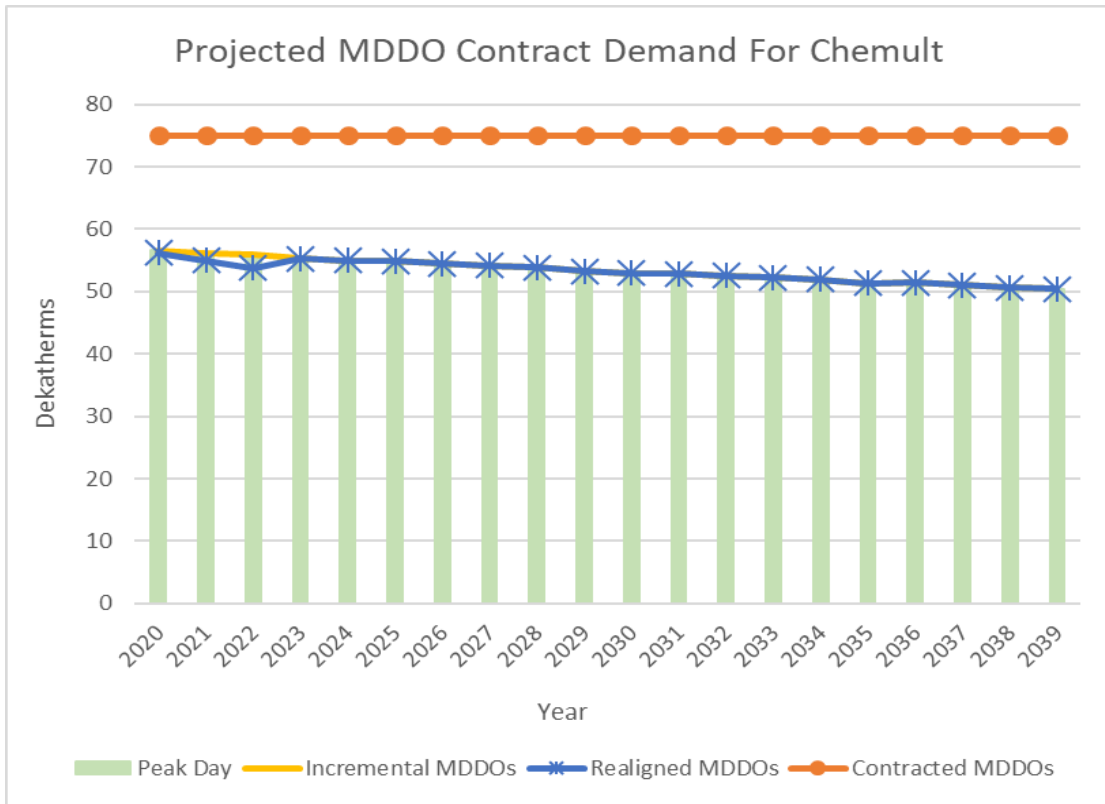


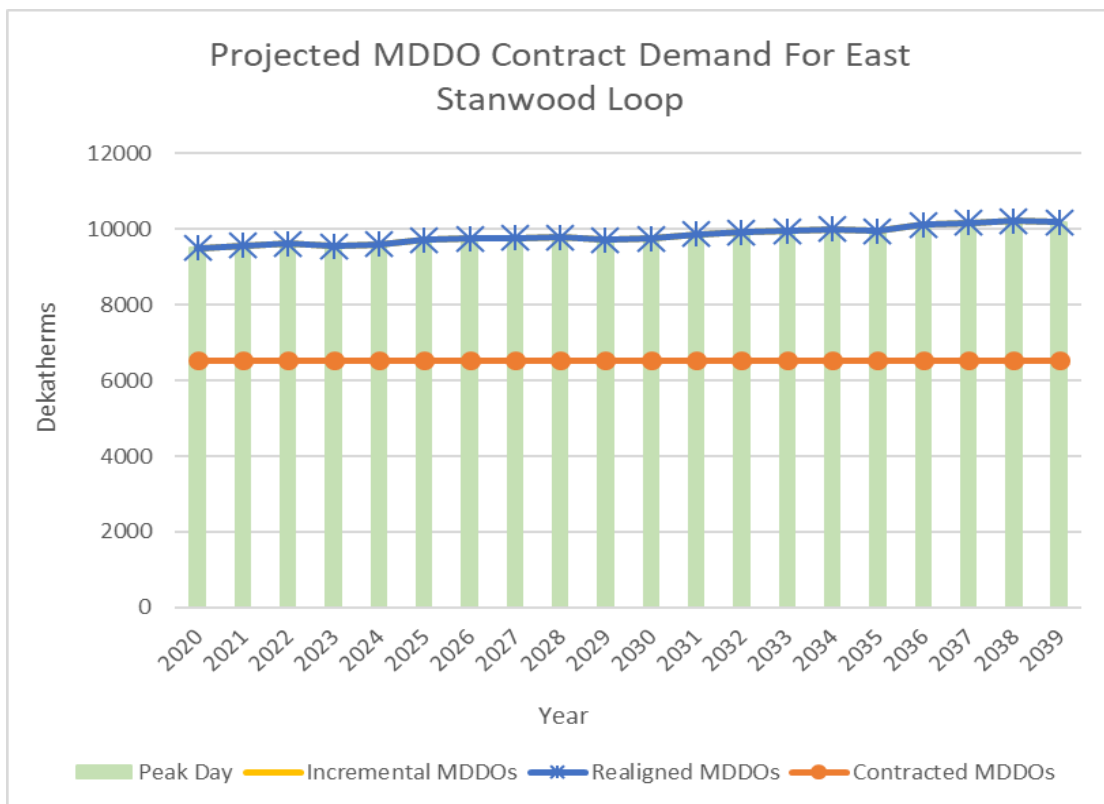
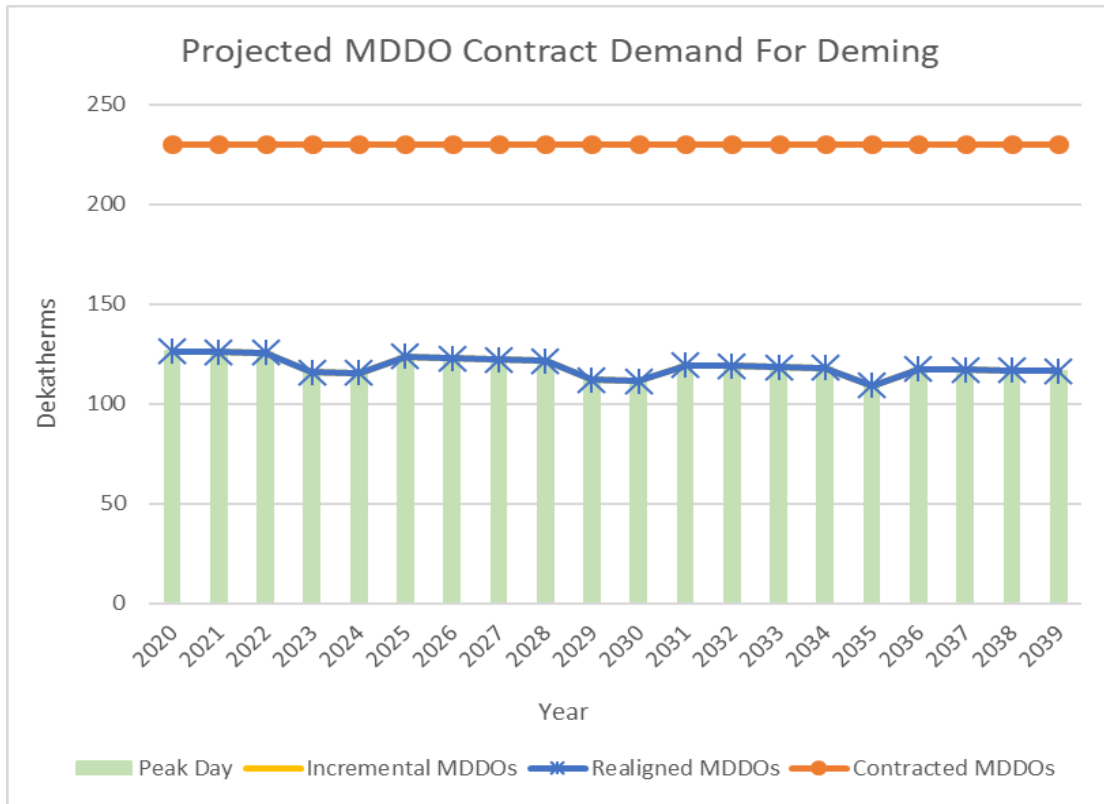


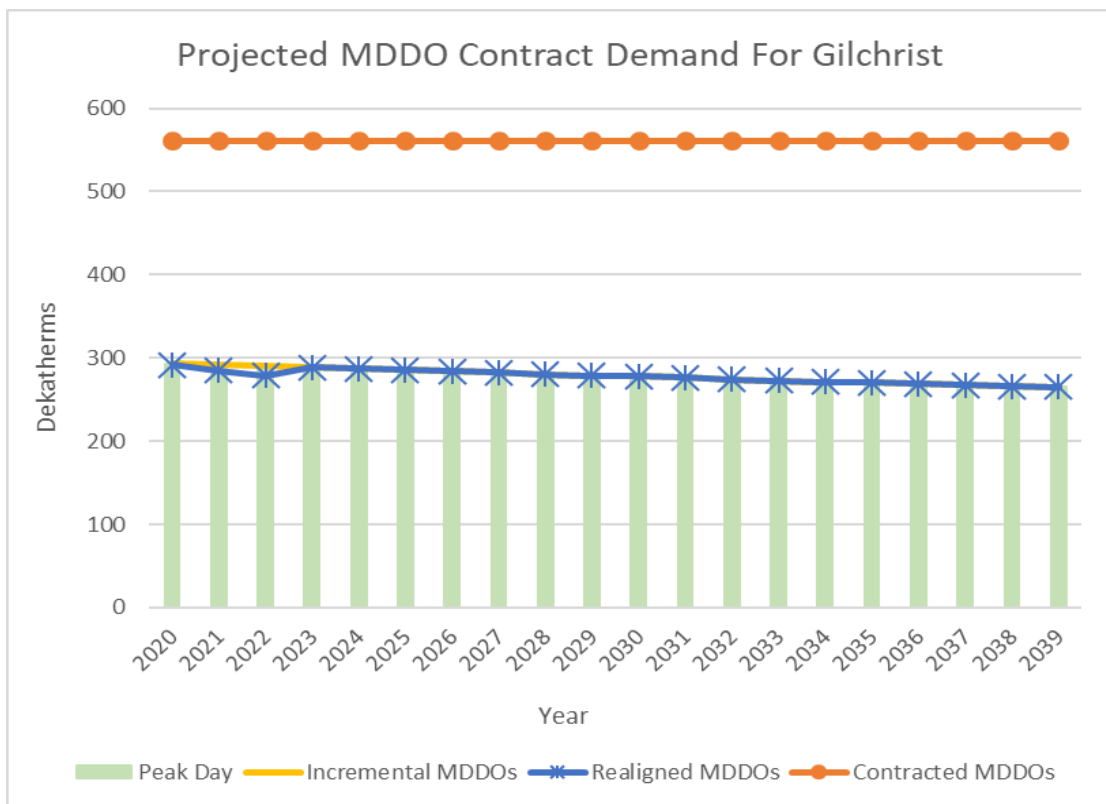
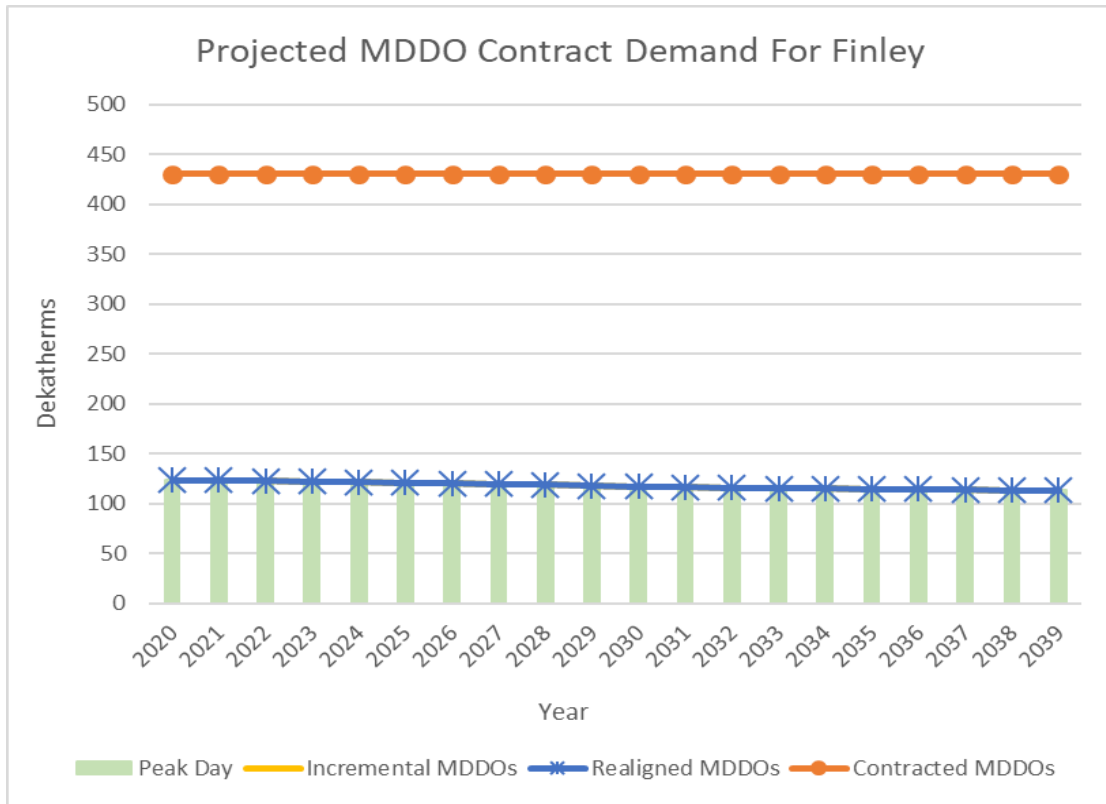


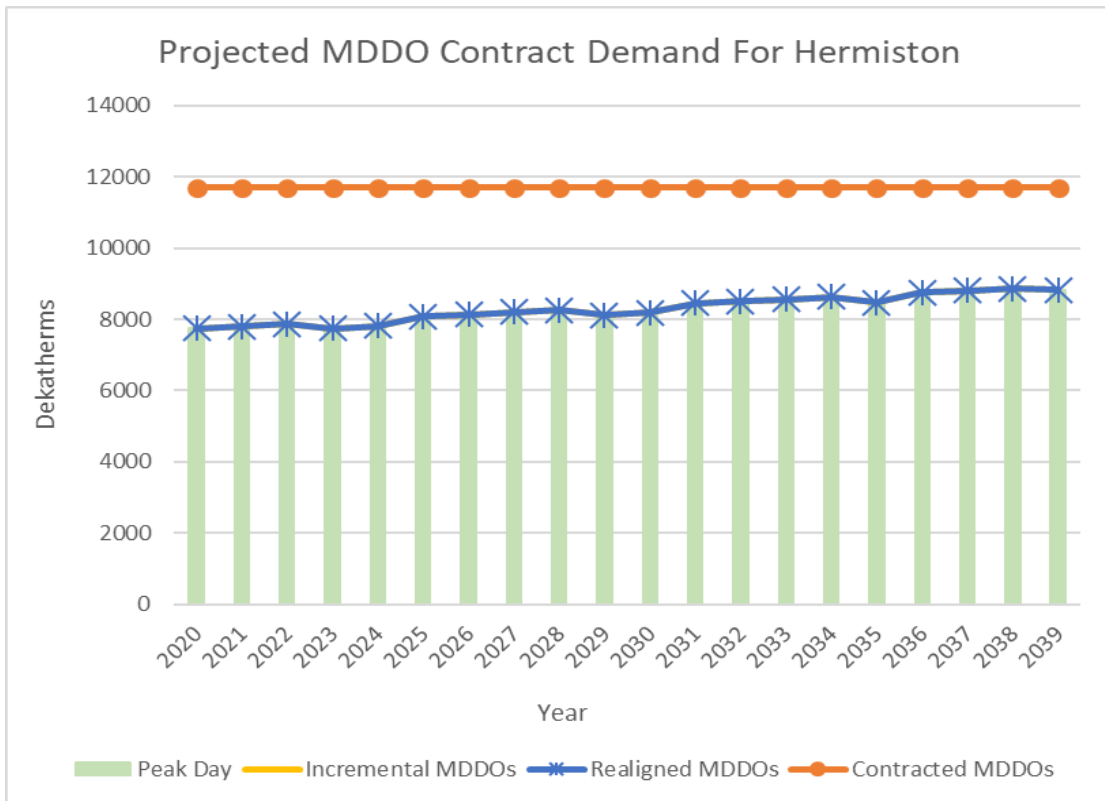
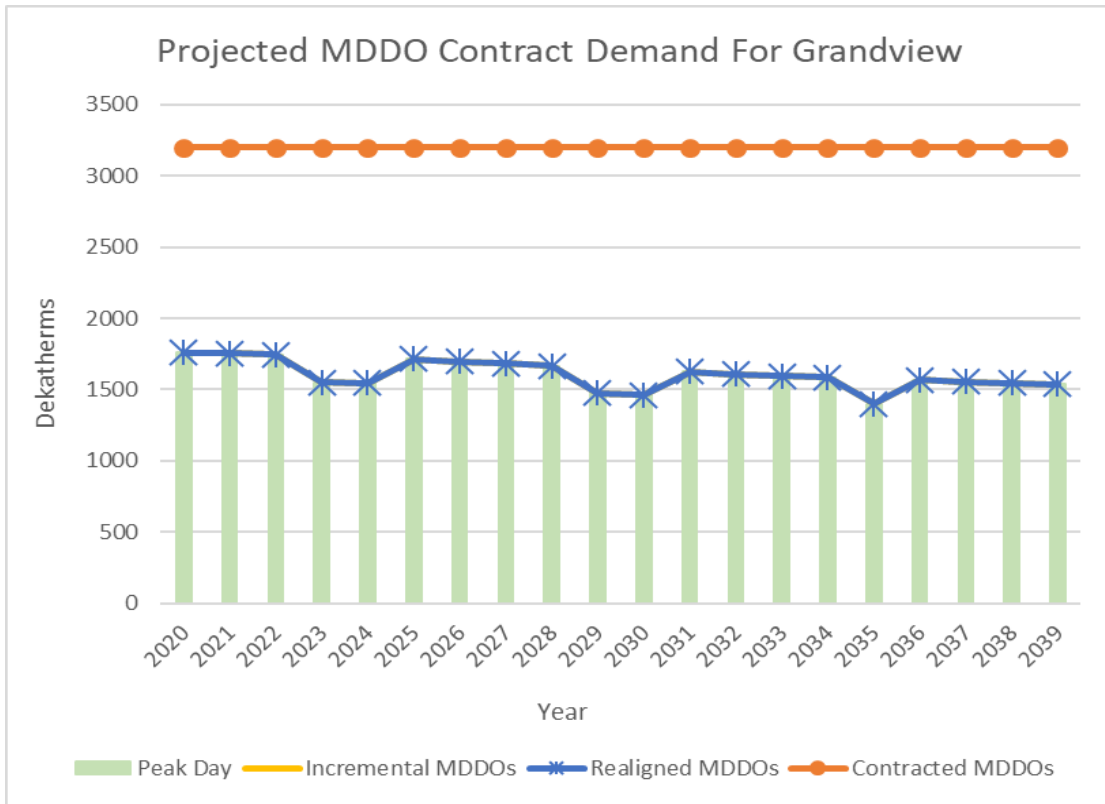


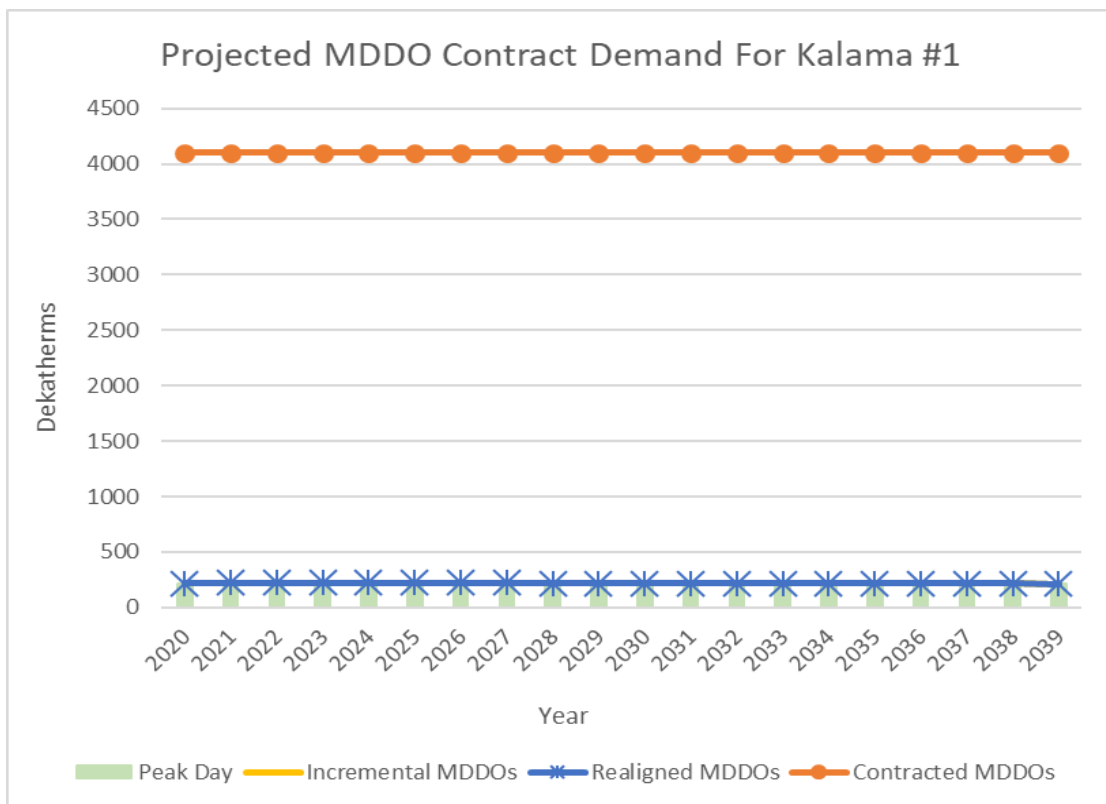
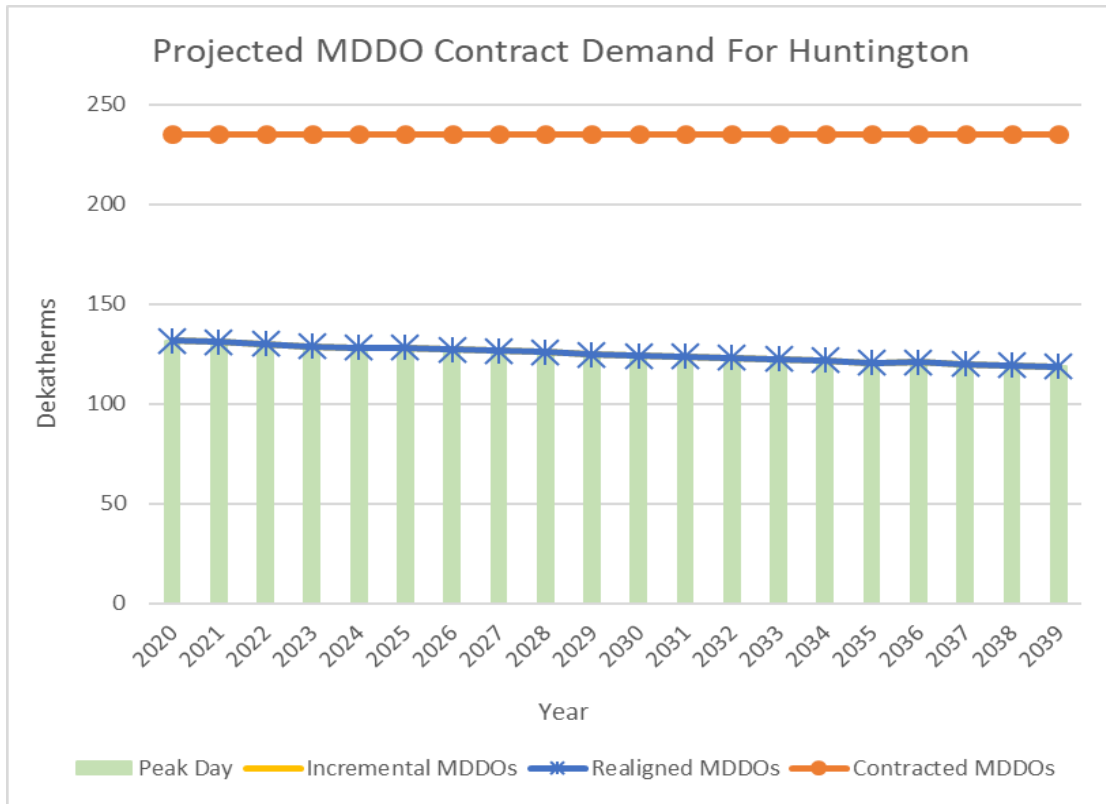


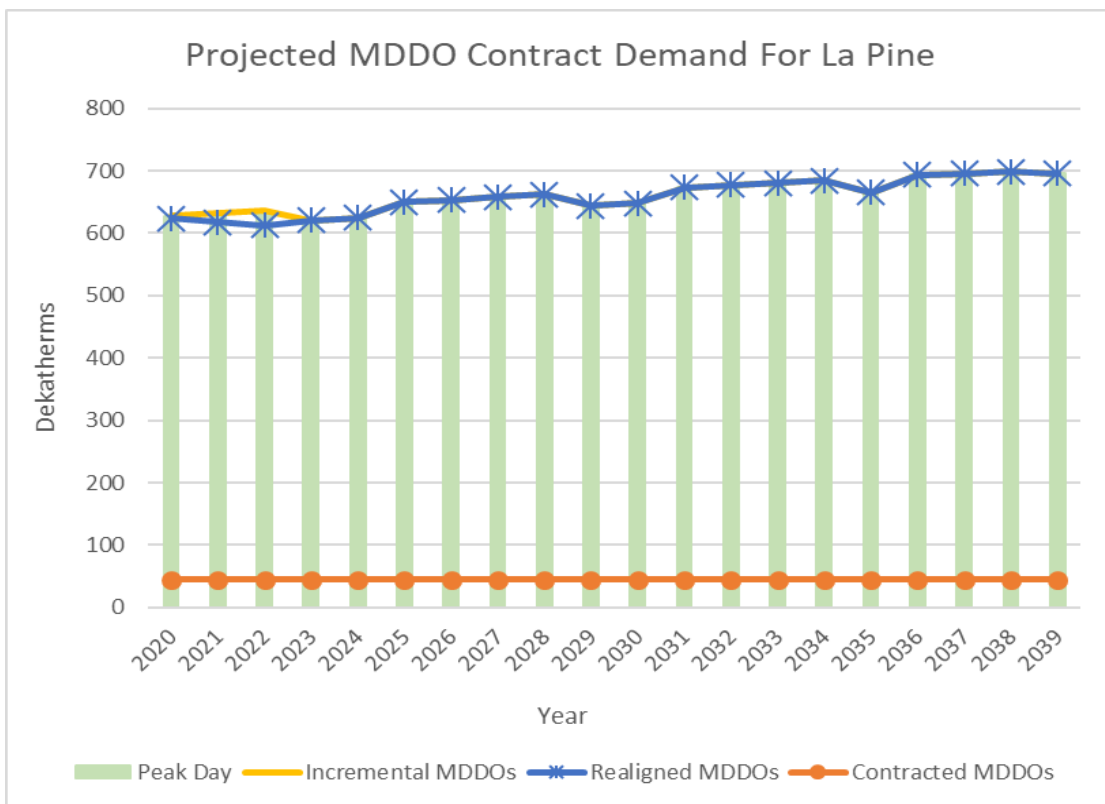
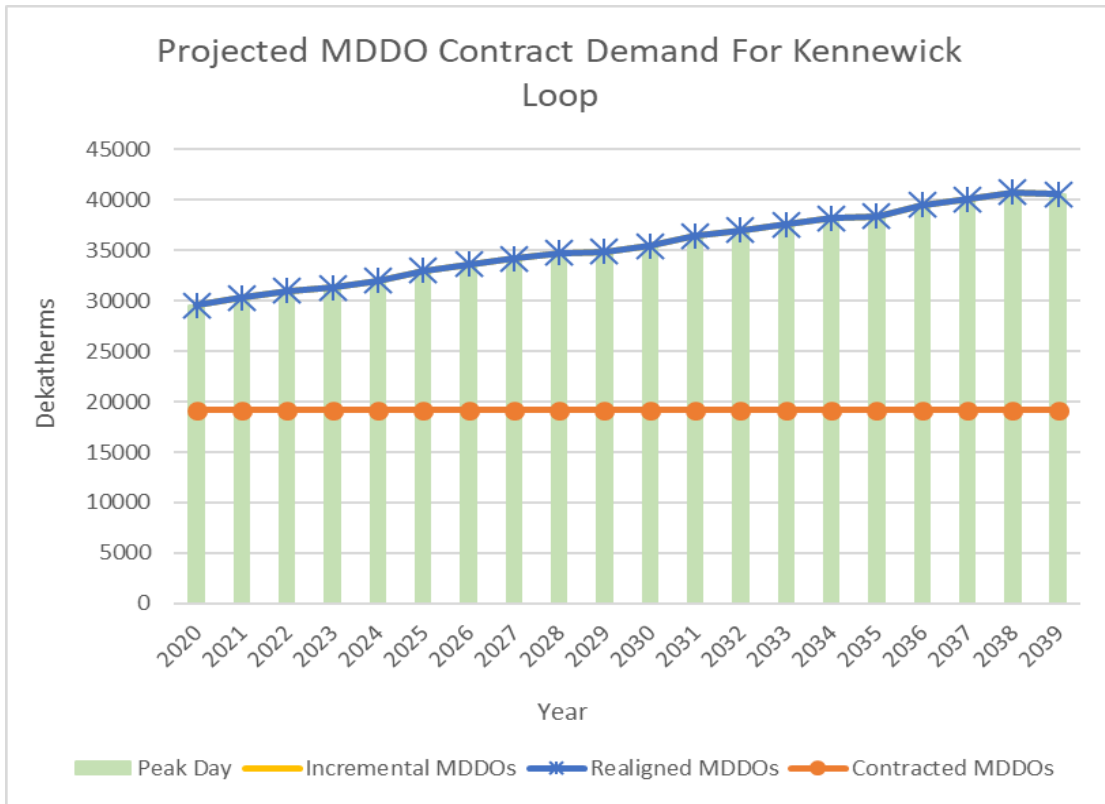


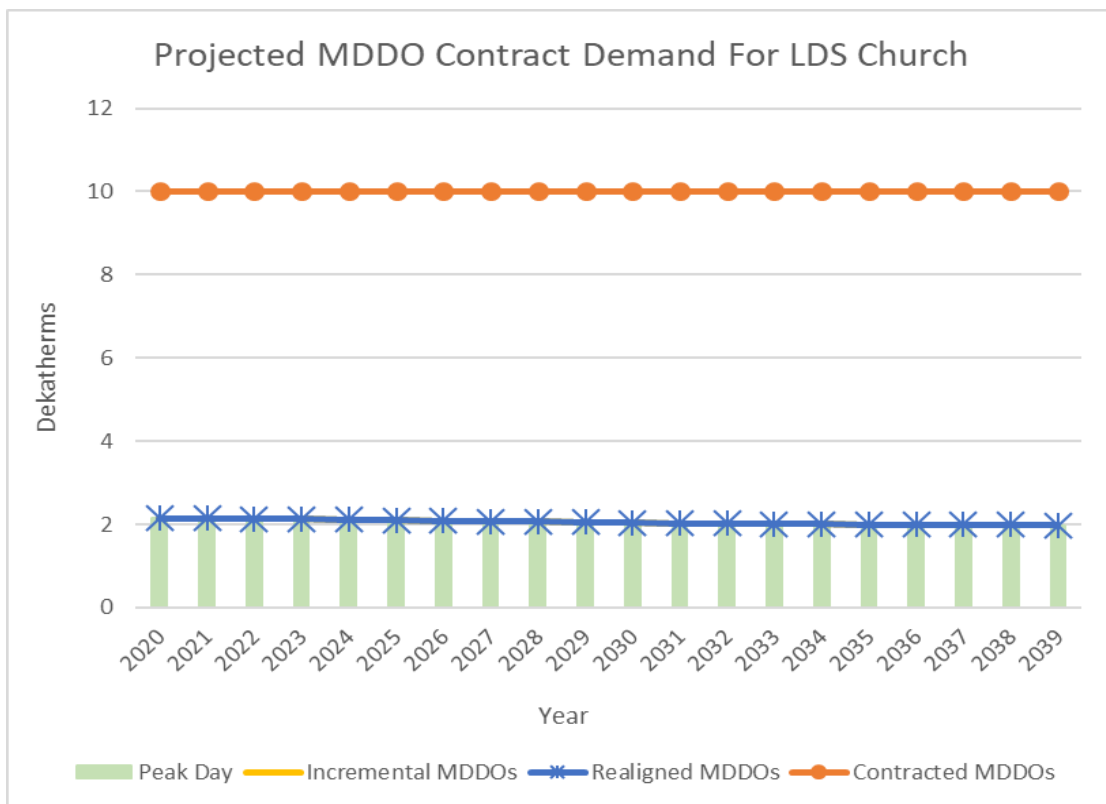
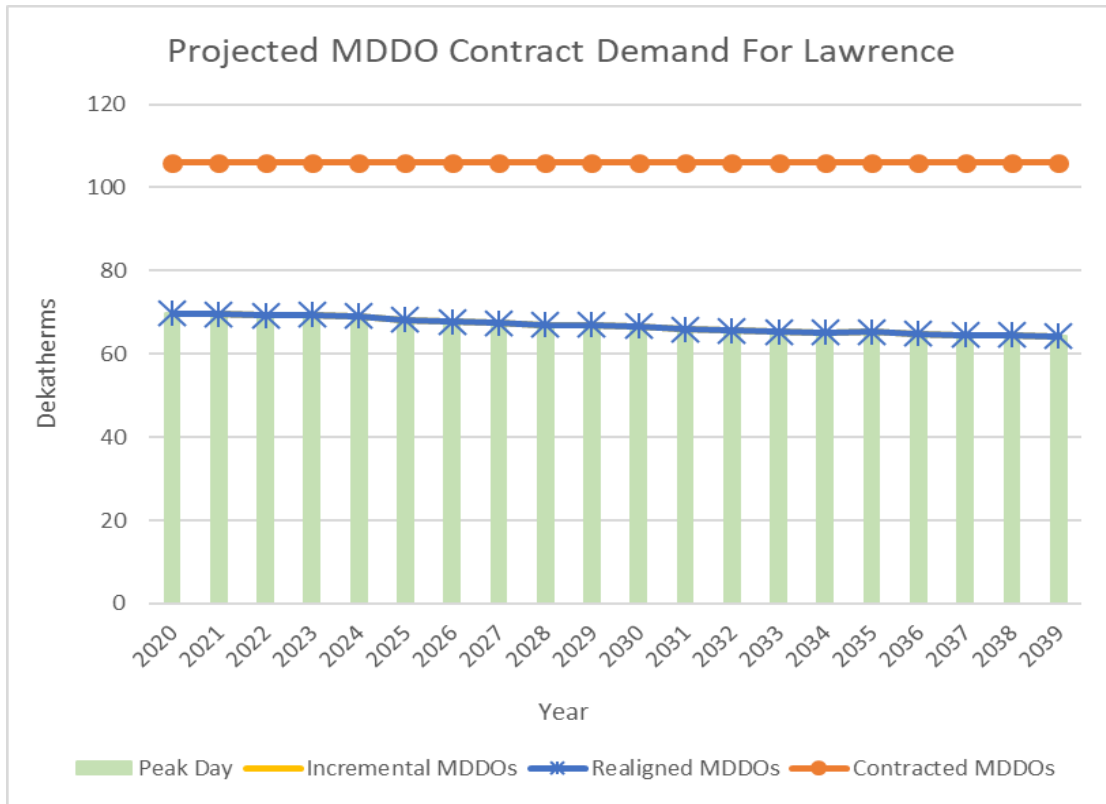


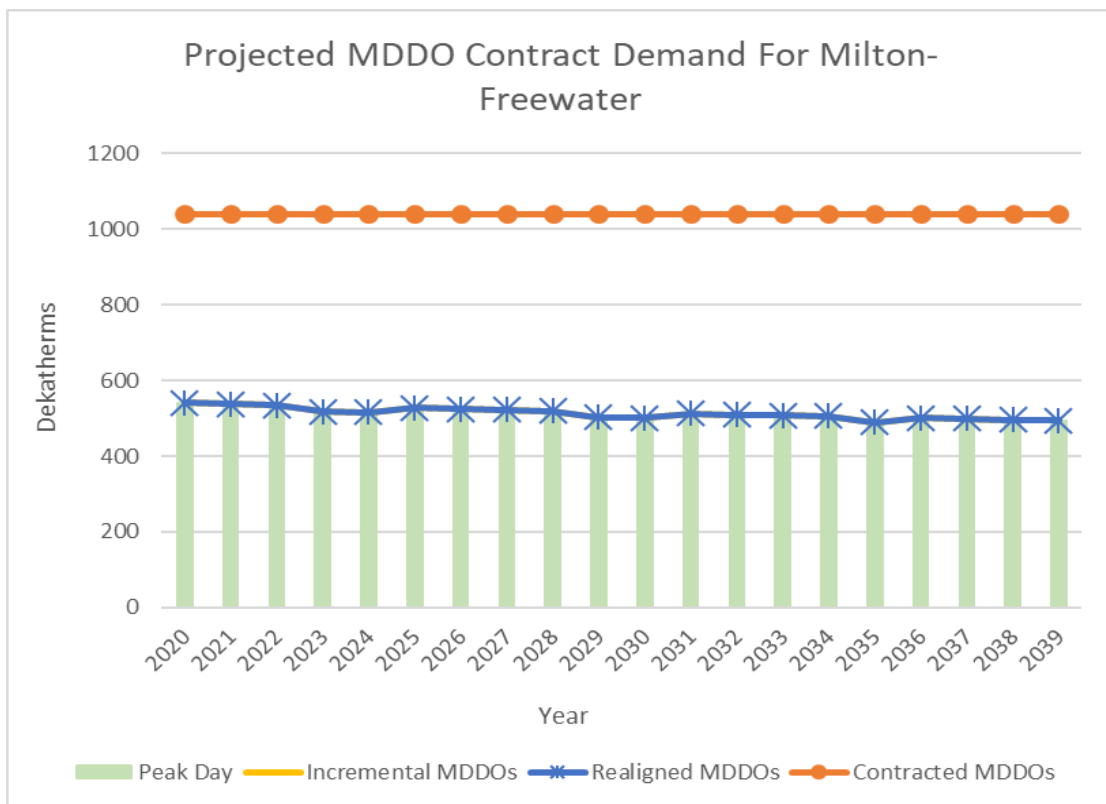
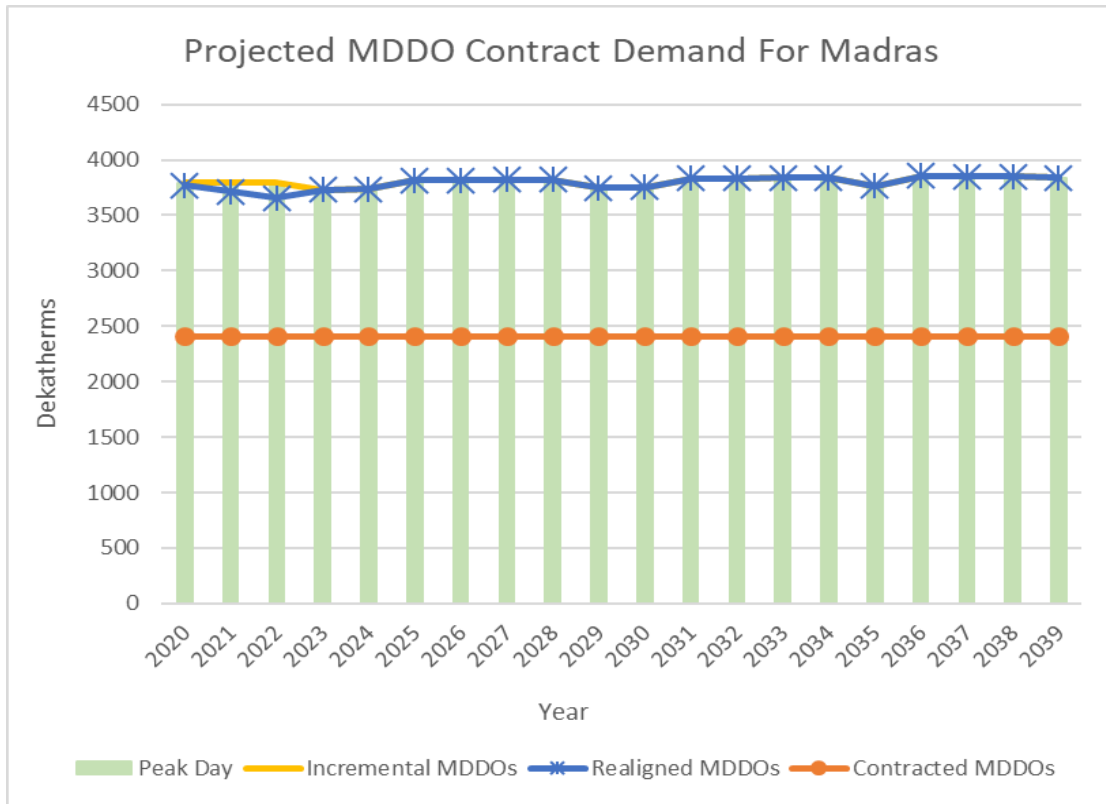




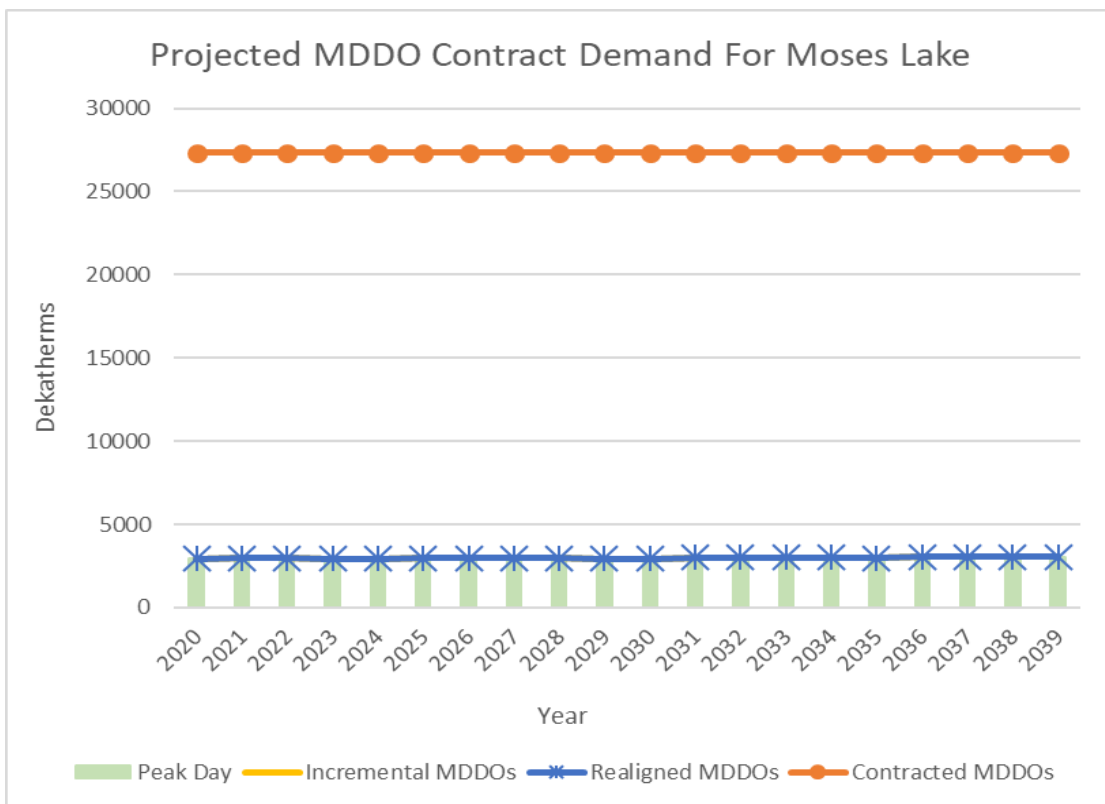
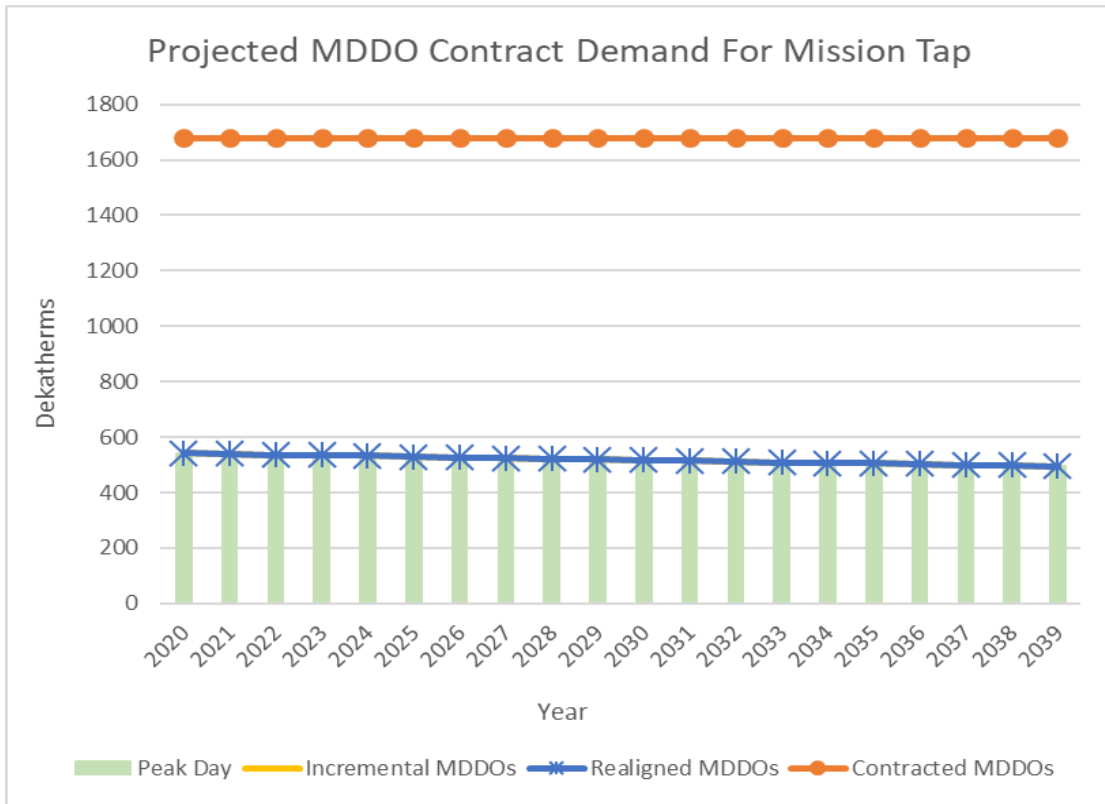


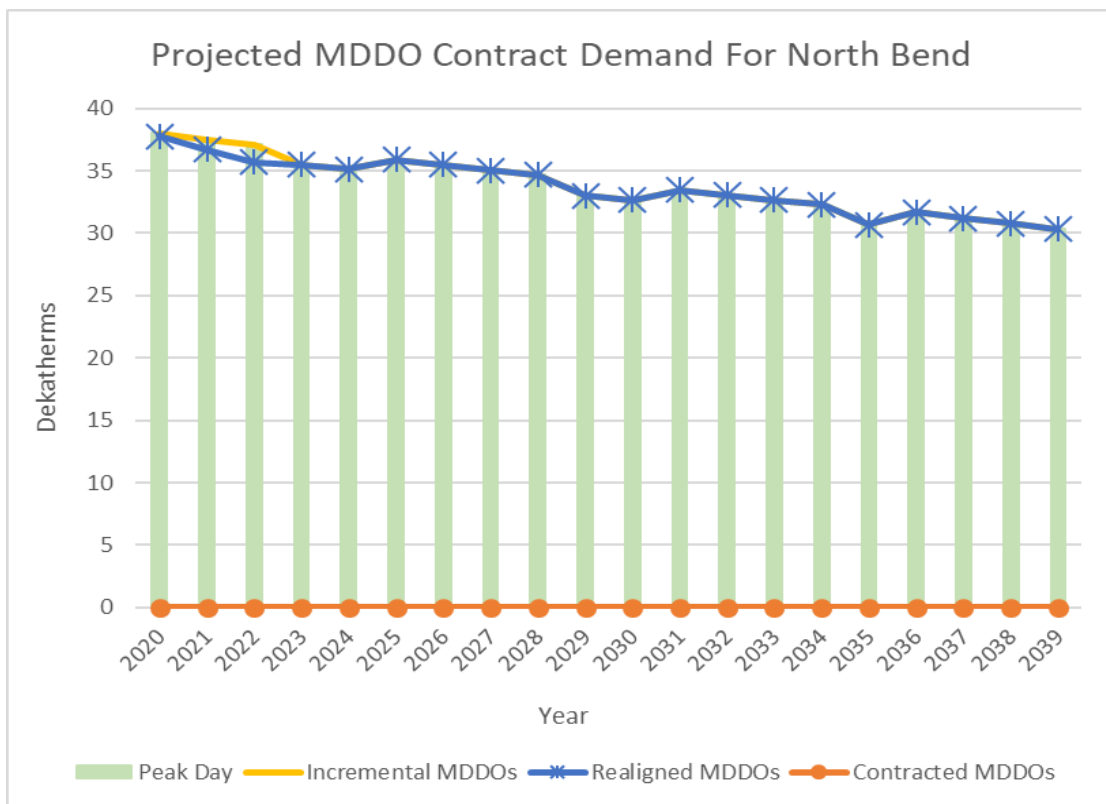
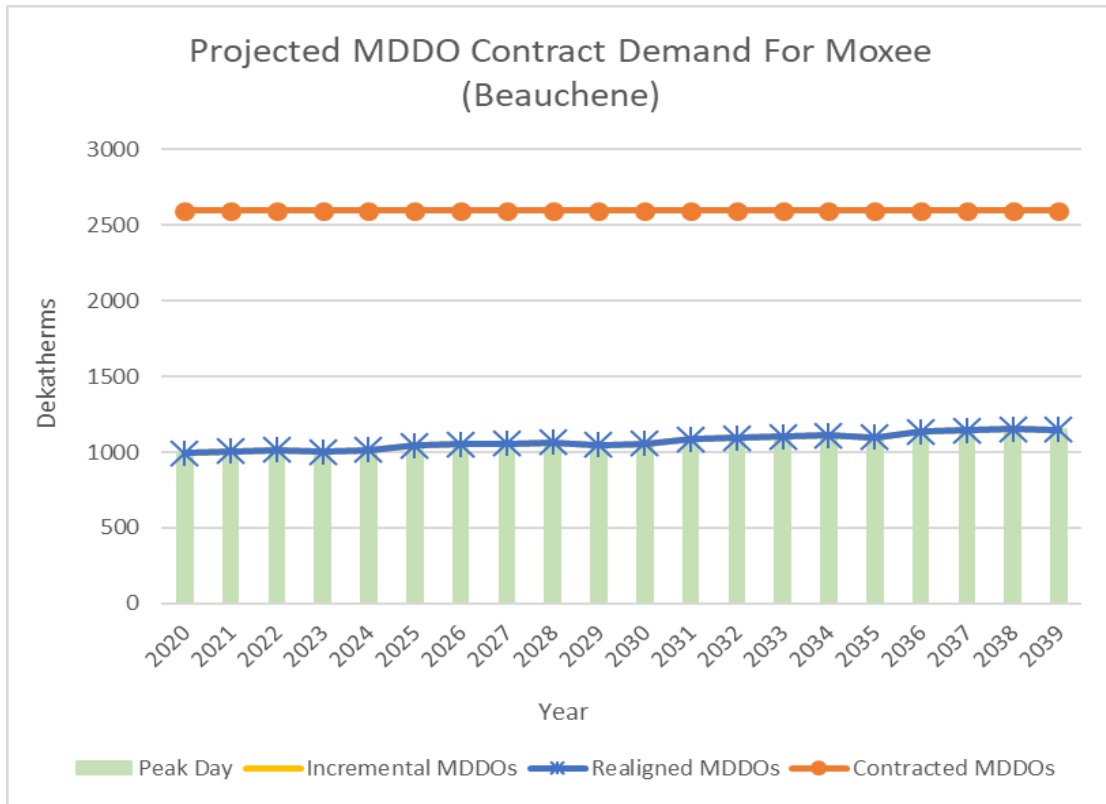


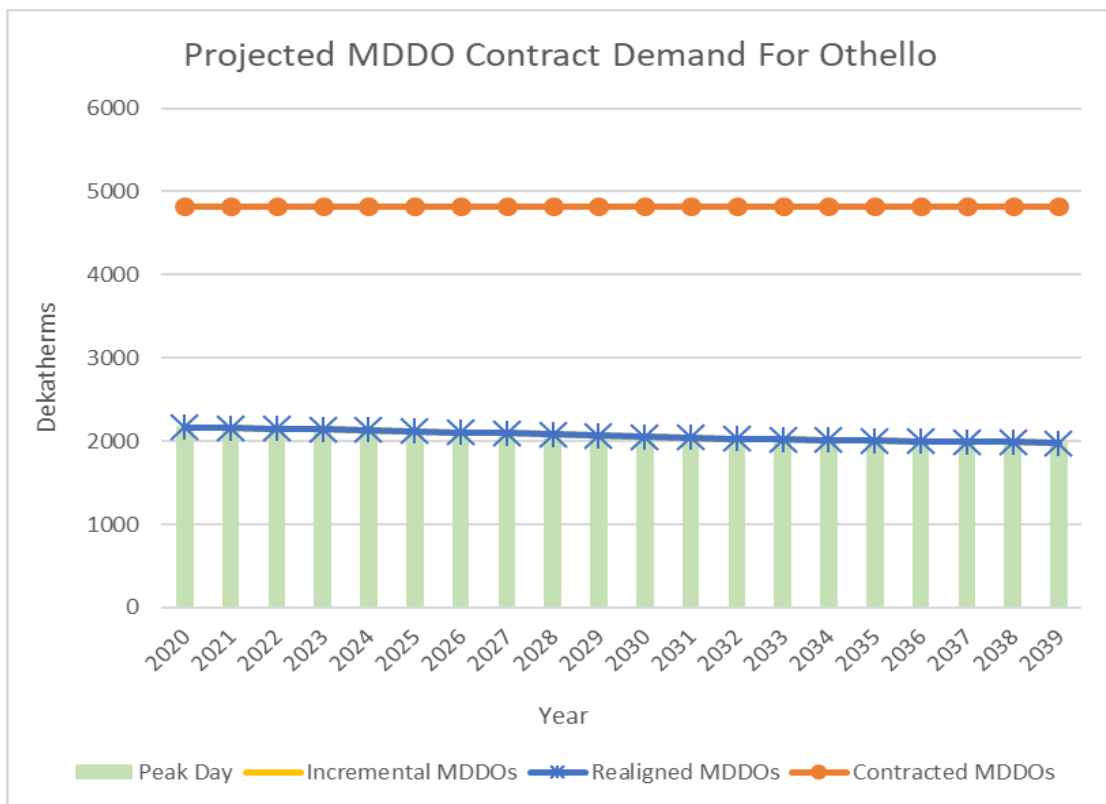
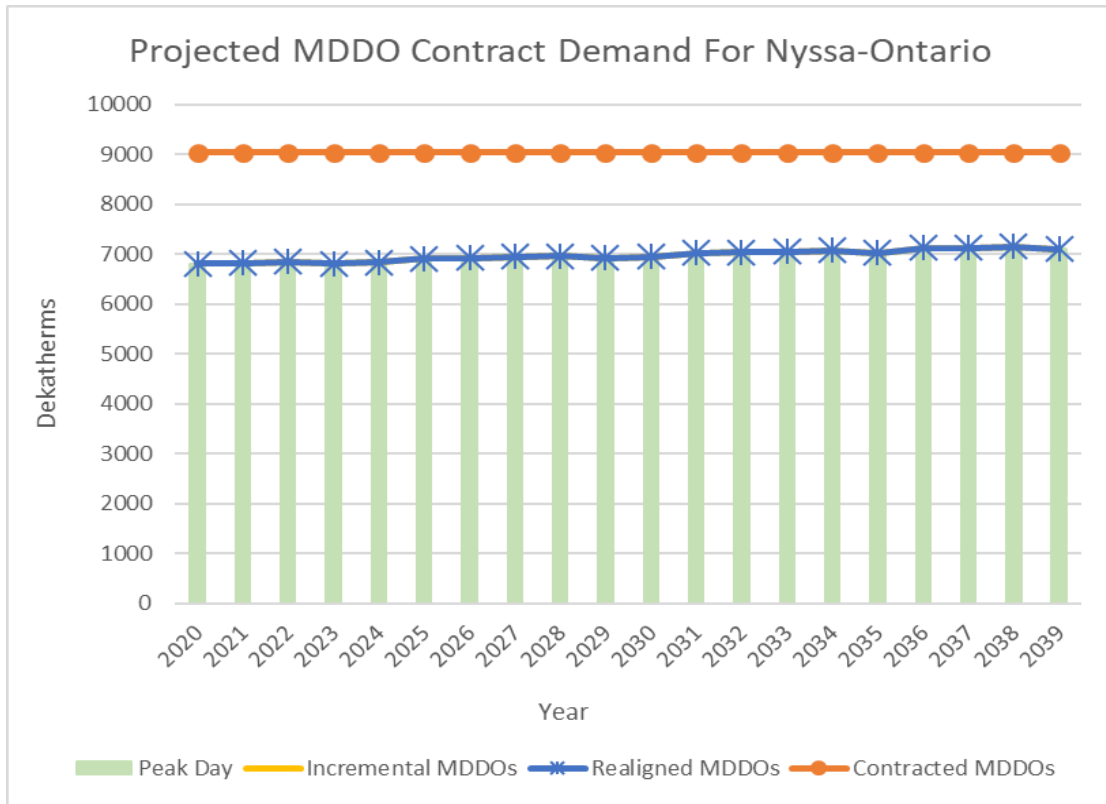


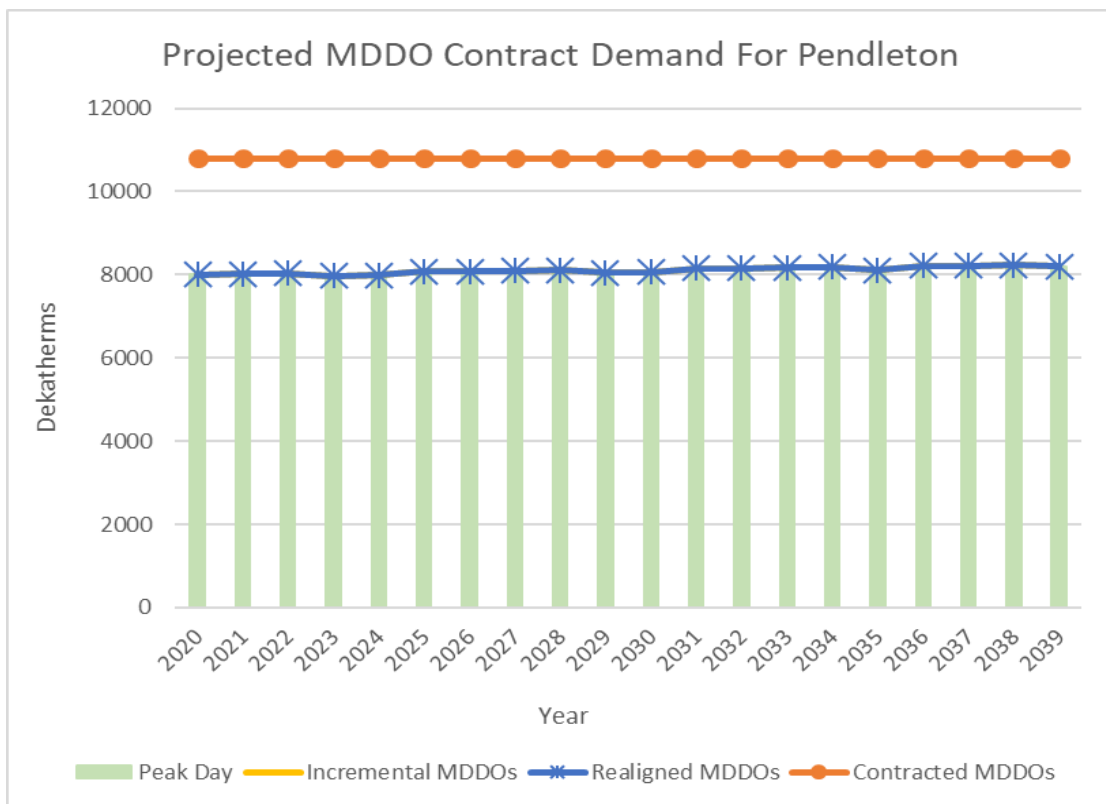
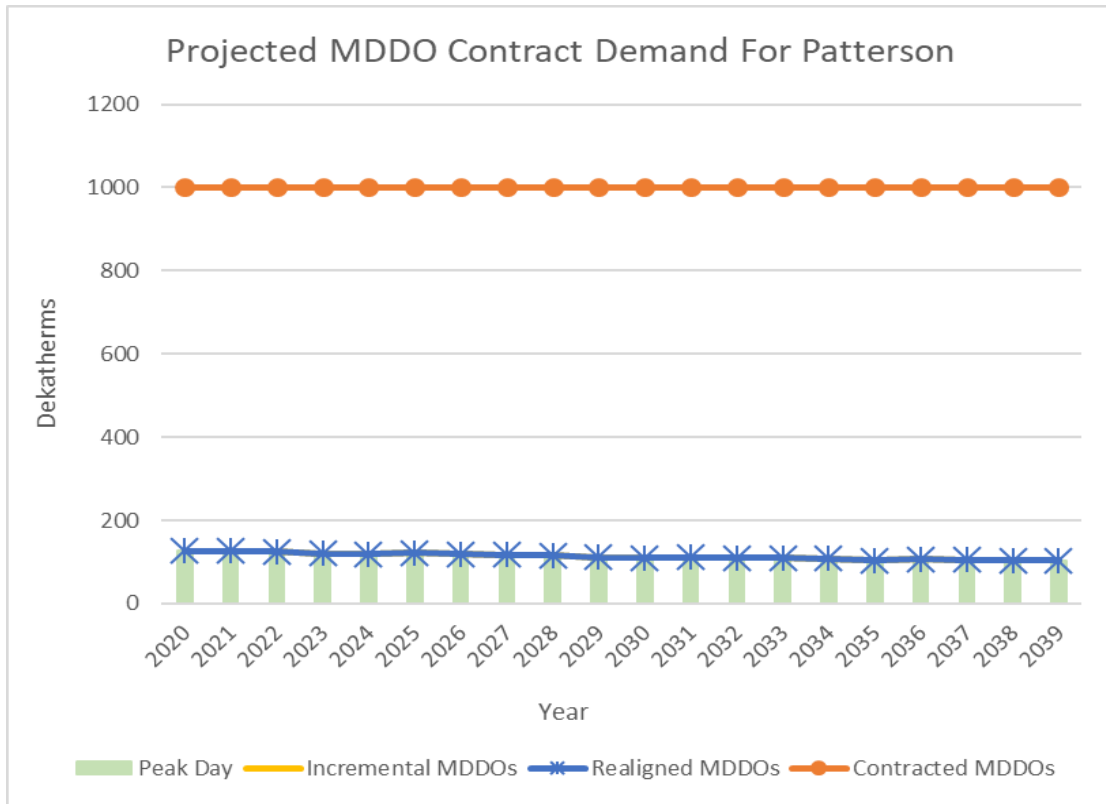


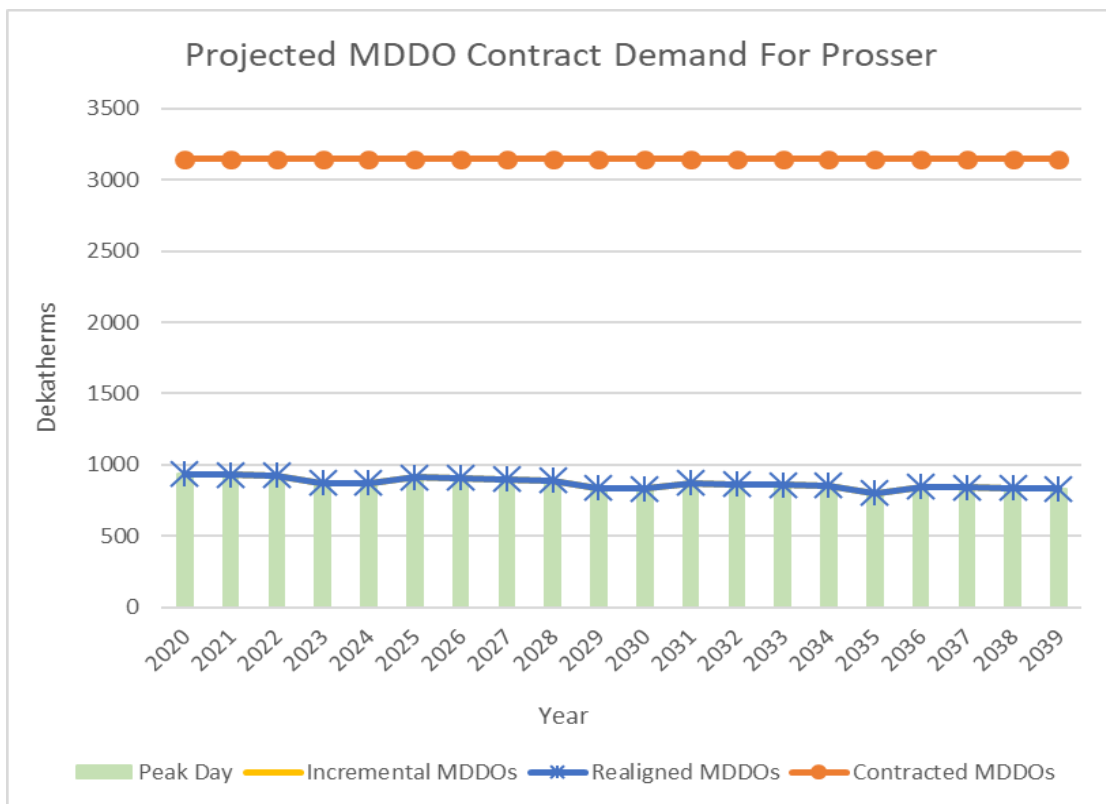
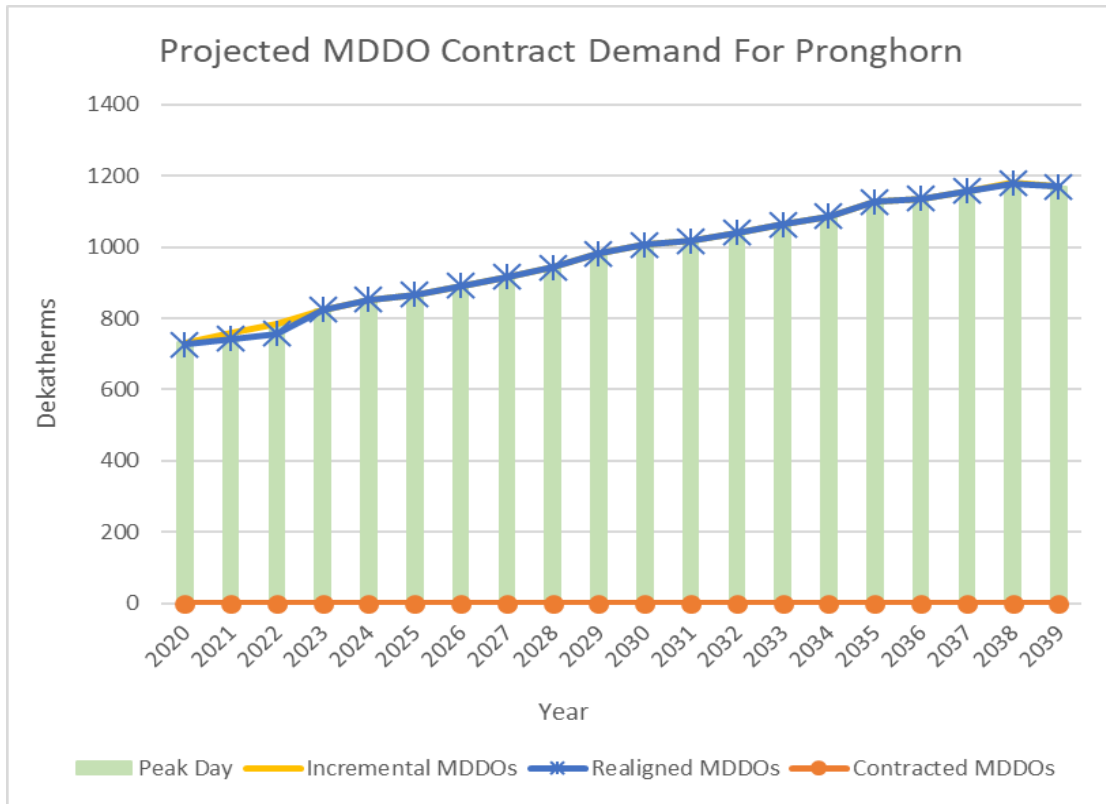


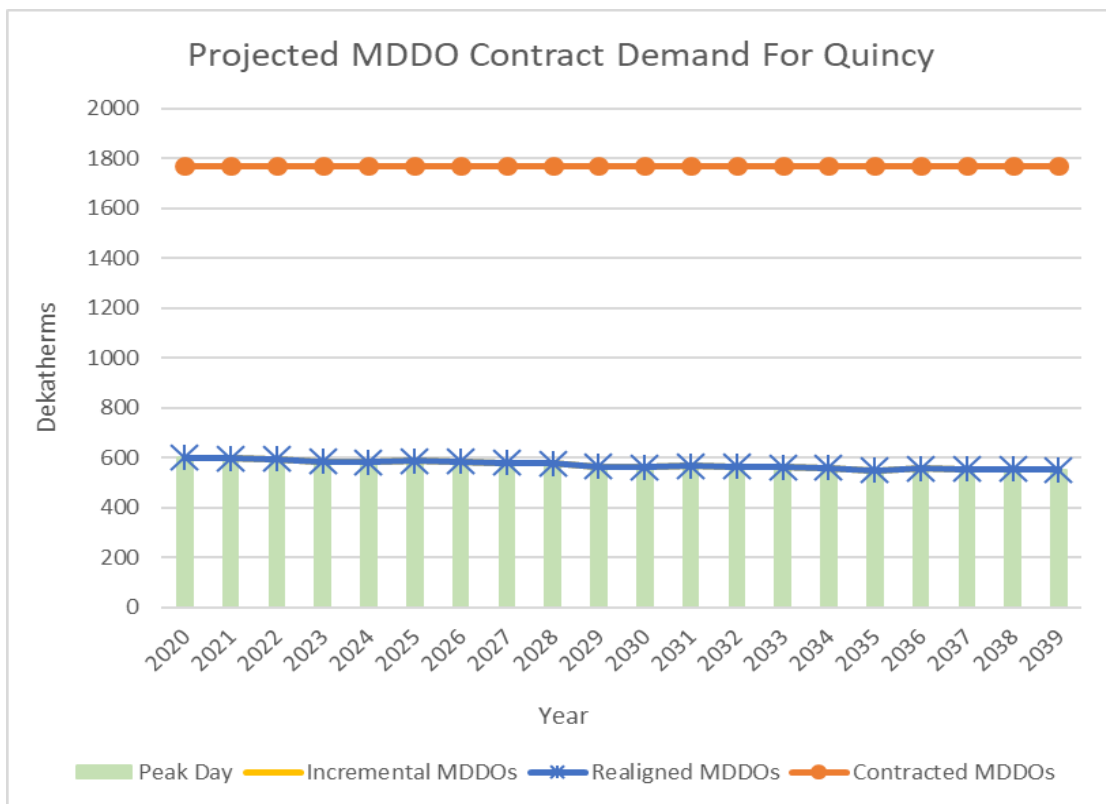
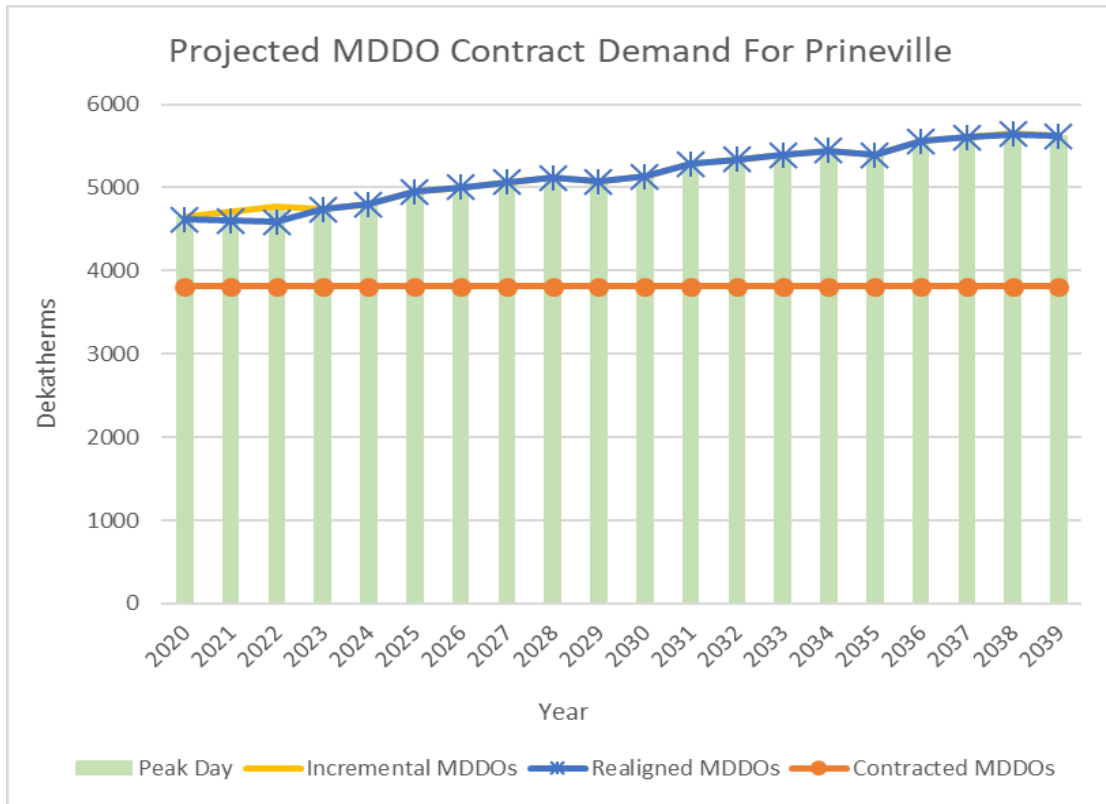


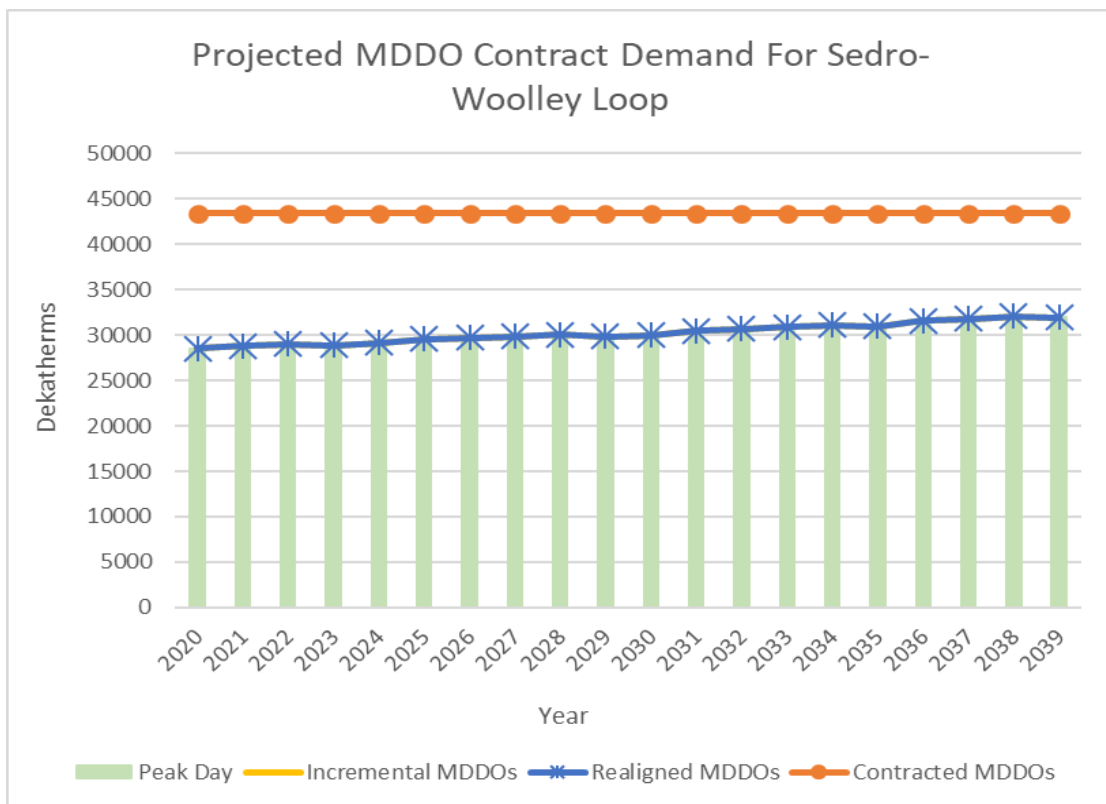
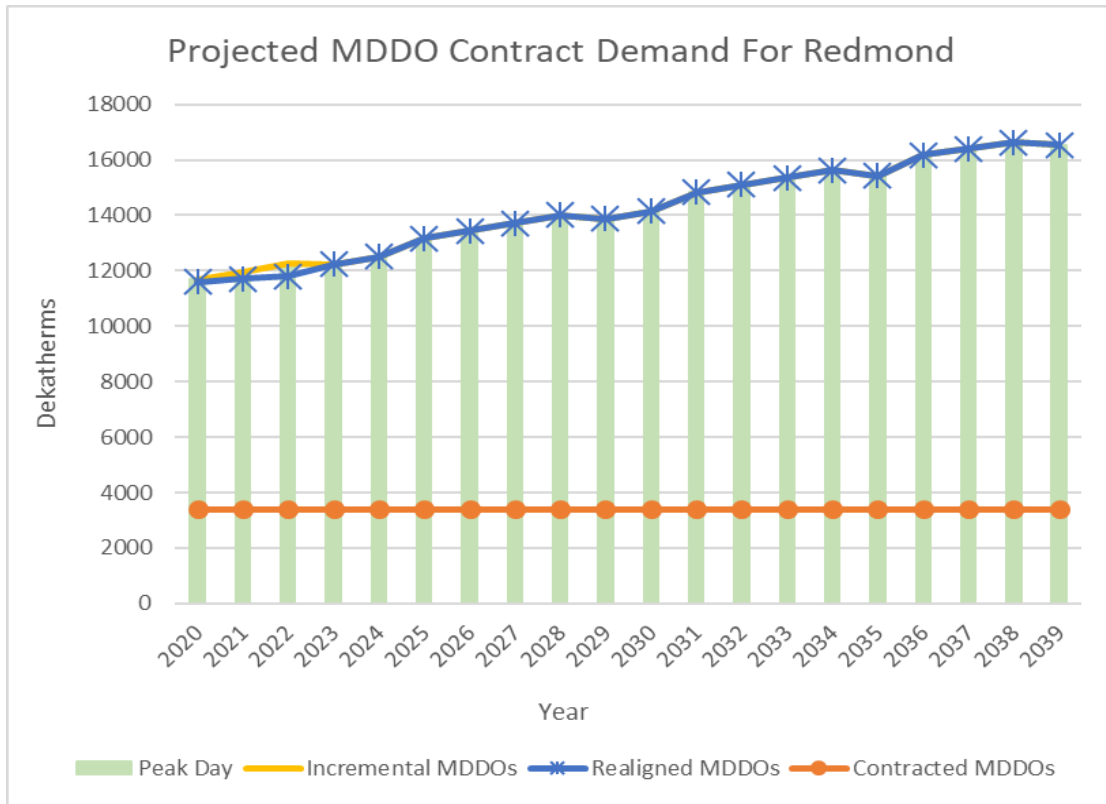


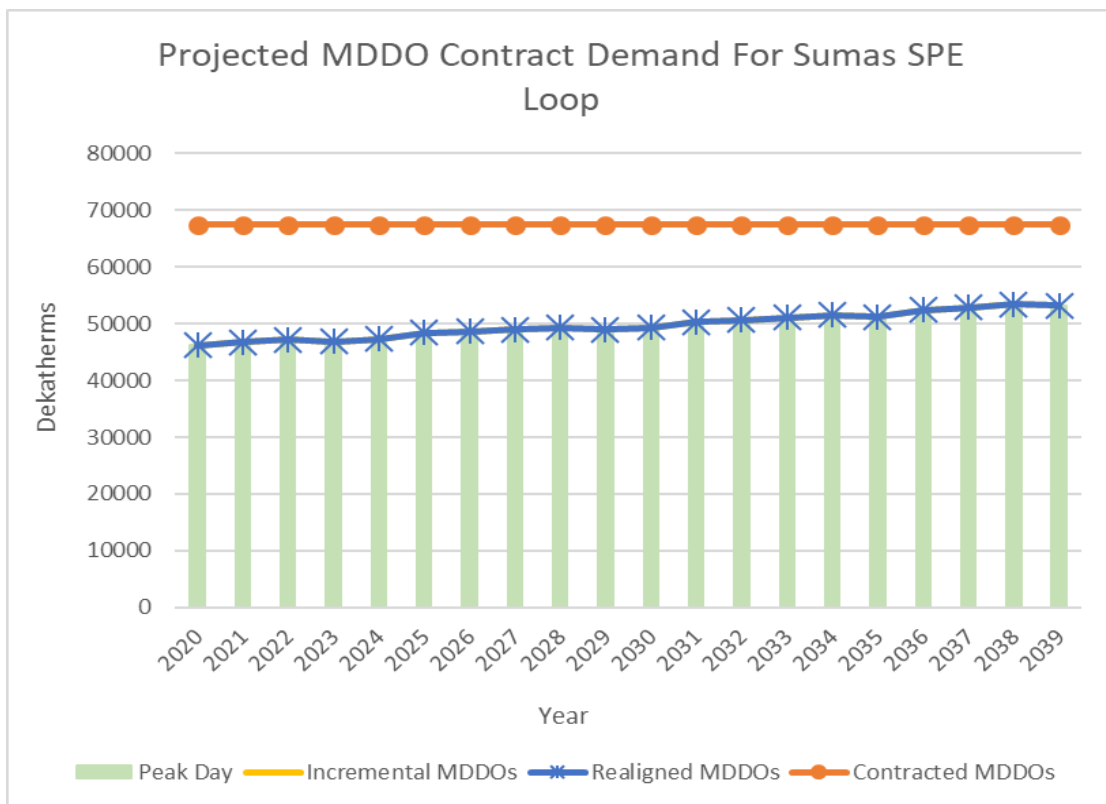
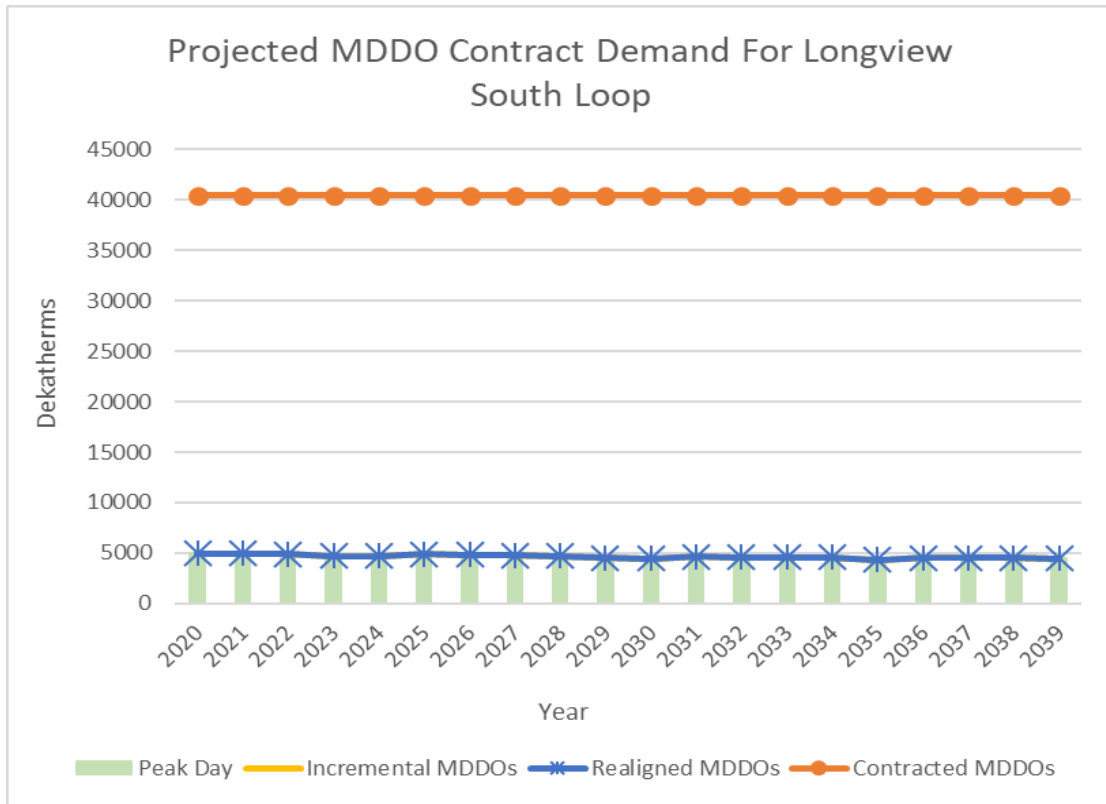




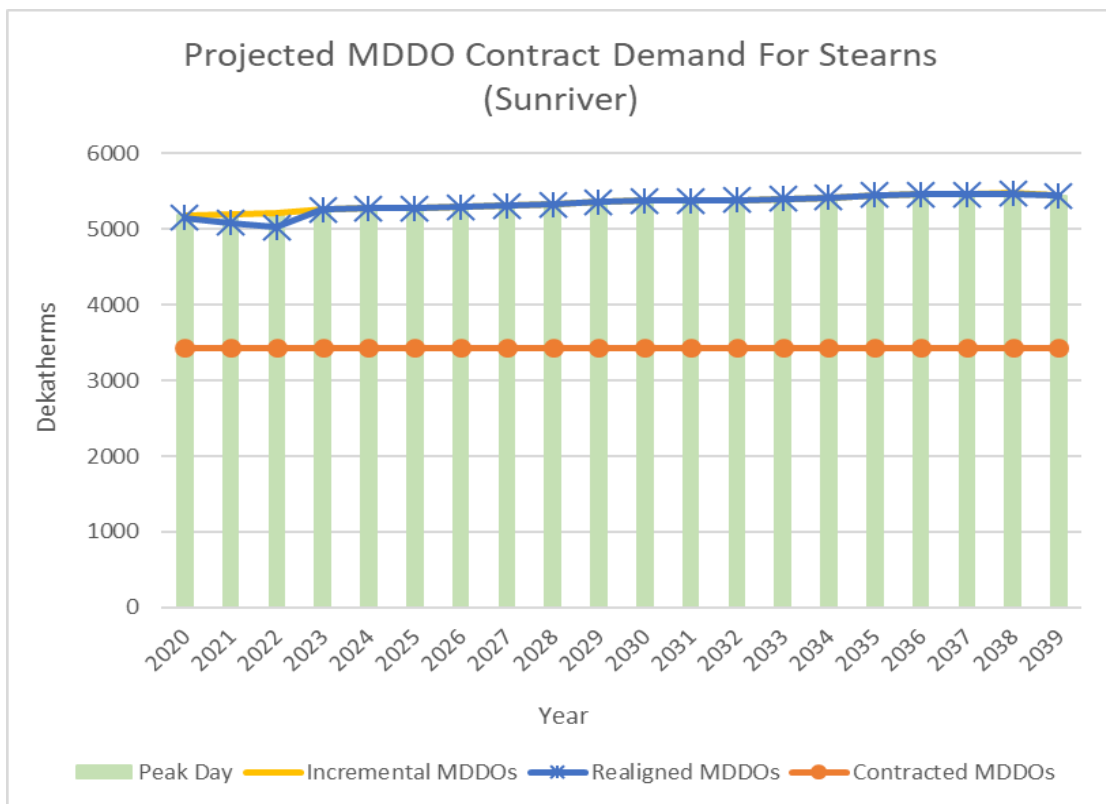
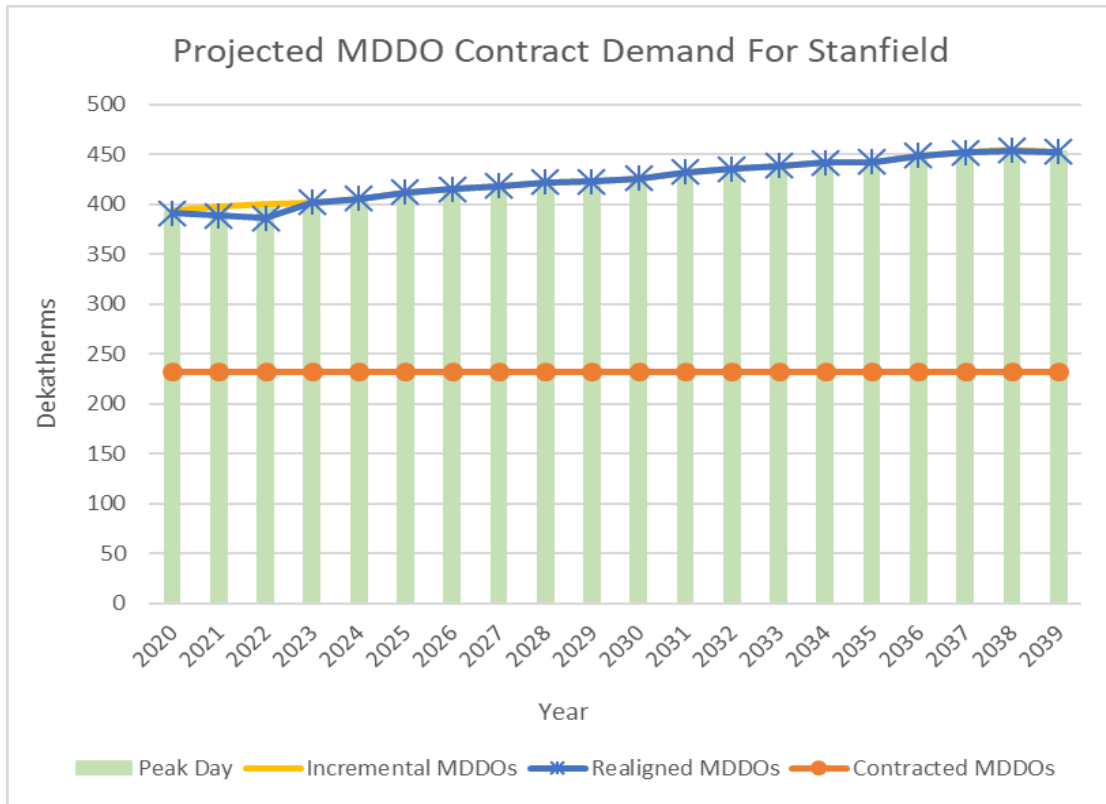


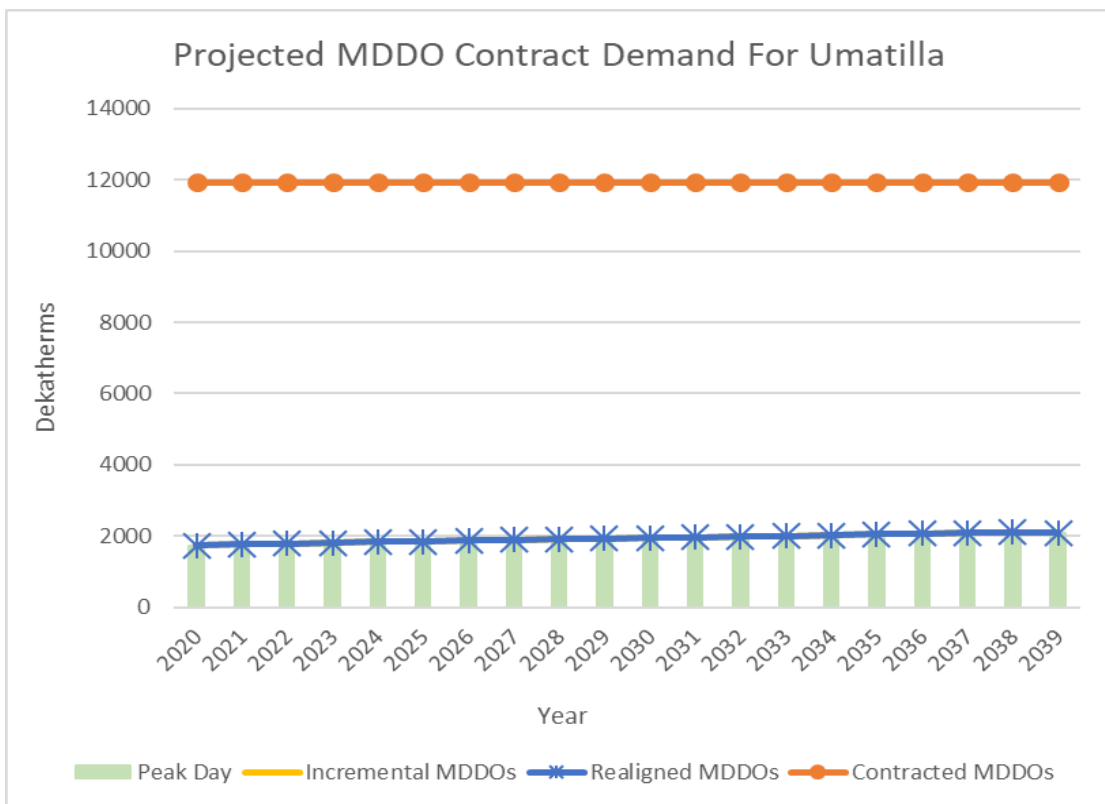
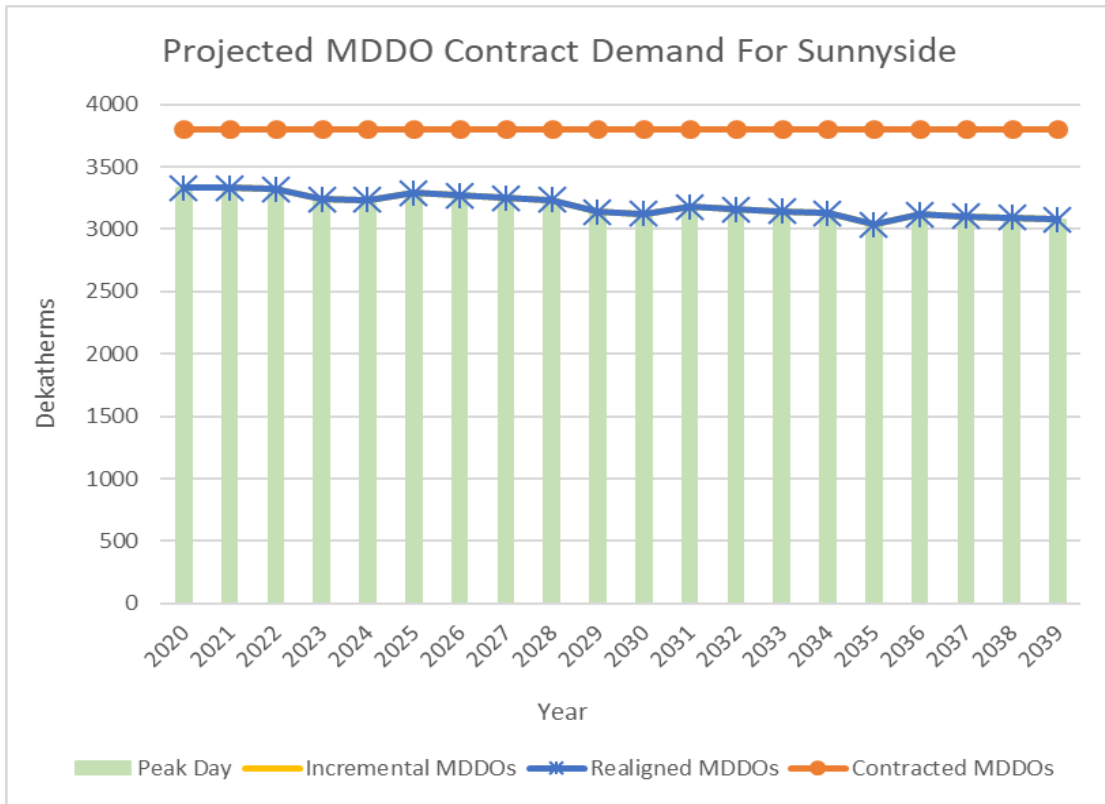


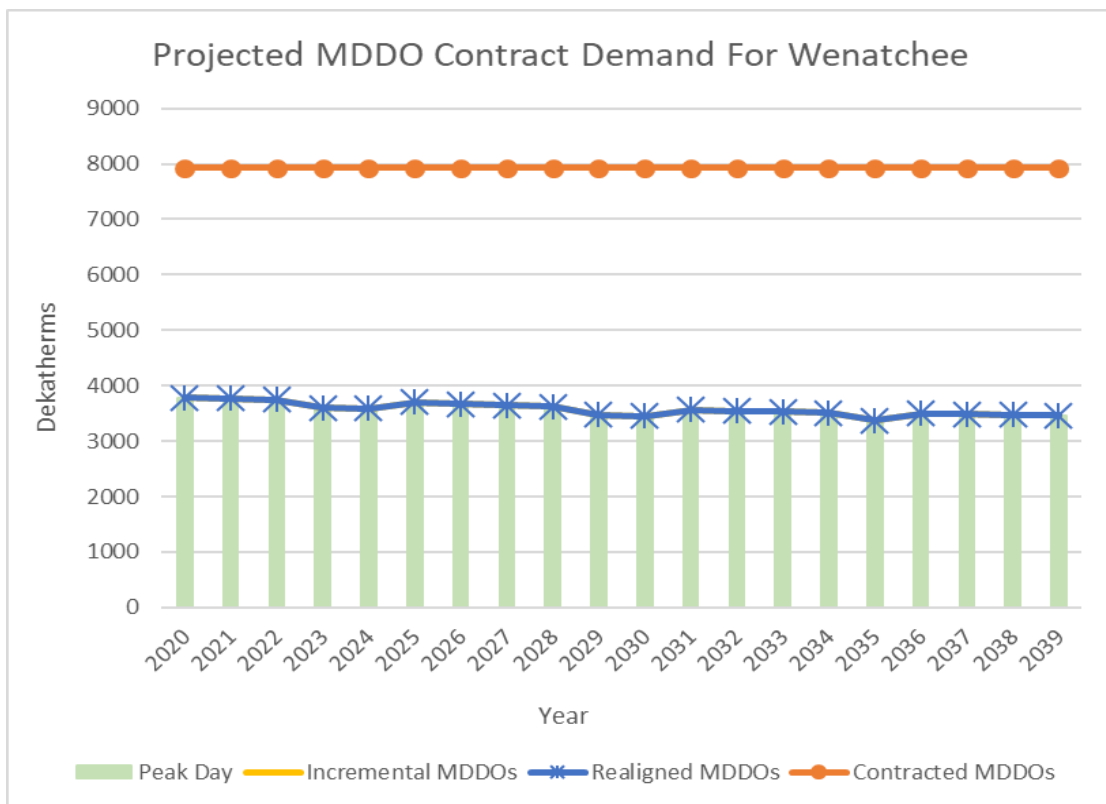
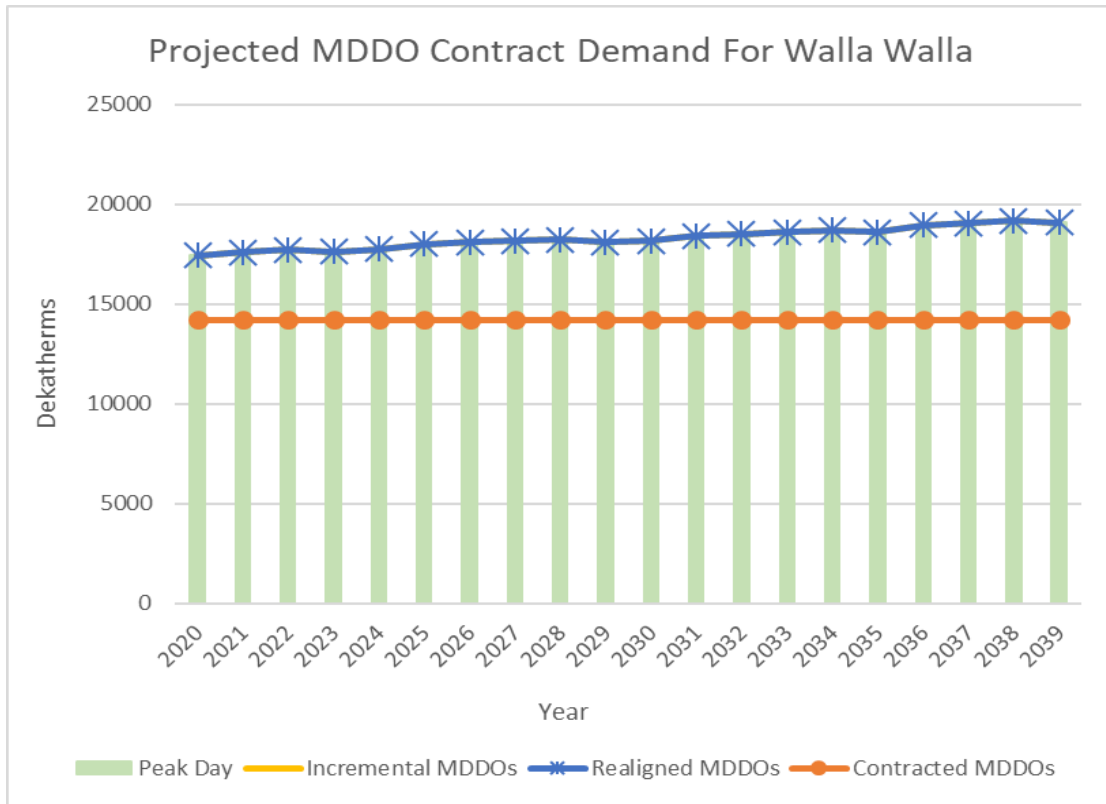


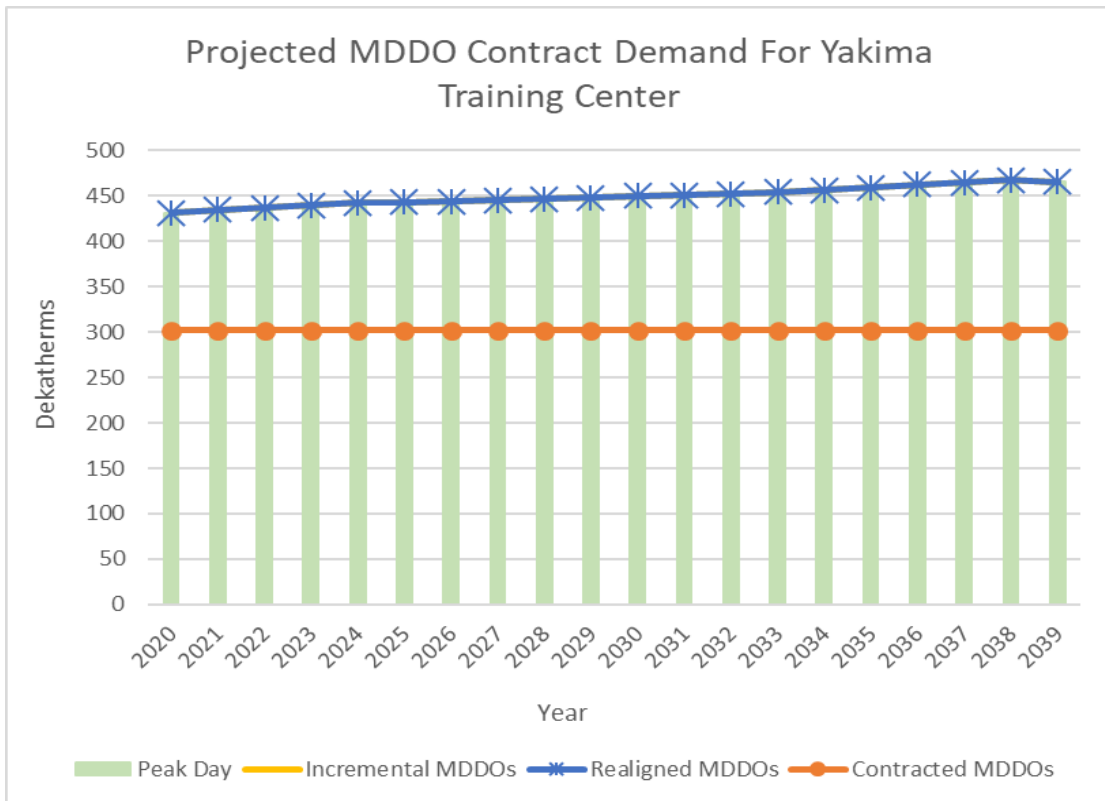
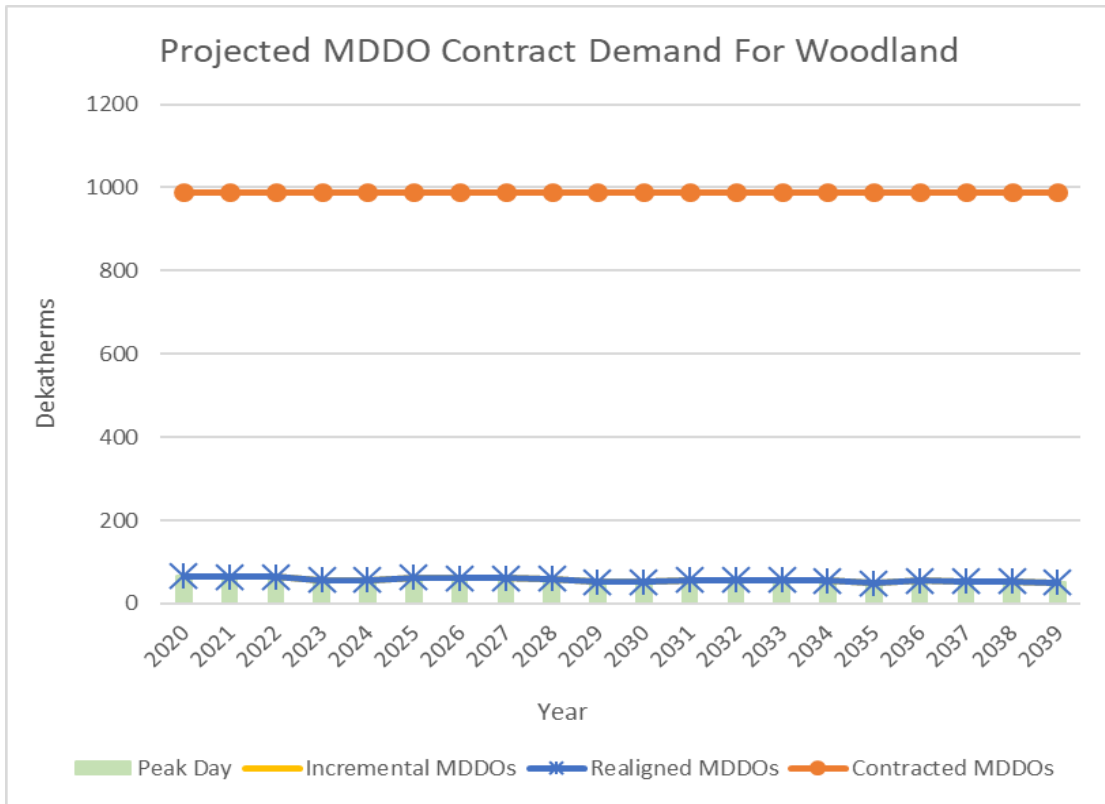


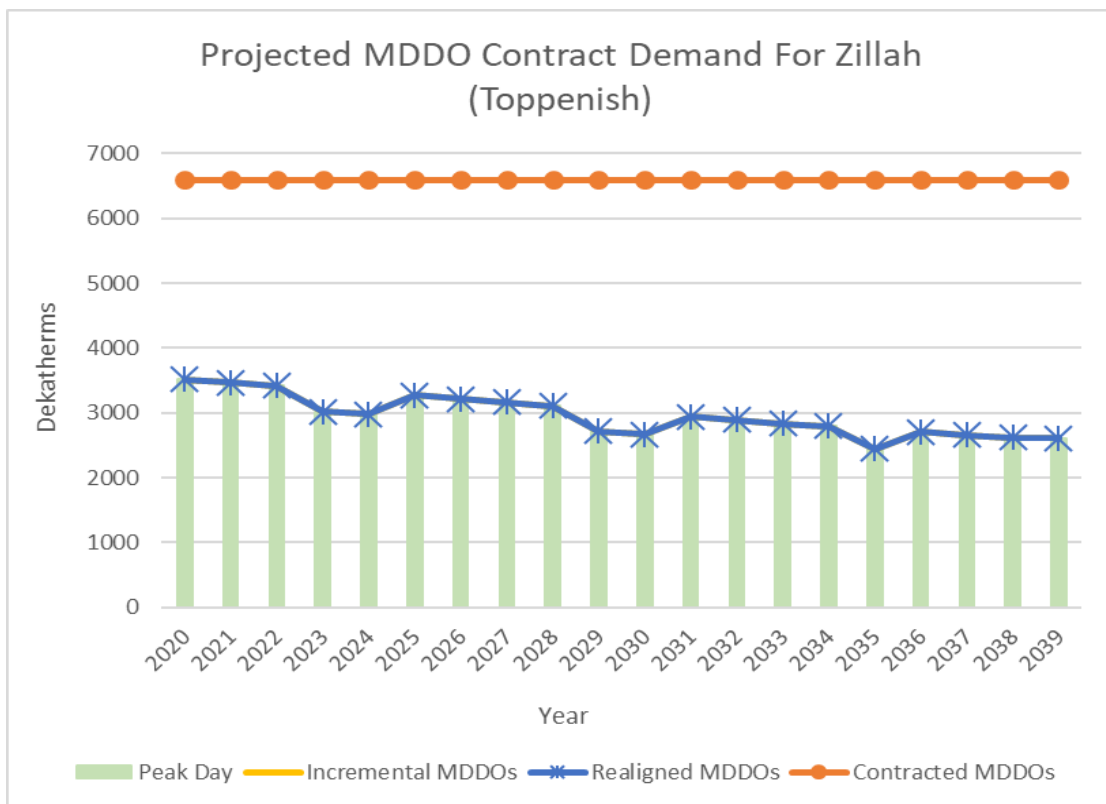
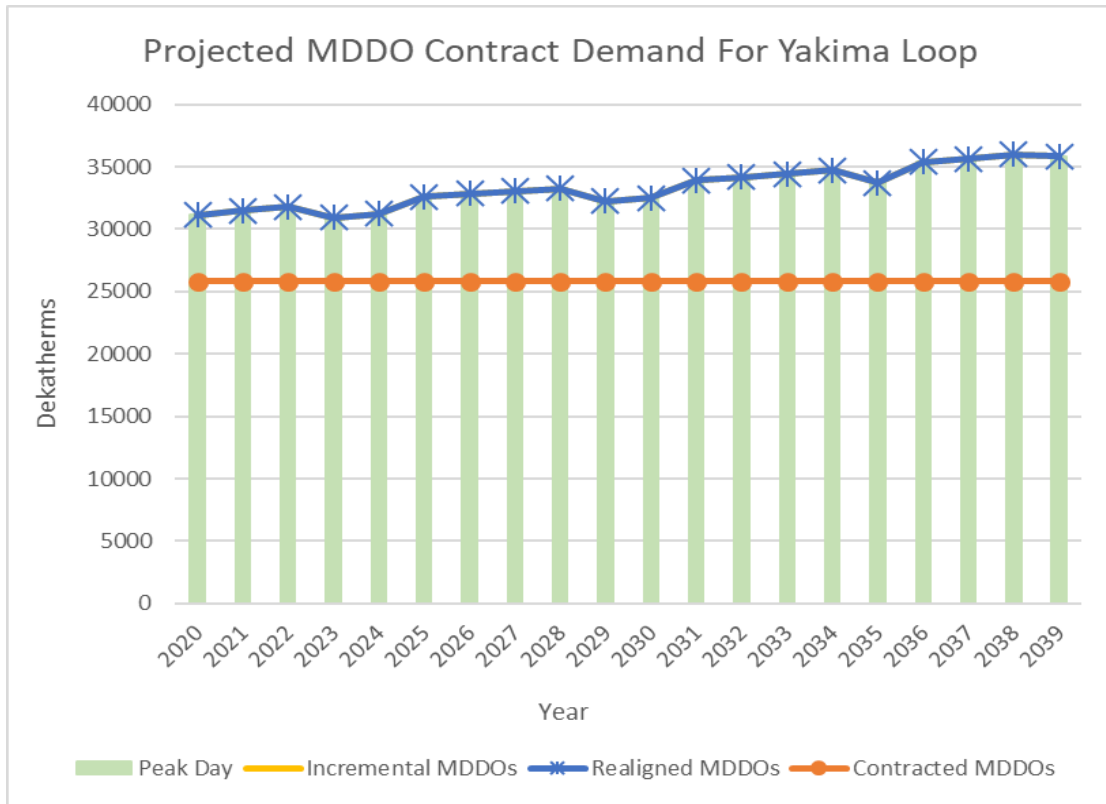


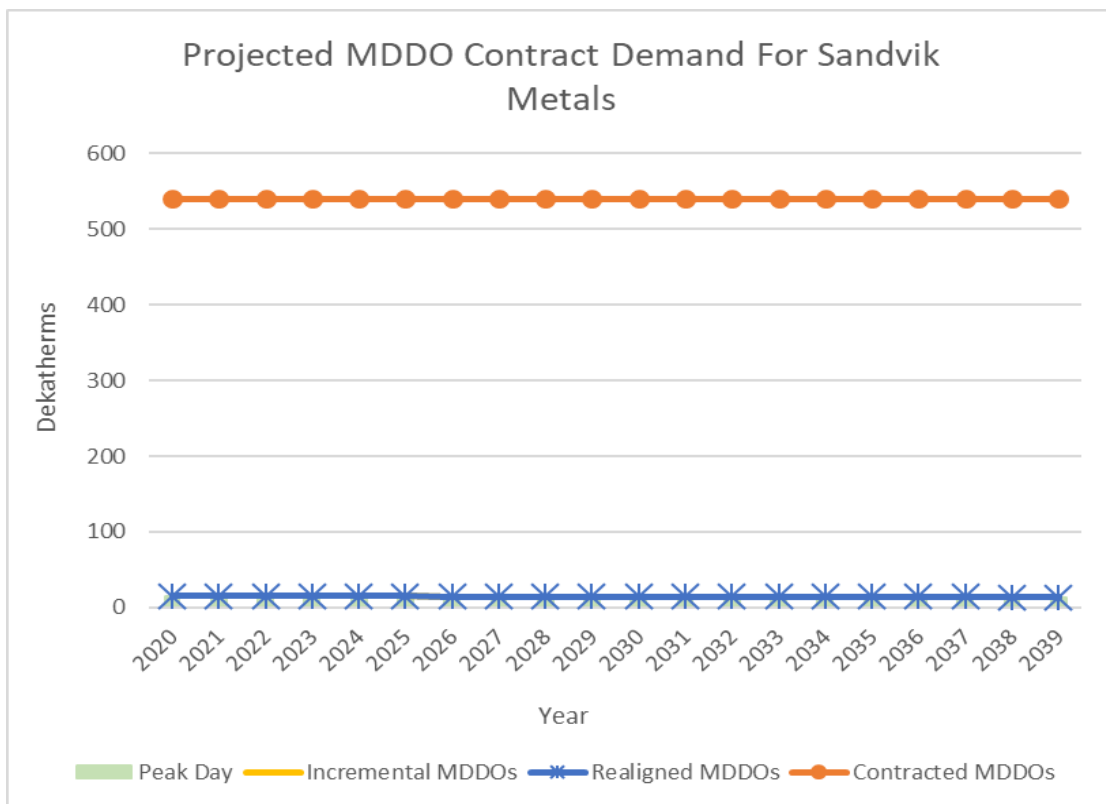
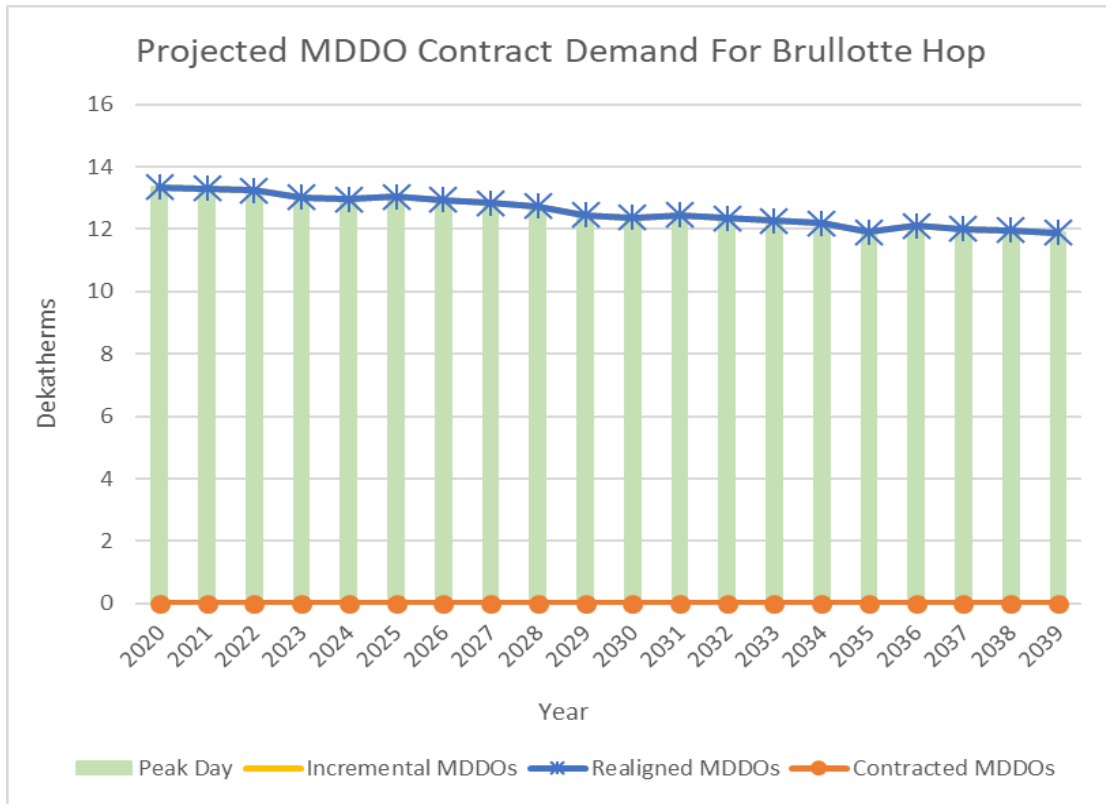


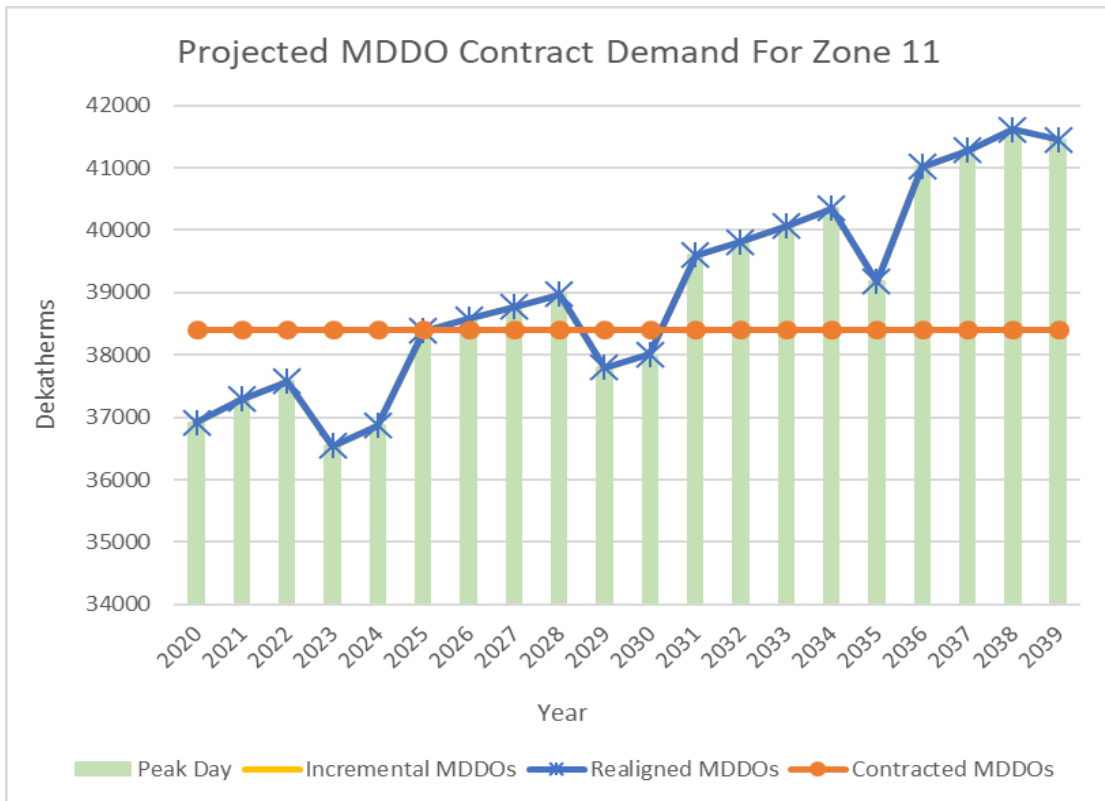
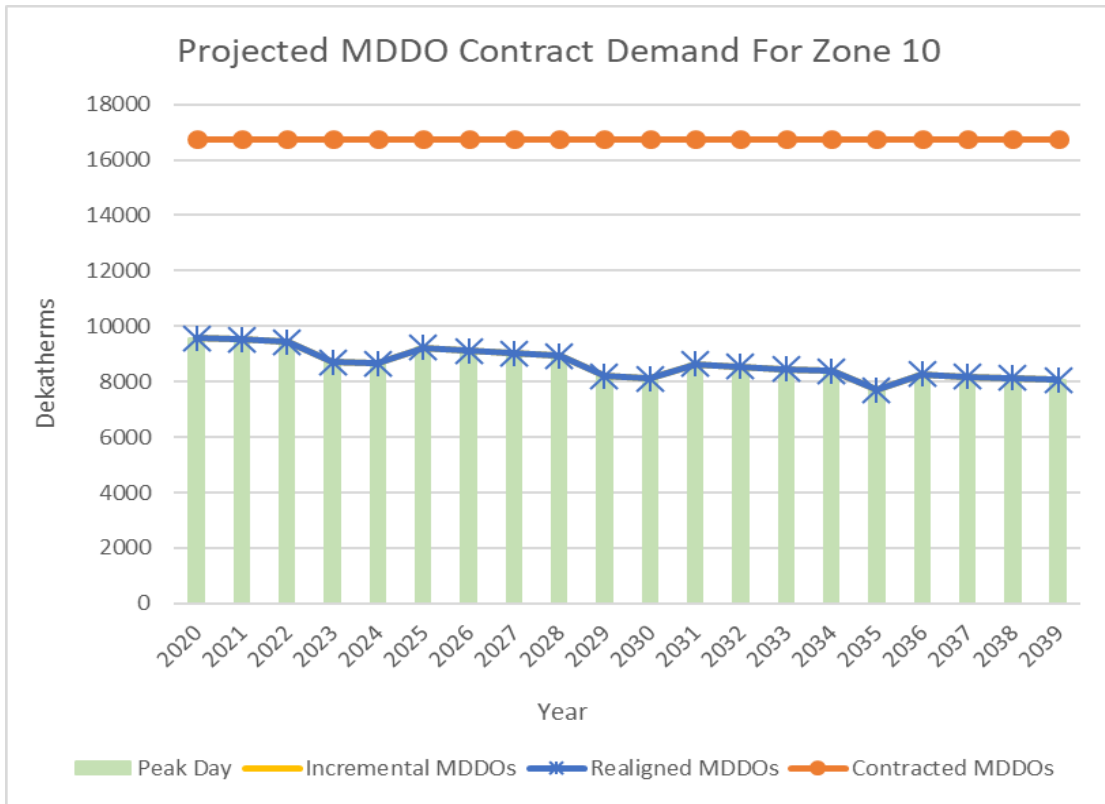


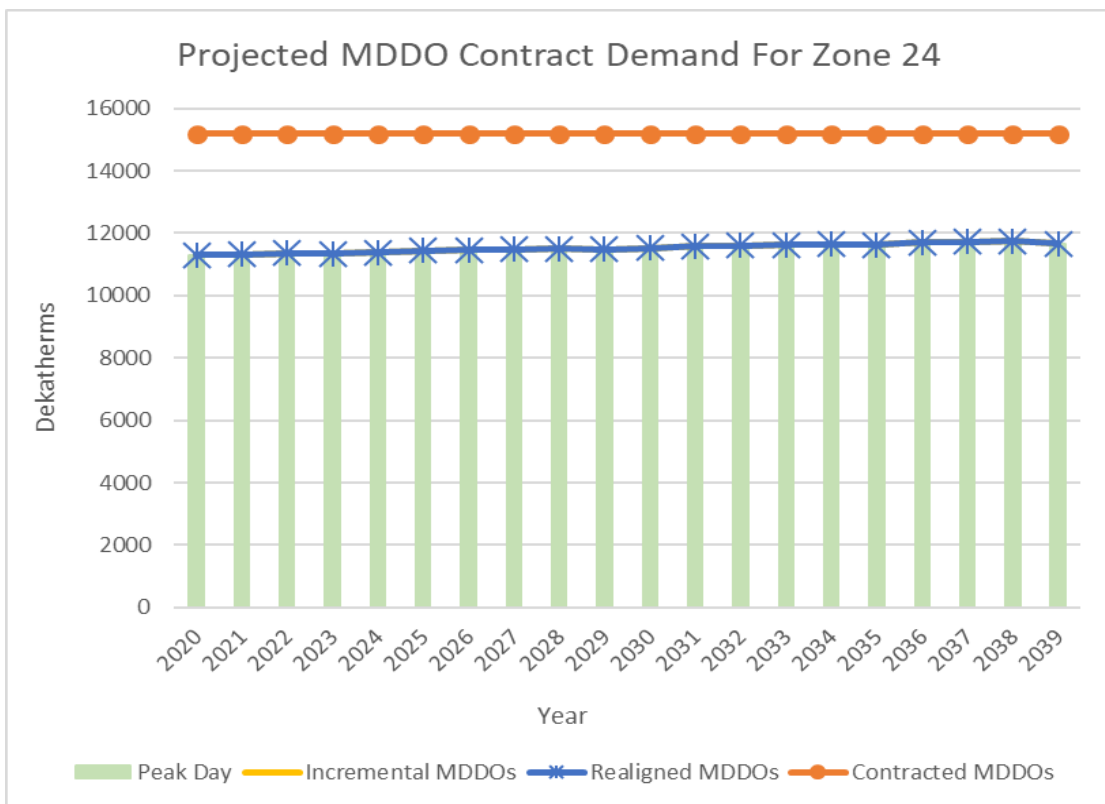
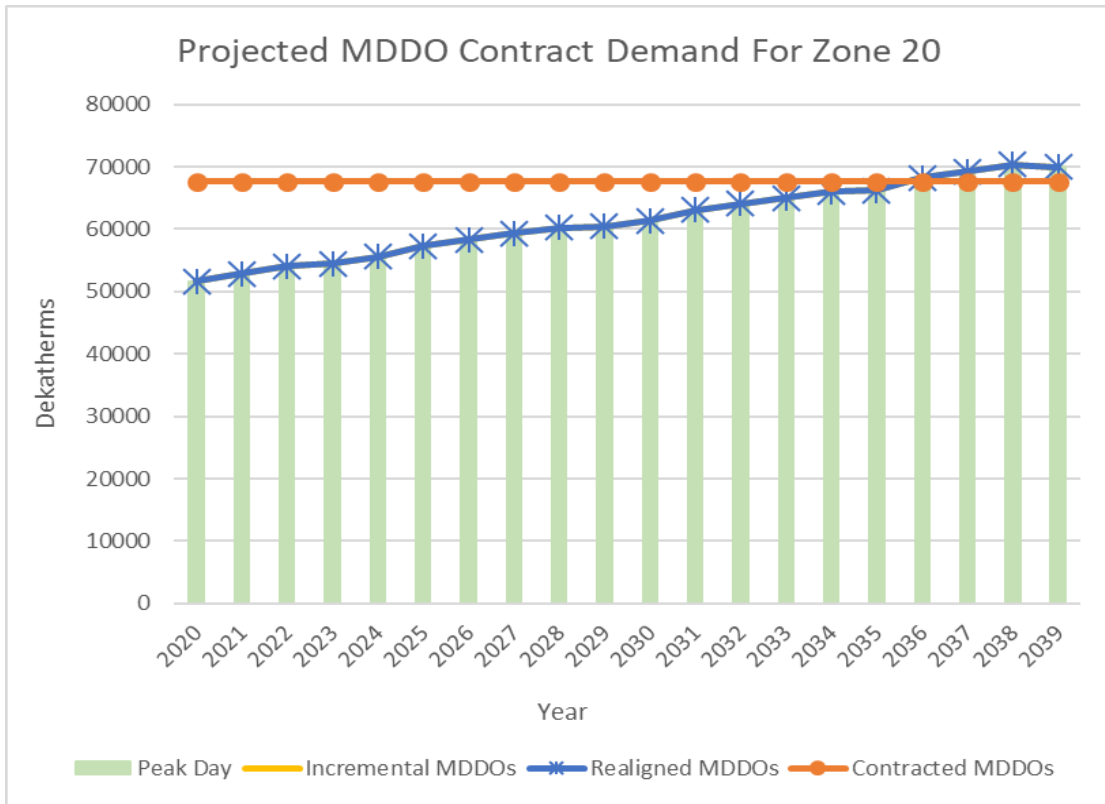




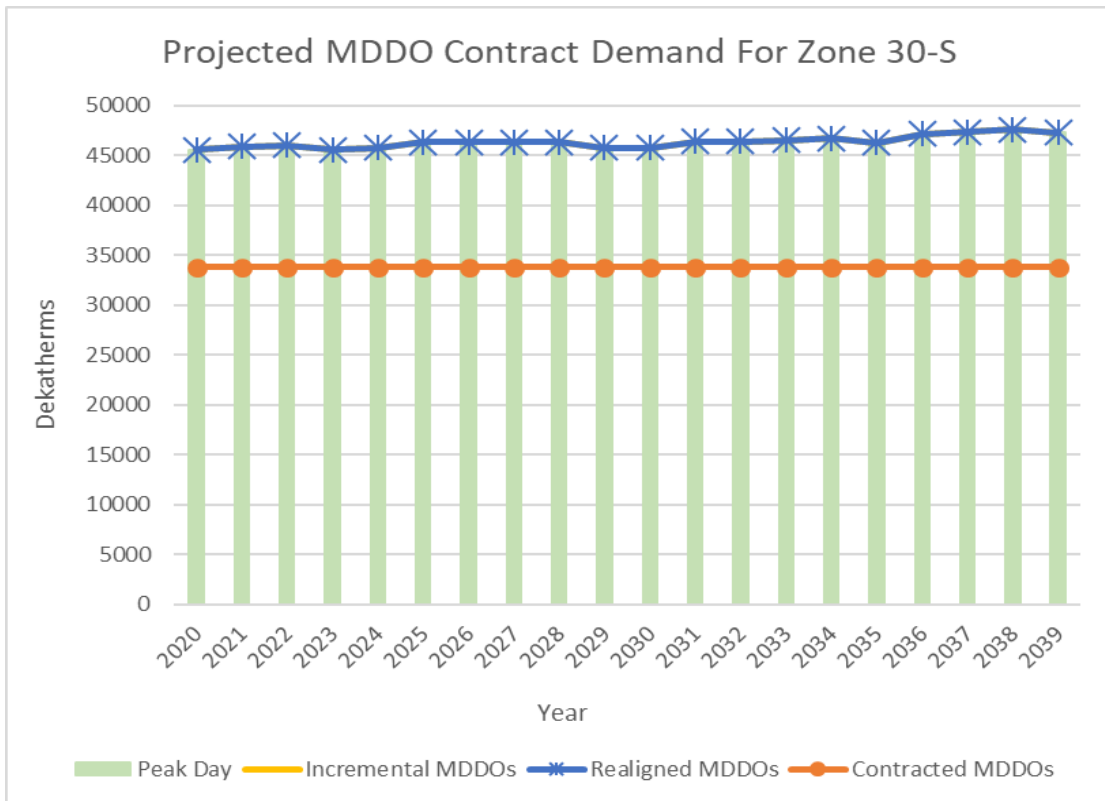
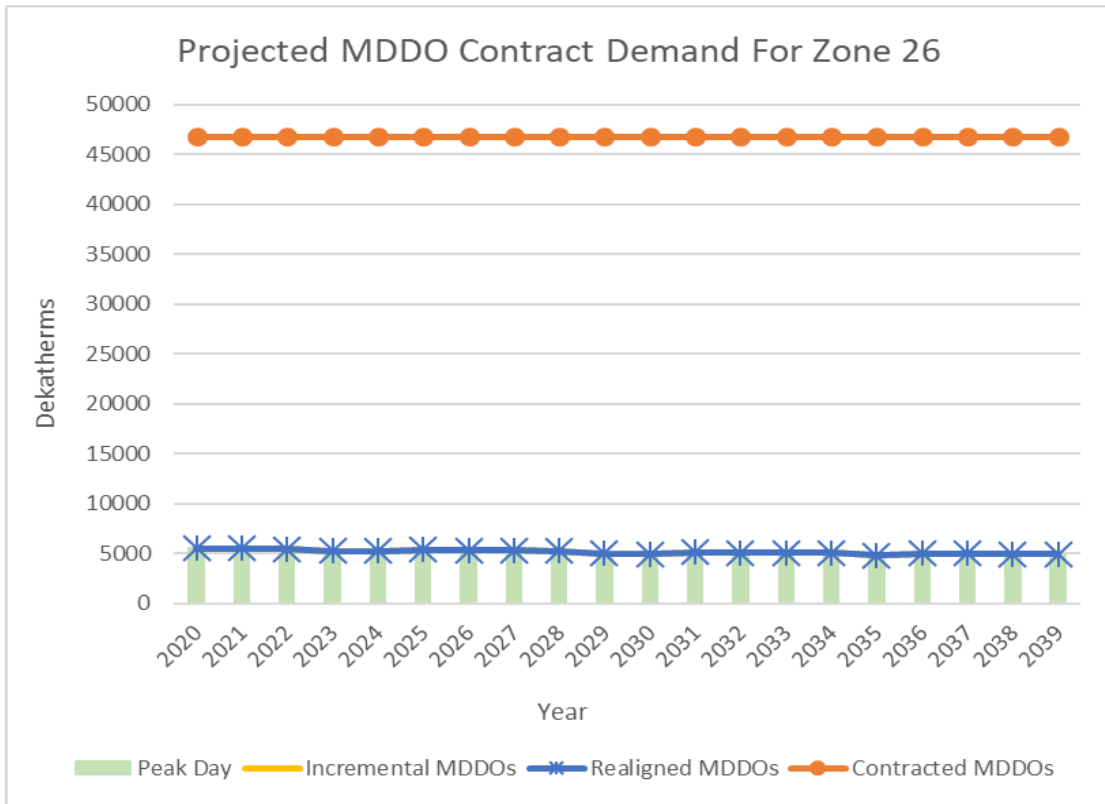


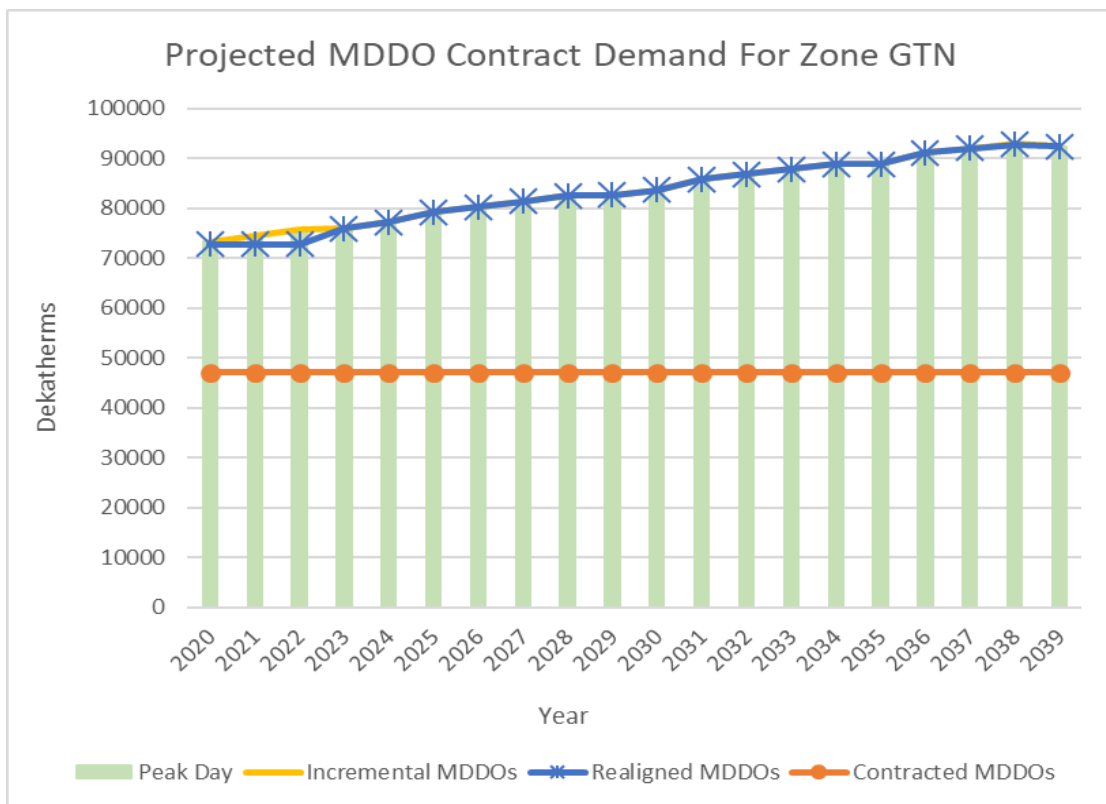
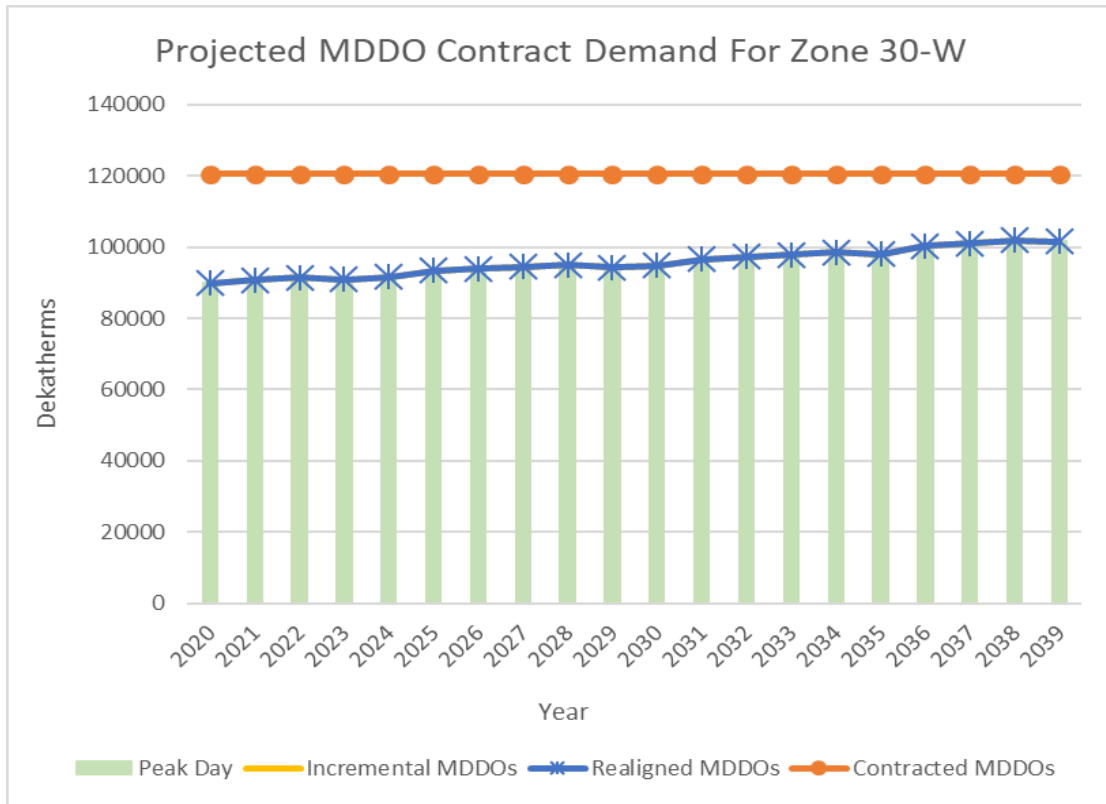


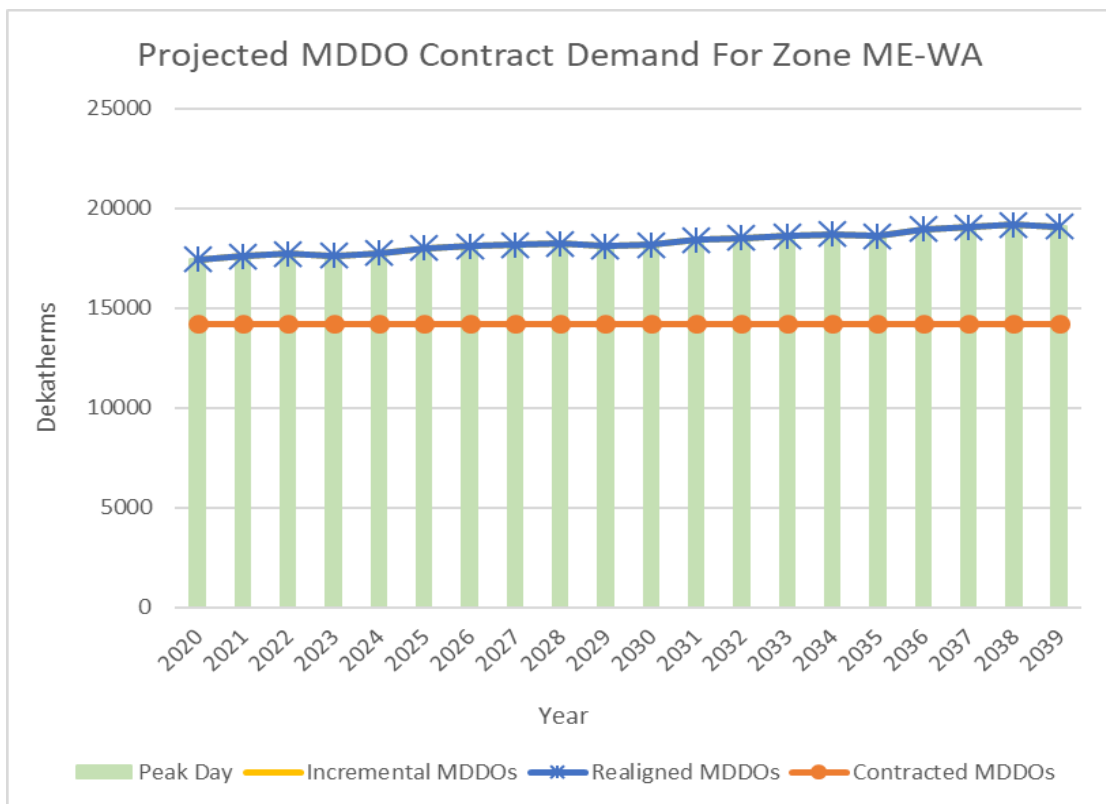
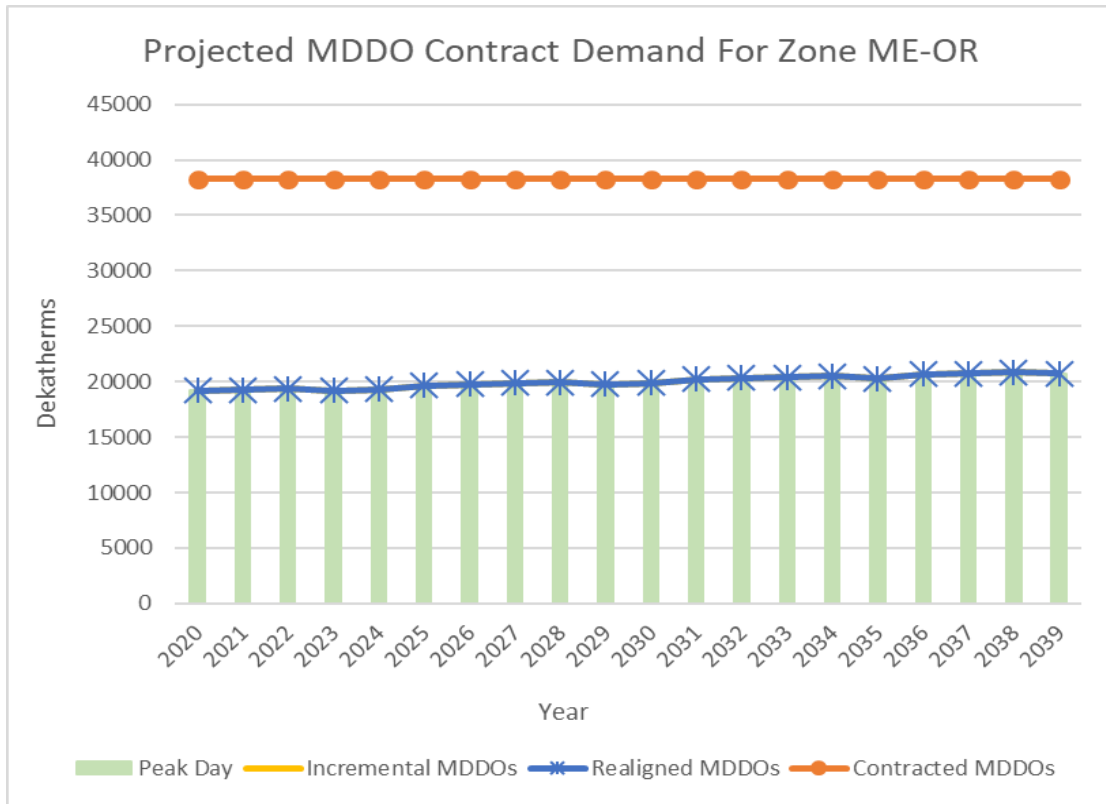


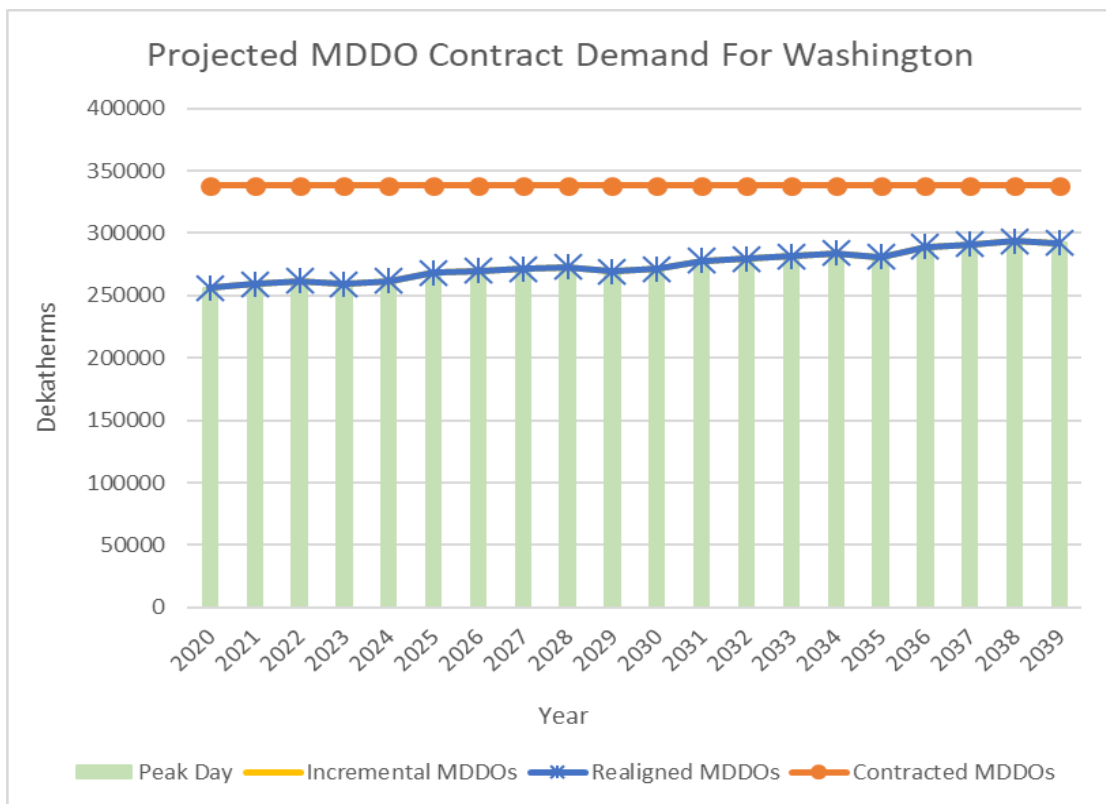
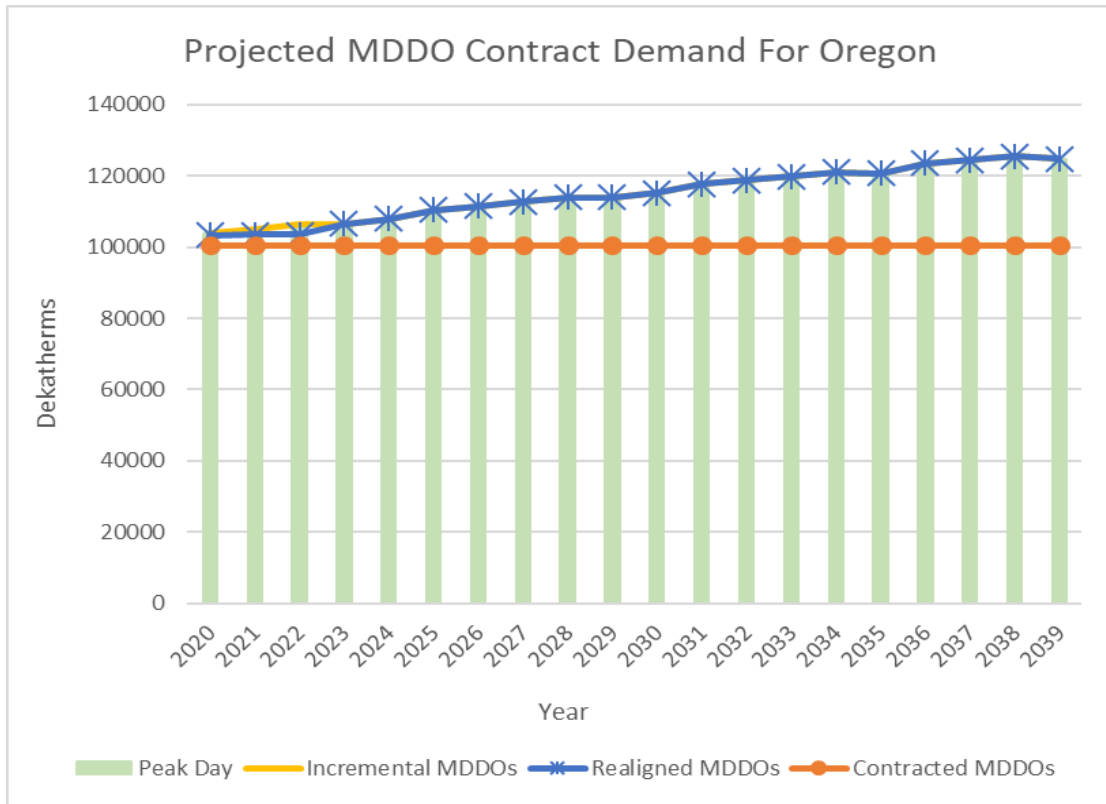


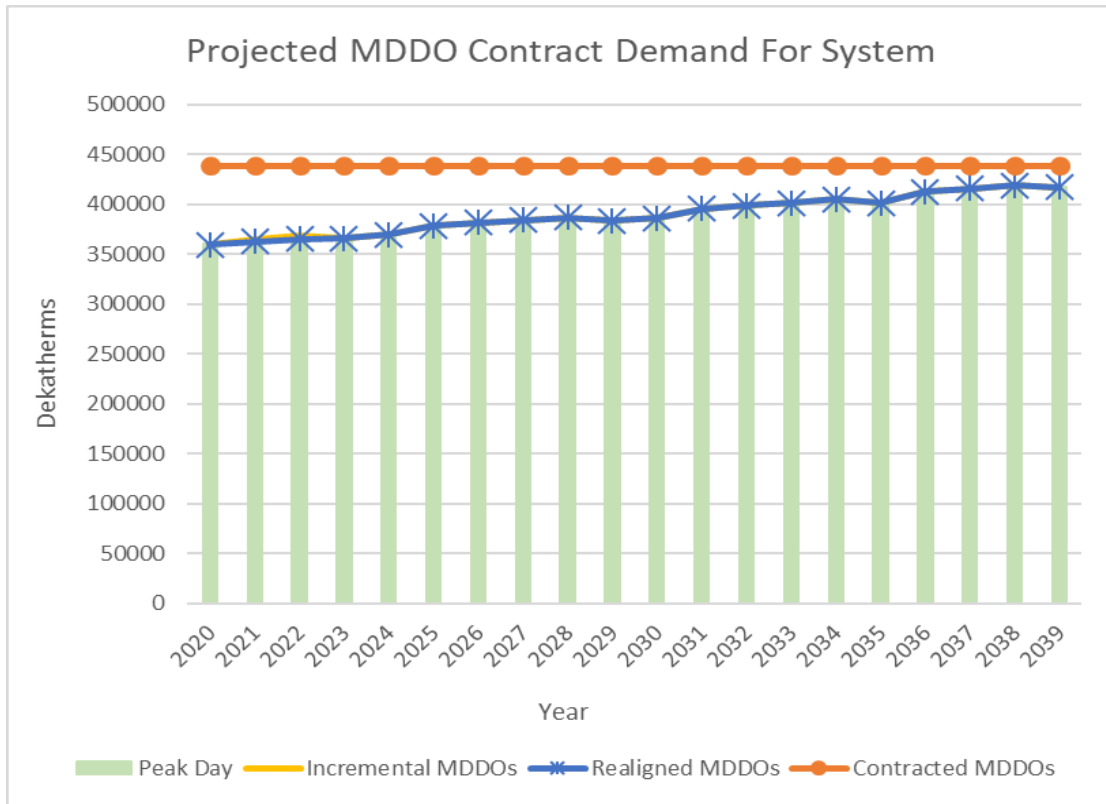












## Appendix G

### Weather & Price Uncertainty Analysis

2020 OR IRP

## **Appendix G – Introduction**

The purpose of this document is to present data used by Cascade in its stochastic analysis. The presentation of data in this format allows for the transparent review of some of the inputs and results that are part of the Company's risk modeling. This is ultimately used to complete Cascade's scenario and sensitivity modeling as discussed in the Company's supply resource optimization process in Chapter 8, Resource Integration.

|           | Monthly Demand (Dth)            |                            |                                      |                                      |                                      |                              |                              |
|-----------|---------------------------------|----------------------------|--------------------------------------|--------------------------------------|--------------------------------------|------------------------------|------------------------------|
|           | Low Growth -<br>Minimum Weather | Low Growth - 1%<br>Weather | Expected Growth -<br>Minimum Weather | Expected Growth -<br>Average Weather | Expected Growth -<br>Maximum Weather | High Growth -<br>99% Weather | High Growth -<br>Max Weather |
| 1/1/2020  | 5,179,367                       | 5,574,217                  | 5,179,519                            | 5,404,526                            | 5,619,787                            | 5,411,126                    | 5,619,941                    |
| 2/1/2020  | 4,302,097                       | 4,464,934                  | 4,336,898                            | 4,532,048                            | 4,653,998                            | 4,769,246                    | 4,691,428                    |
| 3/1/2020  | 3,292,356                       | 3,384,573                  | 3,320,643                            | 3,323,076                            | 3,446,943                            | 3,333,686                    | 3,476,147                    |
| 4/1/2020  | 2,182,626                       | 2,203,774                  | 2,201,361                            | 2,210,816                            | 2,181,565                            | 2,173,038                    | 2,200,081                    |
| 5/1/2020  | 1,585,240                       | 1,665,325                  | 1,597,695                            | 1,623,823                            | 1,652,823                            | 1,670,056                    | 1,666,008                    |
| 6/1/2020  | 1,207,052                       | 1,194,432                  | 1,215,801                            | 1,157,145                            | 1,199,701                            | 1,202,267                    | 1,208,481                    |
| 7/1/2020  | 1,100,727                       | 1,100,727                  | 1,107,795                            | 1,107,795                            | 1,107,795                            | 1,115,555                    | 1,115,555                    |
| 8/1/2020  | 1,091,175                       | 1,091,175                  | 1,098,289                            | 1,098,289                            | 1,098,289                            | 1,106,094                    | 1,106,094                    |
| 9/1/2020  | 1,490,291                       | 1,467,840                  | 1,500,090                            | 1,418,712                            | 1,523,461                            | 1,580,374                    | 1,534,647                    |
| 10/1/2020 | 2,423,106                       | 2,501,608                  | 2,444,348                            | 2,436,974                            | 2,432,486                            | 2,579,720                    | 2,456,297                    |
| 11/1/2020 | 3,949,137                       | 4,024,430                  | 3,993,867                            | 4,243,845                            | 4,158,522                            | 4,416,028                    | 4,208,819                    |
| 12/1/2020 | 5,988,244                       | 5,820,354                  | 6,065,691                            | 6,061,138                            | 5,936,672                            | 6,153,596                    | 6,014,412                    |
| 1/1/2021  | 5,158,508                       | 5,214,350                  | 5,237,522                            | 5,448,230                            | 5,532,320                            | 5,574,713                    | 5,617,612                    |
| 2/1/2021  | 4,372,216                       | 4,306,325                  | 4,442,811                            | 4,411,447                            | 4,654,917                            | 4,417,379                    | 4,730,693                    |
| 3/1/2021  | 3,396,876                       | 3,261,972                  | 3,452,515                            | 3,370,739                            | 3,447,066                            | 3,532,057                    | 3,503,300                    |
| 4/1/2021  | 2,262,018                       | 2,330,710                  | 2,299,083                            | 2,272,042                            | 2,328,014                            | 2,356,877                    | 2,365,558                    |
| 5/1/2021  | 1,620,940                       | 1,590,636                  | 1,646,579                            | 1,611,240                            | 1,611,721                            | 1,677,018                    | 1,636,382                    |
| 6/1/2021  | 1,226,206                       | 1,170,908                  | 1,244,045                            | 1,207,264                            | 1,197,960                            | 1,226,347                    | 1,215,573                    |
| 7/1/2021  | 1,101,653                       | 1,101,653                  | 1,116,680                            | 1,116,680                            | 1,116,680                            | 1,132,609                    | 1,132,609                    |
| 8/1/2021  | 1,103,087                       | 1,103,087                  | 1,118,194                            | 1,118,194                            | 1,118,194                            | 1,134,270                    | 1,134,270                    |
| 9/1/2021  | 1,483,607                       | 1,529,894                  | 1,503,279                            | 1,564,356                            | 1,546,935                            | 1,517,575                    | 1,568,956                    |
| 10/1/2021 | 2,419,908                       | 2,344,112                  | 2,459,450                            | 2,509,806                            | 2,572,531                            | 2,571,573                    | 2,617,527                    |
| 11/1/2021 | 4,193,183                       | 4,288,630                  | 4,272,675                            | 4,170,027                            | 4,402,130                            | 4,368,934                    | 4,489,603                    |
| 12/1/2021 | 5,599,006                       | 5,810,195                  | 5,710,773                            | 6,013,766                            | 6,227,653                            | 6,447,907                    | 6,357,081                    |
| 1/1/2022  | 5,325,203                       | 5,430,050                  | 5,449,242                            | 5,596,929                            | 5,825,652                            | 5,703,105                    | 5,964,232                    |
| 2/1/2022  | 4,343,623                       | 4,465,624                  | 4,449,038                            | 4,428,699                            | 4,706,247                            | 4,626,897                    | 4,821,281                    |
| 3/1/2022  | 3,488,086                       | 3,335,503                  | 3,572,418                            | 3,431,370                            | 3,519,575                            | 3,598,846                    | 3,604,489                    |
| 4/1/2022  | 2,300,958                       | 2,291,364                  | 2,357,070                            | 2,318,437                            | 2,262,798                            | 2,451,134                    | 2,317,475                    |
| 5/1/2022  | 1,679,298                       | 1,647,640                  | 1,718,824                            | 1,665,189                            | 1,652,497                            | 1,734,038                    | 1,691,219                    |
| 6/1/2022  | 1,171,427                       | 1,218,322                  | 1,196,792                            | 1,230,743                            | 1,219,736                            | 1,283,485                    | 1,247,222                    |
| 7/1/2022  | 1,102,249                       | 1,102,249                  | 1,125,418                            | 1,125,418                            | 1,125,418                            | 1,149,892                    | 1,149,892                    |
| 8/1/2022  | 1,114,758                       | 1,114,758                  | 1,138,239                            | 1,138,239                            | 1,138,239                            | 1,163,137                    | 1,163,137                    |
| 9/1/2022  | 1,493,242                       | 1,382,056                  | 1,523,331                            | 1,543,396                            | 1,454,802                            | 1,475,028                    | 1,486,808                    |
| 10/1/2022 | 2,403,047                       | 2,441,242                  | 2,460,733                            | 2,486,313                            | 2,537,582                            | 2,575,710                    | 2,600,344                    |
| 11/1/2022 | 4,139,225                       | 4,176,291                  | 4,251,786                            | 4,387,396                            | 4,407,729                            | 4,428,854                    | 4,530,375                    |
| 12/1/2022 | 5,741,173                       | 5,981,112                  | 5,899,296                            | 5,989,446                            | 6,004,952                            | 6,290,896                    | 6,173,193                    |
| 1/1/2023  | 5,366,233                       | 5,474,197                  | 5,535,849                            | 5,677,915                            | 5,749,016                            | 5,931,853                    | 5,933,979                    |
| 2/1/2023  | 4,420,141                       | 4,295,875                  | 4,562,739                            | 4,715,350                            | 4,617,670                            | 4,601,760                    | 4,764,267                    |
| 3/1/2023  | 3,365,895                       | 3,418,284                  | 3,474,311                            | 3,533,636                            | 3,575,622                            | 3,612,795                    | 3,691,463                    |
| 4/1/2023  | 2,206,365                       | 2,245,059                  | 2,275,731                            | 2,395,558                            | 2,308,197                            | 2,432,807                    | 2,382,294                    |
| 5/1/2023  | 1,632,688                       | 1,704,426                  | 1,682,981                            | 1,692,404                            | 1,687,916                            | 1,752,830                    | 1,740,158                    |
| 6/1/2023  | 1,194,306                       | 1,196,288                  | 1,229,198                            | 1,238,653                            | 1,224,228                            | 1,264,447                    | 1,260,282                    |
| 7/1/2023  | 1,108,463                       | 1,108,463                  | 1,139,740                            | 1,139,740                            | 1,139,740                            | 1,172,907                    | 1,172,907                    |
| 8/1/2023  | 1,121,042                       | 1,121,042                  | 1,152,703                            | 1,152,703                            | 1,152,703                            | 1,186,395                    | 1,186,395                    |
| 9/1/2023  | 1,537,470                       | 1,502,012                  | 1,581,178                            | 1,532,418                            | 1,590,694                            | 1,539,586                    | 1,638,328                    |
| 10/1/2023 | 2,392,825                       | 2,430,653                  | 2,467,336                            | 2,442,197                            | 2,615,902                            | 2,606,656                    | 2,701,747                    |
| 11/1/2023 | 4,028,037                       | 4,200,254                  | 4,168,125                            | 4,259,928                            | 4,256,126                            | 4,427,165                    | 4,408,241                    |
| 12/1/2023 | 5,920,411                       | 6,041,019                  | 6,127,781                            | 6,173,421                            | 6,369,530                            | 6,376,797                    | 6,601,702                    |
| 1/1/2024  | 5,492,538                       | 5,619,571                  | 5,709,555                            | 5,675,921                            | 5,803,080                            | 6,018,381                    | 6,036,531                    |
| 2/1/2024  | 4,374,174                       | 4,498,694                  | 4,544,470                            | 4,910,017                            | 4,810,586                            | 4,958,135                    | 5,005,362                    |
| 3/1/2024  | 3,422,420                       | 3,316,334                  | 3,557,498                            | 3,554,203                            | 3,616,725                            | 3,739,549                    | 3,762,109                    |
| 4/1/2024  | 2,281,401                       | 2,197,438                  | 2,371,517                            | 2,459,271                            | 2,396,593                            | 2,587,666                    | 2,491,278                    |
| 5/1/2024  | 1,623,059                       | 1,628,461                  | 1,684,314                            | 1,769,353                            | 1,759,368                            | 1,817,005                    | 1,829,181                    |
| 6/1/2024  | 1,158,571                       | 1,194,005                  | 1,200,507                            | 1,259,221                            | 1,269,605                            | 1,299,593                    | 1,317,550                    |
| 7/1/2024  | 1,126,082                       | 1,126,082                  | 1,165,692                            | 1,165,692                            | 1,165,692                            | 1,208,035                    | 1,208,035                    |
| 8/1/2024  | 1,122,003                       | 1,122,003                  | 1,161,521                            | 1,161,521                            | 1,161,521                            | 1,203,835                    | 1,203,835                    |
| 9/1/2024  | 1,494,393                       | 1,443,545                  | 1,546,737                            | 1,574,318                            | 1,538,034                            | 1,692,383                    | 1,594,518                    |
| 10/1/2024 | 2,522,271                       | 2,442,699                  | 2,619,174                            | 2,649,870                            | 2,647,192                            | 2,820,275                    | 2,751,510                    |
| 11/1/2024 | 4,242,488                       | 4,080,615                  | 4,421,822                            | 4,419,635                            | 4,317,877                            | 4,501,022                    | 4,506,368                    |
| 12/1/2024 | 6,004,247                       | 6,021,219                  | 6,257,311                            | 6,286,197                            | 6,759,797                            | 6,376,933                    | 7,056,191                    |
| 1/1/2025  | 5,224,161                       | 5,423,212                  | 5,468,933                            | 5,705,075                            | 5,738,406                            | 6,048,972                    | 6,016,763                    |
| 2/1/2025  | 4,357,172                       | 4,423,059                  | 4,563,212                            | 4,530,863                            | 4,649,394                            | 4,958,366                    | 4,869,392                    |
| 3/1/2025  | 3,424,977                       | 3,398,833                  | 3,588,533                            | 3,653,858                            | 3,749,992                            | 3,638,533                    | 3,933,600                    |



|           | Monthly Demand (Dth)            |                            |                                      |                                      |                                      |                              |                              |
|-----------|---------------------------------|----------------------------|--------------------------------------|--------------------------------------|--------------------------------------|------------------------------|------------------------------|
|           | Low Growth -<br>Minimum Weather | Low Growth - 1%<br>Weather | Expected Growth -<br>Minimum Weather | Expected Growth -<br>Average Weather | Expected Growth -<br>Maximum Weather | High Growth -<br>99% Weather | High Growth -<br>Max Weather |
| 4/1/2025  | 2,387,554                       | 2,346,230                  | 2,499,673                            | 2,434,960                            | 2,484,086                            | 2,574,980                    | 2,602,532                    |
| 5/1/2025  | 1,622,341                       | 1,676,240                  | 1,697,106                            | 1,723,359                            | 1,798,513                            | 1,846,696                    | 1,882,490                    |
| 6/1/2025  | 1,223,079                       | 1,210,011                  | 1,276,453                            | 1,258,847                            | 1,256,733                            | 1,337,595                    | 1,312,460                    |
| 7/1/2025  | 1,132,208                       | 1,132,208                  | 1,180,161                            | 1,180,161                            | 1,180,161                            | 1,231,795                    | 1,231,795                    |
| 8/1/2025  | 1,122,478                       | 1,122,478                  | 1,170,048                            | 1,170,048                            | 1,170,048                            | 1,221,329                    | 1,221,329                    |
| 9/1/2025  | 1,554,809                       | 1,499,463                  | 1,618,980                            | 1,564,158                            | 1,572,664                            | 1,614,240                    | 1,640,978                    |
| 10/1/2025 | 2,381,570                       | 2,493,458                  | 2,491,415                            | 2,622,989                            | 2,718,087                            | 2,749,401                    | 2,848,428                    |
| 11/1/2025 | 4,014,822                       | 4,317,247                  | 4,214,346                            | 4,339,072                            | 4,368,176                            | 4,668,411                    | 4,590,541                    |
| 12/1/2025 | 6,038,302                       | 6,034,565                  | 6,333,677                            | 6,501,407                            | 6,627,547                            | 7,081,480                    | 6,964,517                    |
| 1/1/2026  | 5,426,000                       | 5,385,686                  | 5,720,427                            | 5,763,014                            | 5,999,412                            | 6,400,898                    | 6,338,800                    |
| 2/1/2026  | 4,486,661                       | 4,589,910                  | 4,736,310                            | 4,684,728                            | 4,780,242                            | 5,137,781                    | 5,049,602                    |
| 3/1/2026  | 3,521,869                       | 3,504,915                  | 3,717,241                            | 3,720,358                            | 3,765,601                            | 3,886,049                    | 3,974,812                    |
| 4/1/2026  | 2,304,224                       | 2,301,043                  | 2,428,205                            | 2,521,983                            | 2,463,617                            | 2,628,355                    | 2,601,780                    |
| 5/1/2026  | 1,667,345                       | 1,646,953                  | 1,755,679                            | 1,746,599                            | 1,838,896                            | 1,905,996                    | 1,939,182                    |
| 6/1/2026  | 1,224,661                       | 1,237,730                  | 1,286,970                            | 1,317,197                            | 1,278,438                            | 1,354,360                    | 1,345,748                    |
| 7/1/2026  | 1,138,080                       | 1,138,080                  | 1,194,627                            | 1,194,627                            | 1,194,627                            | 1,256,005                    | 1,256,005                    |
| 8/1/2026  | 1,128,298                       | 1,128,298                  | 1,184,367                            | 1,184,367                            | 1,184,367                            | 1,245,293                    | 1,245,293                    |
| 9/1/2026  | 1,506,930                       | 1,453,737                  | 1,580,159                            | 1,653,305                            | 1,582,292                            | 1,762,372                    | 1,662,347                    |
| 10/1/2026 | 2,435,909                       | 2,540,142                  | 2,566,496                            | 2,584,681                            | 2,682,726                            | 2,830,533                    | 2,830,080                    |
| 11/1/2026 | 4,197,801                       | 4,185,250                  | 4,438,492                            | 4,513,349                            | 4,550,507                            | 4,964,608                    | 4,820,185                    |
| 12/1/2026 | 6,212,439                       | 5,939,906                  | 6,564,603                            | 6,495,135                            | 6,539,947                            | 6,798,729                    | 6,920,304                    |
| 1/1/2027  | 5,450,701                       | 5,661,929                  | 5,789,330                            | 5,995,743                            | 6,260,596                            | 6,232,016                    | 6,664,770                    |
| 2/1/2027  | 4,422,057                       | 4,667,432                  | 4,702,203                            | 4,830,397                            | 4,864,706                            | 5,071,261                    | 5,180,487                    |
| 3/1/2027  | 3,474,975                       | 3,516,075                  | 3,693,814                            | 3,619,393                            | 3,693,502                            | 4,072,089                    | 3,930,896                    |
| 4/1/2027  | 2,332,988                       | 2,329,046                  | 2,478,395                            | 2,595,914                            | 2,476,118                            | 2,757,111                    | 2,633,920                    |
| 5/1/2027  | 1,651,107                       | 1,671,816                  | 1,752,239                            | 1,806,452                            | 1,826,846                            | 1,953,113                    | 1,942,674                    |
| 6/1/2027  | 1,243,441                       | 1,254,268                  | 1,315,405                            | 1,324,391                            | 1,309,145                            | 1,398,755                    | 1,387,220                    |
| 7/1/2027  | 1,138,382                       | 1,138,382                  | 1,203,076                            | 1,203,076                            | 1,203,076                            | 1,273,866                    | 1,273,866                    |
| 8/1/2027  | 1,139,917                       | 1,139,917                  | 1,204,702                            | 1,204,702                            | 1,204,702                            | 1,275,700                    | 1,275,700                    |
| 9/1/2027  | 1,553,423                       | 1,476,166                  | 1,640,486                            | 1,610,167                            | 1,614,905                            | 1,724,209                    | 1,708,824                    |
| 10/1/2027 | 2,340,298                       | 2,473,736                  | 2,480,952                            | 2,686,565                            | 2,696,030                            | 2,914,633                    | 2,867,114                    |
| 11/1/2027 | 4,267,654                       | 4,190,305                  | 4,543,627                            | 4,509,553                            | 4,513,891                            | 5,073,616                    | 4,818,136                    |
| 12/1/2027 | 6,256,964                       | 6,136,025                  | 6,659,454                            | 6,642,670                            | 6,840,995                            | 7,142,650                    | 7,294,049                    |
| 1/1/2028  | 5,859,803                       | 5,626,884                  | 6,278,076                            | 6,121,752                            | 6,007,211                            | 6,318,393                    | 6,441,774                    |
| 2/1/2028  | 4,602,878                       | 4,810,509                  | 4,929,467                            | 5,024,014                            | 5,197,190                            | 5,566,753                    | 5,572,865                    |
| 3/1/2028  | 3,519,906                       | 3,530,838                  | 3,769,862                            | 3,747,914                            | 3,864,801                            | 4,256,916                    | 4,143,035                    |
| 4/1/2028  | 2,301,345                       | 2,270,955                  | 2,461,528                            | 2,541,394                            | 2,558,474                            | 2,741,377                    | 2,741,708                    |
| 5/1/2028  | 1,685,202                       | 1,733,669                  | 1,799,740                            | 1,840,870                            | 1,943,647                            | 1,995,125                    | 2,080,497                    |
| 6/1/2028  | 1,210,022                       | 1,262,343                  | 1,288,807                            | 1,288,339                            | 1,285,636                            | 1,383,861                    | 1,371,579                    |
| 7/1/2028  | 1,138,827                       | 1,138,827                  | 1,211,412                            | 1,211,412                            | 1,211,412                            | 1,291,524                    | 1,291,524                    |
| 8/1/2028  | 1,151,891                       | 1,151,891                  | 1,225,330                            | 1,225,330                            | 1,225,330                            | 1,306,544                    | 1,306,544                    |
| 9/1/2028  | 1,493,577                       | 1,539,711                  | 1,586,518                            | 1,634,214                            | 1,723,017                            | 1,799,604                    | 1,836,411                    |
| 10/1/2028 | 2,576,521                       | 2,545,410                  | 2,751,661                            | 2,660,727                            | 2,796,189                            | 3,052,423                    | 2,996,012                    |
| 11/1/2028 | 4,315,609                       | 4,204,720                  | 4,630,238                            | 4,705,654                            | 4,978,317                            | 5,030,483                    | 5,353,561                    |
| 12/1/2028 | 6,097,278                       | 6,320,580                  | 6,532,542                            | 6,616,331                            | 6,639,958                            | 7,173,637                    | 7,127,741                    |
| 1/1/2029  | 5,606,390                       | 5,492,697                  | 6,047,942                            | 6,109,444                            | 6,187,033                            | 6,762,979                    | 6,692,531                    |
| 2/1/2029  | 4,454,191                       | 4,506,206                  | 4,800,257                            | 5,112,959                            | 5,032,394                            | 5,225,768                    | 5,438,406                    |
| 3/1/2029  | 3,492,608                       | 3,599,748                  | 3,764,873                            | 3,809,727                            | 3,866,710                            | 4,212,724                    | 4,179,095                    |
| 4/1/2029  | 2,352,575                       | 2,292,708                  | 2,532,962                            | 2,485,750                            | 2,613,869                            | 2,887,766                    | 2,820,356                    |
| 5/1/2029  | 1,660,500                       | 1,694,262                  | 1,786,561                            | 1,854,217                            | 1,825,478                            | 1,983,679                    | 1,968,041                    |
| 6/1/2029  | 1,232,201                       | 1,248,436                  | 1,322,196                            | 1,348,881                            | 1,311,712                            | 1,398,037                    | 1,409,996                    |
| 7/1/2029  | 1,150,380                       | 1,150,380                  | 1,231,898                            | 1,231,898                            | 1,231,898                            | 1,322,658                    | 1,322,658                    |
| 8/1/2029  | 1,157,762                       | 1,157,762                  | 1,239,799                            | 1,239,799                            | 1,239,799                            | 1,331,283                    | 1,331,283                    |
| 9/1/2029  | 1,512,076                       | 1,537,321                  | 1,616,284                            | 1,615,398                            | 1,690,837                            | 1,724,990                    | 1,814,073                    |
| 10/1/2029 | 2,538,009                       | 2,587,288                  | 2,728,750                            | 2,753,098                            | 2,840,465                            | 2,940,617                    | 3,067,669                    |
| 11/1/2029 | 4,194,606                       | 4,503,204                  | 4,529,563                            | 4,625,229                            | 4,542,847                            | 4,957,754                    | 4,918,342                    |
| 12/1/2029 | 6,146,197                       | 6,119,156                  | 6,626,690                            | 6,730,611                            | 6,896,403                            | 7,321,021                    | 7,456,162                    |
| 1/1/2030  | 5,497,529                       | 5,394,964                  | 5,970,627                            | 6,329,260                            | 6,118,938                            | 6,758,928                    | 6,661,982                    |
| 2/1/2030  | 4,586,009                       | 4,520,348                  | 4,982,816                            | 5,151,669                            | 5,081,313                            | 5,403,448                    | 5,526,153                    |
| 3/1/2030  | 3,500,387                       | 3,557,902                  | 3,798,857                            | 3,943,590                            | 3,884,267                            | 4,286,758                    | 4,229,285                    |
| 4/1/2030  | 2,433,398                       | 2,420,740                  | 2,641,585                            | 2,585,655                            | 2,639,933                            | 2,865,364                    | 2,865,796                    |
| 5/1/2030  | 1,708,794                       | 1,765,252                  | 1,852,518                            | 1,909,596                            | 1,866,349                            | 2,077,964                    | 2,026,612                    |
| 6/1/2030  | 1,219,402                       | 1,236,127                  | 1,316,656                            | 1,368,539                            | 1,368,281                            | 1,456,620                    | 1,483,527                    |

|           | Monthly Demand (Dth)            |                            |                                      |                                      |                                      |                              |                              |
|-----------|---------------------------------|----------------------------|--------------------------------------|--------------------------------------|--------------------------------------|------------------------------|------------------------------|
|           | Low Growth -<br>Minimum Weather | Low Growth - 1%<br>Weather | Expected Growth -<br>Minimum Weather | Expected Growth -<br>Average Weather | Expected Growth -<br>Maximum Weather | High Growth -<br>99% Weather | High Growth -<br>Max Weather |
| 7/1/2030  | 1,161,743                       | 1,161,743                  | 1,252,527                            | 1,252,527                            | 1,252,527                            | 1,354,475                    | 1,354,475                    |
| 8/1/2030  | 1,157,607                       | 1,157,607                  | 1,248,032                            | 1,248,032                            | 1,248,032                            | 1,349,688                    | 1,349,688                    |
| 9/1/2030  | 1,548,530                       | 1,540,025                  | 1,670,373                            | 1,689,805                            | 1,581,104                            | 1,881,108                    | 1,706,083                    |
| 10/1/2030 | 2,516,773                       | 2,507,341                  | 2,726,802                            | 2,839,906                            | 2,816,431                            | 3,062,088                    | 3,061,637                    |
| 11/1/2030 | 4,277,327                       | 4,285,777                  | 4,652,790                            | 4,700,981                            | 4,817,853                            | 5,163,369                    | 5,255,599                    |
| 12/1/2030 | 6,294,466                       | 6,165,578                  | 6,828,432                            | 6,806,823                            | 7,046,368                            | 7,696,880                    | 7,675,070                    |
| 1/1/2031  | 5,420,675                       | 5,781,793                  | 5,925,363                            | 6,254,462                            | 6,127,012                            | 6,753,002                    | 6,717,219                    |
| 2/1/2031  | 4,543,677                       | 4,729,702                  | 4,971,326                            | 5,160,590                            | 5,046,774                            | 5,589,691                    | 5,535,368                    |
| 3/1/2031  | 3,546,599                       | 3,596,198                  | 3,878,598                            | 3,756,998                            | 3,988,104                            | 4,191,473                    | 4,375,487                    |
| 4/1/2031  | 2,407,057                       | 2,405,742                  | 2,627,759                            | 2,611,081                            | 2,710,233                            | 2,902,967                    | 2,969,422                    |
| 5/1/2031  | 1,647,071                       | 1,748,747                  | 1,795,013                            | 1,908,024                            | 1,879,246                            | 2,101,366                    | 2,056,429                    |
| 6/1/2031  | 1,234,276                       | 1,245,206                  | 1,341,079                            | 1,357,394                            | 1,346,058                            | 1,490,889                    | 1,467,927                    |
| 7/1/2031  | 1,167,484                       | 1,167,484                  | 1,266,994                            | 1,266,994                            | 1,266,994                            | 1,379,682                    | 1,379,682                    |
| 8/1/2031  | 1,157,520                       | 1,157,520                  | 1,256,119                            | 1,256,119                            | 1,256,119                            | 1,367,875                    | 1,367,875                    |
| 9/1/2031  | 1,596,291                       | 1,519,044                  | 1,731,428                            | 1,682,602                            | 1,700,397                            | 1,902,932                    | 1,848,013                    |
| 10/1/2031 | 2,568,283                       | 2,532,073                  | 2,802,998                            | 2,860,981                            | 3,031,532                            | 3,049,901                    | 3,323,231                    |
| 11/1/2031 | 4,350,208                       | 4,367,669                  | 4,760,113                            | 4,731,146                            | 4,844,237                            | 5,370,010                    | 5,321,263                    |
| 12/1/2031 | 6,244,271                       | 6,325,794                  | 6,817,305                            | 6,923,134                            | 6,774,369                            | 7,644,254                    | 7,434,780                    |
| 1/1/2032  | 5,616,759                       | 5,729,799                  | 6,184,797                            | 6,309,383                            | 6,687,461                            | 7,423,907                    | 7,395,716                    |
| 2/1/2032  | 4,762,402                       | 4,816,906                  | 5,243,593                            | 5,312,482                            | 5,541,155                            | 5,907,358                    | 6,125,069                    |
| 3/1/2032  | 3,627,418                       | 3,632,244                  | 3,995,202                            | 4,017,399                            | 3,967,070                            | 4,429,169                    | 4,382,112                    |
| 4/1/2032  | 2,469,355                       | 2,429,576                  | 2,720,180                            | 2,613,968                            | 2,640,568                            | 3,026,702                    | 2,910,528                    |
| 5/1/2032  | 1,742,662                       | 1,722,523                  | 1,914,061                            | 1,856,674                            | 1,994,140                            | 2,079,152                    | 2,197,818                    |
| 6/1/2032  | 1,267,156                       | 1,261,135                  | 1,386,725                            | 1,382,813                            | 1,378,226                            | 1,484,083                    | 1,514,237                    |
| 7/1/2032  | 1,167,611                       | 1,167,611                  | 1,275,113                            | 1,275,113                            | 1,275,113                            | 1,397,902                    | 1,397,902                    |
| 8/1/2032  | 1,169,336                       | 1,169,336                  | 1,276,962                            | 1,276,962                            | 1,276,962                            | 1,400,037                    | 1,400,037                    |
| 9/1/2032  | 1,580,946                       | 1,489,811                  | 1,727,921                            | 1,784,378                            | 1,722,854                            | 1,981,780                    | 1,886,855                    |
| 10/1/2032 | 2,584,648                       | 2,745,429                  | 2,835,119                            | 2,876,117                            | 2,906,320                            | 3,228,417                    | 3,201,766                    |
| 11/1/2032 | 4,362,126                       | 4,444,624                  | 4,807,873                            | 5,085,280                            | 5,052,760                            | 5,602,443                    | 5,599,183                    |
| 12/1/2032 | 6,225,729                       | 6,249,139                  | 6,840,869                            | 7,142,838                            | 7,302,211                            | 7,846,563                    | 8,071,127                    |
| 1/1/2033  | 5,671,285                       | 5,818,779                  | 6,290,438                            | 6,435,689                            | 6,506,364                            | 7,176,838                    | 7,236,771                    |
| 2/1/2033  | 4,606,611                       | 4,576,669                  | 5,113,406                            | 5,239,682                            | 5,098,901                            | 5,598,527                    | 5,678,326                    |
| 3/1/2033  | 3,540,591                       | 3,474,005                  | 3,920,535                            | 3,941,682                            | 4,210,083                            | 4,431,920                    | 4,686,666                    |
| 4/1/2033  | 2,413,438                       | 2,414,978                  | 2,669,745                            | 2,673,658                            | 2,771,933                            | 2,939,611                    | 3,081,649                    |
| 5/1/2033  | 1,698,776                       | 1,730,986                  | 1,879,168                            | 1,958,501                            | 2,063,446                            | 2,183,470                    | 2,289,675                    |
| 6/1/2033  | 1,287,970                       | 1,277,777                  | 1,417,240                            | 1,418,255                            | 1,418,880                            | 1,564,503                    | 1,567,772                    |
| 7/1/2033  | 1,167,360                       | 1,167,360                  | 1,283,057                            | 1,283,057                            | 1,283,057                            | 1,416,281                    | 1,416,281                    |
| 8/1/2033  | 1,180,805                       | 1,180,805                  | 1,297,807                            | 1,297,807                            | 1,297,807                            | 1,432,735                    | 1,432,735                    |
| 9/1/2033  | 1,569,155                       | 1,619,329                  | 1,720,736                            | 1,719,581                            | 1,769,482                            | 1,992,817                    | 1,950,278                    |
| 10/1/2033 | 2,628,271                       | 2,505,131                  | 2,904,657                            | 2,879,630                            | 2,941,087                            | 3,077,506                    | 3,263,615                    |
| 11/1/2033 | 4,354,411                       | 4,437,977                  | 4,838,304                            | 5,010,767                            | 4,980,079                            | 5,497,761                    | 5,552,183                    |
| 12/1/2033 | 6,325,578                       | 6,338,505                  | 6,999,944                            | 7,065,456                            | 7,154,525                            | 7,907,402                    | 7,955,623                    |
| 1/1/2034  | 5,693,212                       | 5,902,542                  | 6,357,089                            | 6,274,723                            | 6,982,476                            | 7,545,520                    | 7,847,021                    |
| 2/1/2034  | 4,642,228                       | 4,601,010                  | 5,180,085                            | 5,193,401                            | 5,285,026                            | 6,125,432                    | 5,927,416                    |
| 3/1/2034  | 3,505,126                       | 3,467,104                  | 3,908,902                            | 4,153,047                            | 3,950,946                            | 4,489,873                    | 4,427,317                    |
| 4/1/2034  | 2,429,820                       | 2,505,919                  | 2,709,749                            | 2,705,487                            | 2,810,206                            | 3,117,327                    | 3,147,203                    |
| 5/1/2034  | 1,755,409                       | 1,712,136                  | 1,954,708                            | 1,924,774                            | 2,055,053                            | 2,236,585                    | 2,301,773                    |
| 6/1/2034  | 1,258,446                       | 1,302,551                  | 1,395,466                            | 1,393,356                            | 1,452,586                            | 1,577,970                    | 1,615,445                    |
| 7/1/2034  | 1,172,699                       | 1,172,699                  | 1,297,379                            | 1,297,379                            | 1,297,379                            | 1,442,101                    | 1,442,101                    |
| 8/1/2034  | 1,186,194                       | 1,186,194                  | 1,312,272                            | 1,312,272                            | 1,312,272                            | 1,458,824                    | 1,458,824                    |
| 9/1/2034  | 1,621,472                       | 1,593,890                  | 1,788,575                            | 1,805,375                            | 1,736,611                            | 1,942,467                    | 1,928,994                    |
| 10/1/2034 | 2,600,246                       | 2,661,564                  | 2,892,514                            | 2,824,984                            | 2,858,252                            | 3,132,471                    | 3,194,951                    |
| 11/1/2034 | 4,491,944                       | 4,521,173                  | 5,015,758                            | 5,058,741                            | 5,011,091                            | 5,715,509                    | 5,632,308                    |
| 12/1/2034 | 6,331,811                       | 6,276,452                  | 7,048,620                            | 7,032,355                            | 7,145,208                            | 8,108,544                    | 7,990,552                    |
| 1/1/2035  | 5,638,148                       | 5,825,442                  | 6,339,963                            | 6,839,575                            | 6,772,417                            | 7,358,539                    | 7,647,549                    |
| 2/1/2035  | 4,875,905                       | 4,689,656                  | 5,485,839                            | 5,526,212                            | 5,364,327                            | 6,060,513                    | 6,047,350                    |
| 3/1/2035  | 3,766,416                       | 3,670,339                  | 4,230,884                            | 4,038,442                            | 4,127,601                            | 4,708,163                    | 4,655,068                    |
| 4/1/2035  | 2,495,361                       | 2,403,630                  | 2,800,954                            | 2,734,489                            | 2,774,185                            | 3,192,117                    | 3,130,262                    |
| 5/1/2035  | 1,748,645                       | 1,658,213                  | 1,957,669                            | 1,931,025                            | 2,058,110                            | 2,232,495                    | 2,316,029                    |
| 6/1/2035  | 1,257,233                       | 1,297,907                  | 1,402,267                            | 1,439,686                            | 1,461,311                            | 1,578,970                    | 1,641,401                    |
| 7/1/2035  | 1,184,077                       | 1,184,077                  | 1,318,297                            | 1,318,297                            | 1,318,297                            | 1,475,384                    | 1,475,384                    |
| 8/1/2035  | 1,191,715                       | 1,191,715                  | 1,326,736                            | 1,326,736                            | 1,326,736                            | 1,484,950                    | 1,484,950                    |
| 9/1/2035  | 1,595,616                       | 1,534,097                  | 1,774,317                            | 1,722,861                            | 1,788,244                            | 1,986,757                    | 1,998,978                    |

|           | Monthly Demand (Dth)            |                            |                                      |                                      |                                      |                              |                              |
|-----------|---------------------------------|----------------------------|--------------------------------------|--------------------------------------|--------------------------------------|------------------------------|------------------------------|
|           | Low Growth -<br>Minimum Weather | Low Growth - 1%<br>Weather | Expected Growth -<br>Minimum Weather | Expected Growth -<br>Average Weather | Expected Growth -<br>Maximum Weather | High Growth -<br>99% Weather | High Growth -<br>Max Weather |
| 10/1/2035 | 2,700,809                       | 2,533,527                  | 3,027,375                            | 2,928,139                            | 2,963,716                            | 3,482,687                    | 3,331,192                    |
| 11/1/2035 | 4,491,475                       | 4,456,857                  | 5,053,593                            | 5,020,226                            | 5,135,467                            | 5,708,506                    | 5,809,102                    |
| 12/1/2035 | 6,288,167                       | 6,368,189                  | 7,045,127                            | 7,001,083                            | 7,358,327                            | 8,209,770                    | 8,288,206                    |
| 1/1/2036  | 5,844,213                       | 6,090,631                  | 6,622,889                            | 6,679,458                            | 6,989,734                            | 7,690,598                    | 7,962,334                    |
| 2/1/2036  | 4,942,810                       | 5,006,804                  | 5,585,447                            | 5,528,855                            | 5,563,350                            | 6,618,321                    | 6,328,985                    |
| 3/1/2036  | 3,518,524                       | 3,671,491                  | 3,976,483                            | 4,153,788                            | 4,238,917                            | 4,575,913                    | 4,819,122                    |
| 4/1/2036  | 2,442,770                       | 2,400,951                  | 2,758,649                            | 2,868,536                            | 2,886,259                            | 3,185,641                    | 3,275,993                    |
| 5/1/2036  | 1,742,443                       | 1,717,136                  | 1,964,987                            | 1,903,653                            | 2,015,113                            | 2,249,321                    | 2,284,942                    |
| 6/1/2036  | 1,259,714                       | 1,282,917                  | 1,414,563                            | 1,418,566                            | 1,429,621                            | 1,640,334                    | 1,611,903                    |
| 7/1/2036  | 1,195,725                       | 1,195,725                  | 1,339,393                            | 1,339,393                            | 1,339,393                            | 1,508,963                    | 1,508,963                    |
| 8/1/2036  | 1,185,688                       | 1,185,688                  | 1,328,016                            | 1,328,016                            | 1,328,016                            | 1,496,128                    | 1,496,128                    |
| 9/1/2036  | 1,641,230                       | 1,611,361                  | 1,834,157                            | 1,903,158                            | 1,652,377                            | 2,026,366                    | 1,860,168                    |
| 10/1/2036 | 2,724,924                       | 2,804,029                  | 3,070,976                            | 2,996,395                            | 3,092,192                            | 3,503,404                    | 3,502,668                    |
| 11/1/2036 | 4,613,533                       | 4,612,871                  | 5,232,302                            | 4,976,863                            | 5,053,163                            | 6,191,583                    | 5,758,074                    |
| 12/1/2036 | 6,336,329                       | 6,334,803                  | 7,132,764                            | 7,606,292                            | 7,363,479                            | 8,770,264                    | 8,345,043                    |
| 1/1/2037  | 5,797,720                       | 5,886,903                  | 6,607,825                            | 6,743,733                            | 6,991,773                            | 7,851,367                    | 8,024,179                    |
| 2/1/2037  | 4,495,832                       | 4,615,857                  | 5,115,639                            | 5,392,488                            | 5,334,670                            | 6,045,338                    | 6,117,142                    |
| 3/1/2037  | 3,721,146                       | 3,708,406                  | 4,237,609                            | 4,203,252                            | 4,294,765                            | 4,683,034                    | 4,912,527                    |
| 4/1/2037  | 2,532,424                       | 2,433,071                  | 2,877,425                            | 2,836,384                            | 2,705,002                            | 3,338,219                    | 3,089,002                    |
| 5/1/2037  | 1,783,400                       | 1,722,796                  | 2,023,663                            | 2,053,715                            | 2,041,794                            | 2,361,689                    | 2,329,909                    |
| 6/1/2037  | 1,271,679                       | 1,288,423                  | 1,436,972                            | 1,434,937                            | 1,517,029                            | 1,671,624                    | 1,722,947                    |
| 7/1/2037  | 1,201,152                       | 1,201,152                  | 1,353,861                            | 1,353,861                            | 1,353,861                            | 1,535,528                    | 1,535,528                    |
| 8/1/2037  | 1,191,074                       | 1,191,074                  | 1,342,340                            | 1,342,340                            | 1,342,340                            | 1,522,422                    | 1,522,422                    |
| 9/1/2037  | 1,577,504                       | 1,539,845                  | 1,775,444                            | 1,837,115                            | 1,866,255                            | 1,967,087                    | 2,111,896                    |
| 10/1/2037 | 2,685,938                       | 2,616,342                  | 3,043,335                            | 3,116,294                            | 2,988,918                            | 3,456,479                    | 3,410,002                    |
| 11/1/2037 | 4,553,371                       | 4,483,598                  | 5,187,375                            | 5,330,787                            | 5,262,605                            | 5,929,771                    | 6,029,106                    |
| 12/1/2037 | 6,579,642                       | 6,571,392                  | 7,465,540                            | 7,433,651                            | 7,356,361                            | 8,647,390                    | 8,389,455                    |
| 1/1/2038  | 6,068,793                       | 5,680,931                  | 6,962,239                            | 6,946,979                            | 7,182,884                            | 8,181,488                    | 8,296,361                    |
| 2/1/2038  | 4,660,806                       | 4,829,689                  | 5,345,645                            | 5,734,844                            | 5,714,555                            | 6,575,658                    | 6,602,655                    |
| 3/1/2038  | 3,647,960                       | 3,582,332                  | 4,176,311                            | 4,401,512                            | 4,335,835                            | 5,068,281                    | 5,003,777                    |
| 4/1/2038  | 2,621,469                       | 2,504,937                  | 3,000,732                            | 2,780,280                            | 2,964,936                            | 3,335,976                    | 3,415,193                    |
| 5/1/2038  | 1,785,969                       | 1,775,375                  | 2,043,714                            | 2,083,919                            | 2,016,634                            | 2,454,765                    | 2,321,204                    |
| 6/1/2038  | 1,271,174                       | 1,281,853                  | 1,443,564                            | 1,473,284                            | 1,496,534                            | 1,699,837                    | 1,712,227                    |
| 7/1/2038  | 1,200,359                       | 1,200,359                  | 1,361,514                            | 1,361,514                            | 1,361,514                            | 1,554,677                    | 1,554,677                    |
| 8/1/2038  | 1,202,197                       | 1,202,197                  | 1,363,471                            | 1,363,471                            | 1,363,471                            | 1,556,965                    | 1,556,965                    |
| 9/1/2038  | 1,594,383                       | 1,599,389                  | 1,802,346                            | 1,823,906                            | 1,781,727                            | 2,184,564                    | 2,028,639                    |
| 10/1/2038 | 2,686,065                       | 2,584,192                  | 3,069,637                            | 3,025,673                            | 3,040,833                            | 3,551,579                    | 3,488,964                    |
| 11/1/2038 | 4,628,586                       | 4,400,193                  | 5,305,532                            | 5,391,349                            | 5,273,203                            | 6,238,341                    | 6,086,318                    |
| 12/1/2038 | 6,546,793                       | 6,418,919                  | 7,469,267                            | 7,611,613                            | 7,459,990                            | 8,720,225                    | 8,571,572                    |
| 1/1/2039  | 5,957,681                       | 5,956,292                  | 6,886,332                            | 6,981,124                            | 7,135,820                            | 7,899,512                    | 8,302,202                    |
| 2/1/2039  | 4,862,446                       | 4,797,324                  | 5,610,315                            | 5,675,230                            | 5,748,752                            | 6,787,321                    | 6,676,199                    |
| 3/1/2039  | 3,705,070                       | 3,772,957                  | 4,270,719                            | 4,324,261                            | 4,428,285                            | 4,987,994                    | 5,145,360                    |
| 4/1/2039  | 2,411,831                       | 2,488,076                  | 2,773,938                            | 2,808,916                            | 2,823,727                            | 3,425,502                    | 3,273,143                    |
| 5/1/2039  | 1,776,162                       | 1,787,490                  | 2,039,001                            | 2,131,557                            | 2,056,735                            | 2,420,882                    | 2,382,205                    |
| 6/1/2039  | 1,267,818                       | 1,295,431                  | 1,449,804                            | 1,507,633                            | 1,501,058                            | 1,754,769                    | 1,727,555                    |
| 7/1/2039  | 1,199,665                       | 1,199,665                  | 1,369,021                            | 1,369,021                            | 1,369,021                            | 1,573,568                    | 1,573,568                    |
| 8/1/2039  | 1,213,501                       | 1,213,501                  | 1,384,746                            | 1,384,746                            | 1,384,746                            | 1,591,801                    | 1,591,801                    |
| 9/1/2039  | 1,592,797                       | 1,615,135                  | 1,818,008                            | 1,862,413                            | 1,740,723                            | 2,097,002                    | 1,998,644                    |
| 10/1/2039 | 2,621,358                       | 2,756,000                  | 3,008,390                            | 3,206,749                            | 3,148,975                            | 3,456,477                    | 3,643,835                    |
| 11/1/2039 | 4,537,645                       | 4,385,305                  | 5,240,702                            | 5,531,127                            | 5,291,344                            | 6,238,380                    | 6,161,951                    |
| 12/1/2039 | 6,593,246                       | 6,670,059                  | 7,576,746                            | 7,801,679                            | 7,541,753                            | 8,936,581                    | 8,708,464                    |

## Monthly HDDs

|           | Minimum Weather | 1% Weather | 25% Weather | 50% Weather | 75% Weather | 99% Weather | Max Weather |
|-----------|-----------------|------------|-------------|-------------|-------------|-------------|-------------|
| 1/1/2020  | 634             | 748        | 804         | 679         | 722         | 811         | 735         |
| 2/1/2020  | 552             | 604        | 638         | 604         | 627         | 556         | 571         |
| 3/1/2020  | 437             | 501        | 455         | 473         | 422         | 457         | 471         |
| 4/1/2020  | 302             | 262        | 315         | 327         | 304         | 348         | 263         |
| 5/1/2020  | 120             | 140        | 125         | 129         | 174         | 199         | 186         |
| 6/1/2020  | 62              | 55         | 36          | 42          | 54          | 39          | 55          |
| 7/1/2020  | 7               | 6          | 4           | 5           | 4           | 6           | 6           |
| 8/1/2020  | 10              | 2          | 6           | 5           | 4           | 6           | 3           |
| 9/1/2020  | 86              | 80         | 71          | 63          | 89          | 50          | 76          |
| 10/1/2020 | 286             | 344        | 273         | 297         | 303         | 287         | 326         |
| 11/1/2020 | 527             | 619        | 536         | 624         | 592         | 572         | 555         |
| 12/1/2020 | 775             | 739        | 726         | 758         | 831         | 783         | 751         |
| 1/1/2021  | 680             | 726        | 711         | 652         | 647         | 746         | 664         |
| 2/1/2021  | 548             | 598        | 555         | 576         | 600         | 565         | 612         |
| 3/1/2021  | 475             | 445        | 431         | 454         | 529         | 456         | 493         |
| 4/1/2021  | 315             | 308        | 354         | 317         | 317         | 367         | 319         |
| 5/1/2021  | 199             | 193        | 163         | 130         | 156         | 176         | 130         |
| 6/1/2021  | 75              | 61         | 50          | 49          | 57          | 48          | 55          |
| 7/1/2021  | 7               | 6          | 3           | 7           | 5           | 9           | 8           |
| 8/1/2021  | 4               | 7          | 6           | 10          | 4           | 7           | 2           |
| 9/1/2021  | 81              | 94         | 87          | 71          | 62          | 75          | 70          |
| 10/1/2021 | 274             | 313        | 285         | 293         | 287         | 298         | 298         |
| 11/1/2021 | 549             | 583        | 516         | 550         | 532         | 510         | 551         |
| 12/1/2021 | 726             | 768        | 785         | 763         | 776         | 785         | 815         |
| 1/1/2022  | 714             | 725        | 737         | 759         | 730         | 736         | 734         |
| 2/1/2022  | 611             | 509        | 553         | 587         | 538         | 562         | 621         |
| 3/1/2022  | 464             | 488        | 449         | 465         | 458         | 451         | 509         |
| 4/1/2022  | 370             | 344        | 338         | 311         | 384         | 382         | 288         |
| 5/1/2022  | 176             | 181        | 155         | 194         | 197         | 169         | 166         |
| 6/1/2022  | 30              | 43         | 62          | 61          | 53          | 58          | 43          |
| 7/1/2022  | 5               | 6          | 10          | 3           | 8           | 5           | 6           |
| 8/1/2022  | 3               | 7          | 3           | 7           | 2           | 5           | 4           |
| 9/1/2022  | 41              | 72         | 50          | 70          | 90          | 75          | 56          |
| 10/1/2022 | 266             | 331        | 249         | 304         | 293         | 290         | 333         |
| 11/1/2022 | 543             | 492        | 535         | 493         | 514         | 541         | 552         |
| 12/1/2022 | 799             | 800        | 711         | 795         | 777         | 727         | 791         |
| 1/1/2023  | 724             | 697        | 660         | 733         | 697         | 786         | 724         |
| 2/1/2023  | 601             | 546        | 586         | 584         | 605         | 588         | 598         |
| 3/1/2023  | 513             | 453        | 486         | 507         | 483         | 494         | 475         |
| 4/1/2023  | 333             | 292        | 338         | 356         | 310         | 359         | 313         |
| 5/1/2023  | 194             | 122        | 188         | 202         | 196         | 173         | 187         |
| 6/1/2023  | 65              | 53         | 75          | 76          | 49          | 43          | 46          |
| 7/1/2023  | 7               | 7          | 5           | 6           | 5           | 3           | 7           |
| 8/1/2023  | 4               | 3          | 7           | 4           | 5           | 7           | 7           |
| 9/1/2023  | 76              | 60         | 72          | 78          | 75          | 80          | 60          |
| 10/1/2023 | 253             | 285        | 281         | 291         | 341         | 313         | 279         |
| 11/1/2023 | 557             | 577        | 551         | 532         | 554         | 577         | 538         |
| 12/1/2023 | 726             | 790        | 759         | 819         | 755         | 724         | 787         |
| 1/1/2024  | 749             | 675        | 708         | 701         | 648         | 729         | 785         |
| 2/1/2024  | 507             | 625        | 641         | 648         | 631         | 564         | 565         |
| 3/1/2024  | 456             | 456        | 454         | 480         | 503         | 489         | 496         |
| 4/1/2024  | 323             | 329        | 308         | 328         | 334         | 316         | 304         |
| 5/1/2024  | 137             | 159        | 166         | 106         | 200         | 143         | 189         |
| 6/1/2024  | 38              | 65         | 61          | 52          | 64          | 63          | 67          |
| 7/1/2024  | 9               | 7          | 8           | 3           | 9           | 6           | 3           |
| 8/1/2024  | 5               | 7          | 3           | 6           | 8           | 10          | 2           |
| 9/1/2024  | 61              | 85         | 63          | 47          | 67          | 63          | 62          |
| 10/1/2024 | 294             | 272        | 293         | 281         | 279         | 305         | 330         |
| 11/1/2024 | 528             | 533        | 510         | 589         | 592         | 573         | 468         |
| 12/1/2024 | 707             | 800        | 759         | 792         | 779         | 776         | 786         |
| 1/1/2025  | 733             | 759        | 651         | 734         | 762         | 744         | 685         |
| 2/1/2025  | 573             | 538        | 489         | 562         | 538         | 564         | 630         |
| 3/1/2025  | 474             | 450        | 488         | 478         | 515         | 480         | 460         |

**Monthly HDDs**

|           | Minimum Weather | 1% Weather | 25% Weather | 50% Weather | 75% Weather | 99% Weather | Max Weather |
|-----------|-----------------|------------|-------------|-------------|-------------|-------------|-------------|
| 4/1/2025  | 348             | 320        | 328         | 351         | 384         | 331         | 370         |
| 5/1/2025  | 160             | 161        | 176         | 162         | 130         | 145         | 191         |
| 6/1/2025  | 53              | 47         | 64          | 68          | 44          | 53          | 50          |
| 7/1/2025  | 6               | 5          | 5           | 6           | 3           | 6           | 5           |
| 8/1/2025  | 8               | 5          | 4           | 8           | 2           | 4           | 9           |
| 9/1/2025  | 77              | 64         | 79          | 66          | 76          | 58          | 75          |
| 10/1/2025 | 273             | 277        | 251         | 311         | 259         | 309         | 312         |
| 11/1/2025 | 527             | 585        | 579         | 539         | 519         | 540         | 619         |
| 12/1/2025 | 725             | 790        | 733         | 793         | 758         | 764         | 847         |
| 1/1/2026  | 720             | 679        | 743         | 757         | 756         | 734         | 758         |
| 2/1/2026  | 614             | 576        | 589         | 553         | 550         | 593         | 554         |
| 3/1/2026  | 487             | 471        | 493         | 509         | 505         | 515         | 496         |
| 4/1/2026  | 334             | 348        | 350         | 357         | 304         | 318         | 310         |
| 5/1/2026  | 127             | 184        | 133         | 164         | 152         | 159         | 222         |
| 6/1/2026  | 47              | 48         | 52          | 68          | 58          | 39          | 49          |
| 7/1/2026  | 10              | 6          | 5           | 6           | 6           | 2           | 4           |
| 8/1/2026  | 5               | 5          | 5           | 5           | 3           | 6           | 6           |
| 9/1/2026  | 64              | 48         | 77          | 52          | 69          | 63          | 50          |
| 10/1/2026 | 237             | 276        | 300         | 245         | 297         | 251         | 297         |
| 11/1/2026 | 533             | 542        | 565         | 542         | 535         | 494         | 569         |
| 12/1/2026 | 736             | 788        | 754         | 792         | 783         | 753         | 827         |
| 1/1/2027  | 689             | 679        | 743         | 602         | 681         | 644         | 768         |
| 2/1/2027  | 525             | 516        | 613         | 577         | 546         | 645         | 620         |
| 3/1/2027  | 485             | 439        | 459         | 488         | 465         | 503         | 474         |
| 4/1/2027  | 318             | 332        | 320         | 335         | 325         | 398         | 285         |
| 5/1/2027  | 156             | 175        | 166         | 170         | 163         | 169         | 169         |
| 6/1/2027  | 46              | 67         | 52          | 64          | 46          | 53          | 39          |
| 7/1/2027  | 7               | 4          | 7           | 5           | 8           | 5           | 7           |
| 8/1/2027  | 7               | 6          | 1           | 5           | 4           | 7           | 5           |
| 9/1/2027  | 70              | 66         | 64          | 67          | 67          | 65          | 69          |
| 10/1/2027 | 231             | 293        | 268         | 326         | 275         | 245         | 318         |
| 11/1/2027 | 460             | 485        | 526         | 587         | 515         | 554         | 544         |
| 12/1/2027 | 797             | 782        | 794         | 781         | 746         | 802         | 779         |
| 1/1/2028  | 729             | 734        | 707         | 703         | 682         | 798         | 706         |
| 2/1/2028  | 589             | 575        | 561         | 667         | 611         | 611         | 568         |
| 3/1/2028  | 531             | 460        | 463         | 487         | 499         | 497         | 498         |
| 4/1/2028  | 306             | 320        | 338         | 317         | 337         | 274         | 300         |
| 5/1/2028  | 159             | 147        | 185         | 122         | 156         | 158         | 201         |
| 6/1/2028  | 42              | 54         | 52          | 61          | 53          | 64          | 32          |
| 7/1/2028  | 5               | 6          | 7           | 6           | 9           | 5           | 4           |
| 8/1/2028  | 5               | 3          | 6           | 3           | 3           | 7           | 8           |
| 9/1/2028  | 44              | 43         | 55          | 76          | 59          | 50          | 83          |
| 10/1/2028 | 301             | 272        | 308         | 292         | 325         | 363         | 320         |
| 11/1/2028 | 565             | 557        | 522         | 512         | 582         | 532         | 627         |
| 12/1/2028 | 753             | 745        | 683         | 729         | 812         | 807         | 846         |
| 1/1/2029  | 704             | 733        | 697         | 707         | 731         | 677         | 683         |
| 2/1/2029  | 503             | 589        | 530         | 583         | 525         | 564         | 609         |
| 3/1/2029  | 463             | 430        | 514         | 501         | 471         | 478         | 493         |
| 4/1/2029  | 281             | 282        | 336         | 359         | 268         | 303         | 334         |
| 5/1/2029  | 138             | 167        | 166         | 168         | 150         | 180         | 164         |
| 6/1/2029  | 72              | 52         | 63          | 60          | 71          | 53          | 35          |
| 7/1/2029  | 4               | 5          | 8           | 11          | 4           | 2           | 7           |
| 8/1/2029  | 8               | 3          | 2           | 6           | 6           | 6           | 7           |
| 9/1/2029  | 54              | 53         | 75          | 102         | 56          | 63          | 76          |
| 10/1/2029 | 260             | 283        | 309         | 220         | 276         | 302         | 284         |
| 11/1/2029 | 516             | 542        | 576         | 551         | 580         | 575         | 567         |
| 12/1/2029 | 734             | 789        | 817         | 716         | 802         | 813         | 738         |
| 1/1/2030  | 696             | 694        | 740         | 720         | 675         | 768         | 716         |
| 2/1/2030  | 548             | 546        | 546         | 575         | 586         | 583         | 635         |
| 3/1/2030  | 465             | 450        | 458         | 470         | 536         | 494         | 498         |
| 4/1/2030  | 331             | 310        | 326         | 330         | 358         | 300         | 363         |
| 5/1/2030  | 191             | 161        | 173         | 155         | 171         | 149         | 176         |
| 6/1/2030  | 53              | 60         | 36          | 66          | 57          | 41          | 49          |

Monthly HDDs

|           | Minimum Weather | 1% Weather | 25% Weather | 50% Weather | 75% Weather | 99% Weather | Max Weather |
|-----------|-----------------|------------|-------------|-------------|-------------|-------------|-------------|
| 7/1/2030  | 7               | 6          | 5           | 6           | 6           | 5           | 4           |
| 8/1/2030  | 5               | 7          | 5           | 4           | 5           | 4           | 5           |
| 9/1/2030  | 76              | 61         | 58          | 87          | 91          | 69          | 65          |
| 10/1/2030 | 280             | 294        | 267         | 272         | 304         | 322         | 256         |
| 11/1/2030 | 563             | 533        | 594         | 559         | 529         | 515         | 555         |
| 12/1/2030 | 716             | 833        | 747         | 816         | 767         | 815         | 814         |
| 1/1/2031  | 694             | 725        | 779         | 602         | 722         | 721         | 740         |
| 2/1/2031  | 599             | 559        | 607         | 555         | 578         | 564         | 609         |
| 3/1/2031  | 514             | 504        | 474         | 493         | 429         | 505         | 478         |
| 4/1/2031  | 306             | 321        | 313         | 332         | 277         | 377         | 351         |
| 5/1/2031  | 151             | 160        | 174         | 118         | 103         | 154         | 151         |
| 6/1/2031  | 51              | 62         | 60          | 69          | 64          | 48          | 44          |
| 7/1/2031  | 7               | 3          | 11          | 4           | 5           | 3           | 7           |
| 8/1/2031  | 7               | 5          | 4           | 8           | 5           | 5           | 4           |
| 9/1/2031  | 73              | 56         | 66          | 58          | 71          | 49          | 72          |
| 10/1/2031 | 320             | 254        | 295         | 299         | 277         | 285         | 247         |
| 11/1/2031 | 545             | 563        | 549         | 607         | 600         | 572         | 616         |
| 12/1/2031 | 767             | 724        | 806         | 817         | 794         | 769         | 672         |
| 1/1/2032  | 684             | 698        | 719         | 686         | 717         | 696         | 734         |
| 2/1/2032  | 590             | 643        | 575         | 617         | 610         | 596         | 603         |
| 3/1/2032  | 465             | 516        | 473         | 485         | 456         | 470         | 484         |
| 4/1/2032  | 340             | 357        | 338         | 343         | 329         | 314         | 344         |
| 5/1/2032  | 212             | 168        | 153         | 135         | 161         | 175         | 190         |
| 6/1/2032  | 58              | 61         | 58          | 45          | 65          | 55          | 37          |
| 7/1/2032  | 7               | 6          | 10          | 4           | 7           | 7           | 4           |
| 8/1/2032  | 5               | 9          | 4           | 3           | 9           | 5           | 4           |
| 9/1/2032  | 80              | 65         | 52          | 62          | 92          | 56          | 80          |
| 10/1/2032 | 244             | 302        | 285         | 286         | 292         | 320         | 300         |
| 11/1/2032 | 482             | 533        | 596         | 585         | 536         | 559         | 478         |
| 12/1/2032 | 782             | 733        | 817         | 822         | 763         | 832         | 843         |
| 1/1/2033  | 692             | 721        | 773         | 694         | 799         | 698         | 787         |
| 2/1/2033  | 600             | 542        | 522         | 573         | 611         | 586         | 495         |
| 3/1/2033  | 469             | 480        | 520         | 479         | 459         | 481         | 502         |
| 4/1/2033  | 310             | 329        | 314         | 289         | 318         | 330         | 330         |
| 5/1/2033  | 169             | 157        | 147         | 175         | 179         | 176         | 229         |
| 6/1/2033  | 51              | 58         | 51          | 54          | 78          | 48          | 73          |
| 7/1/2033  | 5               | 6          | 3           | 9           | 8           | 10          | 5           |
| 8/1/2033  | 4               | 2          | 5           | 7           | 3           | 6           | 2           |
| 9/1/2033  | 53              | 79         | 73          | 59          | 59          | 77          | 46          |
| 10/1/2033 | 305             | 312        | 276         | 279         | 283         | 320         | 265         |
| 11/1/2033 | 517             | 527        | 562         | 562         | 511         | 580         | 519         |
| 12/1/2033 | 796             | 775        | 739         | 810         | 816         | 833         | 831         |
| 1/1/2034  | 770             | 692        | 698         | 745         | 707         | 769         | 718         |
| 2/1/2034  | 592             | 517        | 563         | 554         | 562         | 545         | 576         |
| 3/1/2034  | 451             | 476        | 452         | 466         | 515         | 503         | 450         |
| 4/1/2034  | 333             | 358        | 345         | 306         | 349         | 344         | 318         |
| 5/1/2034  | 185             | 195        | 195         | 151         | 185         | 200         | 182         |
| 6/1/2034  | 51              | 60         | 51          | 45          | 49          | 48          | 83          |
| 7/1/2034  | 5               | 4          | 10          | 4           | 5           | 5           | 12          |
| 8/1/2034  | 6               | 4          | 4           | 4           | 4           | 4           | 5           |
| 9/1/2034  | 56              | 59         | 65          | 56          | 53          | 70          | 69          |
| 10/1/2034 | 269             | 251        | 236         | 275         | 331         | 290         | 283         |
| 11/1/2034 | 548             | 541        | 562         | 536         | 575         | 556         | 576         |
| 12/1/2034 | 789             | 772        | 833         | 745         | 744         | 795         | 830         |
| 1/1/2035  | 662             | 623        | 752         | 762         | 738         | 743         | 748         |
| 2/1/2035  | 618             | 584        | 571         | 591         | 545         | 588         | 629         |
| 3/1/2035  | 485             | 485        | 502         | 495         | 493         | 452         | 462         |
| 4/1/2035  | 331             | 337        | 346         | 359         | 336         | 345         | 312         |
| 5/1/2035  | 159             | 183        | 140         | 191         | 152         | 141         | 172         |
| 6/1/2035  | 52              | 67         | 42          | 55          | 29          | 39          | 59          |
| 7/1/2035  | 6               | 5          | 5           | 6           | 5           | 7           | 10          |
| 8/1/2035  | 1               | 2          | 5           | 5           | 3           | 5           | 4           |
| 9/1/2035  | 70              | 43         | 71          | 60          | 67          | 60          | 84          |

## Monthly HDDs

|           | Minimum Weather | 1% Weather | 25% Weather | 50% Weather | 75% Weather | 99% Weather | Max Weather |
|-----------|-----------------|------------|-------------|-------------|-------------|-------------|-------------|
| 10/1/2035 | 308             | 253        | 304         | 279         | 315         | 320         | 306         |
| 11/1/2035 | 560             | 524        | 640         | 560         | 569         | 532         | 577         |
| 12/1/2035 | 698             | 755        | 717         | 809         | 796         | 742         | 830         |
| 1/1/2036  | 831             | 724        | 720         | 691         | 719         | 741         | 788         |
| 2/1/2036  | 525             | 594        | 582         | 555         | 566         | 663         | 584         |
| 3/1/2036  | 452             | 448        | 483         | 442         | 484         | 492         | 464         |
| 4/1/2036  | 320             | 322        | 329         | 323         | 280         | 311         | 331         |
| 5/1/2036  | 154             | 152        | 150         | 161         | 149         | 177         | 147         |
| 6/1/2036  | 50              | 59         | 74          | 40          | 46          | 62          | 55          |
| 7/1/2036  | 5               | 3          | 5           | 6           | 5           | 6           | 7           |
| 8/1/2036  | 6               | 5          | 5           | 7           | 5           | 5           | 4           |
| 9/1/2036  | 60              | 72         | 74          | 76          | 60          | 64          | 67          |
| 10/1/2036 | 310             | 271        | 305         | 299         | 259         | 316         | 335         |
| 11/1/2036 | 581             | 553        | 548         | 577         | 535         | 554         | 524         |
| 12/1/2036 | 713             | 733        | 778         | 786         | 831         | 684         | 827         |
| 1/1/2037  | 699             | 707        | 702         | 730         | 751         | 715         | 739         |
| 2/1/2037  | 531             | 521        | 586         | 596         | 601         | 576         | 534         |
| 3/1/2037  | 490             | 494        | 456         | 428         | 453         | 495         | 482         |
| 4/1/2037  | 328             | 349        | 381         | 337         | 339         | 292         | 311         |
| 5/1/2037  | 158             | 159        | 178         | 164         | 171         | 170         | 170         |
| 6/1/2037  | 52              | 48         | 44          | 49          | 69          | 42          | 89          |
| 7/1/2037  | 7               | 7          | 3           | 3           | 6           | 4           | 2           |
| 8/1/2037  | 7               | 5          | 5           | 4           | 5           | 4           | 5           |
| 9/1/2037  | 47              | 66         | 63          | 69          | 77          | 69          | 53          |
| 10/1/2037 | 290             | 268        | 295         | 258         | 274         | 326         | 299         |
| 11/1/2037 | 550             | 584        | 539         | 551         | 571         | 498         | 521         |
| 12/1/2037 | 736             | 781        | 772         | 812         | 812         | 743         | 770         |
| 1/1/2038  | 717             | 708        | 758         | 743         | 660         | 808         | 816         |
| 2/1/2038  | 589             | 605        | 584         | 566         | 575         | 624         | 611         |
| 3/1/2038  | 476             | 484        | 535         | 479         | 457         | 481         | 481         |
| 4/1/2038  | 363             | 327        | 327         | 293         | 353         | 327         | 348         |
| 5/1/2038  | 213             | 146        | 168         | 154         | 168         | 171         | 110         |
| 6/1/2038  | 36              | 55         | 54          | 39          | 58          | 78          | 57          |
| 7/1/2038  | 6               | 8          | 5           | 3           | 6           | 8           | 6           |
| 8/1/2038  | 7               | 6          | 3           | 2           | 7           | 3           | 4           |
| 9/1/2038  | 51              | 57         | 65          | 65          | 84          | 78          | 69          |
| 10/1/2038 | 308             | 321        | 257         | 285         | 252         | 299         | 273         |
| 11/1/2038 | 549             | 546        | 542         | 493         | 549         | 544         | 552         |
| 12/1/2038 | 744             | 739        | 763         | 819         | 780         | 830         | 745         |
| 1/1/2039  | 708             | 735        | 743         | 761         | 744         | 704         | 748         |
| 2/1/2039  | 581             | 560        | 503         | 574         | 542         | 603         | 617         |
| 3/1/2039  | 491             | 441        | 488         | 472         | 445         | 490         | 490         |
| 4/1/2039  | 301             | 335        | 334         | 303         | 349         | 342         | 290         |
| 5/1/2039  | 161             | 125        | 146         | 180         | 137         | 119         | 143         |
| 6/1/2039  | 45              | 52         | 61          | 62          | 52          | 52          | 59          |
| 7/1/2039  | 3               | 6          | 7           | 2           | 5           | 6           | 5           |
| 8/1/2039  | 4               | 5          | 3           | 5           | 3           | 7           | 5           |
| 9/1/2039  | 69              | 74         | 72          | 90          | 72          | 67          | 54          |
| 10/1/2039 | 242             | 332        | 288         | 275         | 280         | 280         | 282         |
| 11/1/2039 | 590             | 513        | 518         | 491         | 583         | 570         | 534         |
| 12/1/2039 | 720             | 783        | 796         | 813         | 806         | 718         | 791         |

|           | Total System Cost (\$000)       |                            |                                      |                                      |                                      |                              |                              |
|-----------|---------------------------------|----------------------------|--------------------------------------|--------------------------------------|--------------------------------------|------------------------------|------------------------------|
|           | Low Growth -<br>Minimum Weather | Low Growth - 1%<br>Weather | Expected Growth -<br>Minimum Weather | Expected Growth -<br>Average Weather | Expected Growth -<br>Maximum Weather | High Growth -<br>99% Weather | High Growth -<br>Max Weather |
| 1/1/2020  | 129,020                         | 129,027                    | 129,076                              | 129,080                              | 129,085                              | 129,025                      | 129,029                      |
| 2/1/2020  | 114,417                         | 114,420                    | 114,463                              | 114,468                              | 114,470                              | 114,428                      | 114,426                      |
| 3/1/2020  | 106,104                         | 106,106                    | 106,148                              | 106,148                              | 106,150                              | 106,105                      | 106,108                      |
| 4/1/2020  | 52,442                          | 52,439                     | 52,446                               | 52,446                               | 52,445                               | 52,438                       | 52,441                       |
| 5/1/2020  | 52,720                          | 52,721                     | 52,726                               | 52,726                               | 52,727                               | 52,721                       | 52,721                       |
| 6/1/2020  | 51,523                          | 51,523                     | 51,528                               | 51,527                               | 51,528                               | 51,523                       | 51,523                       |
| 7/1/2020  | 54,494                          | 54,494                     | 54,538                               | 54,538                               | 54,538                               | 54,494                       | 54,494                       |
| 8/1/2020  | 54,646                          | 54,646                     | 54,696                               | 54,696                               | 54,696                               | 54,646                       | 54,646                       |
| 9/1/2020  | 52,759                          | 52,759                     | 52,812                               | 52,811                               | 52,813                               | 52,760                       | 52,760                       |
| 10/1/2020 | 55,919                          | 55,921                     | 55,966                               | 55,966                               | 55,965                               | 55,922                       | 55,920                       |
| 11/1/2020 | 14,454                          | 14,623                     | 14,594                               | 15,297                               | 15,039                               | 15,665                       | 15,184                       |
| 12/1/2020 | 20,637                          | 20,495                     | 21,471                               | 21,819                               | 21,472                               | 22,238                       | 21,761                       |
| 1/1/2021  | 16,451                          | 16,167                     | 16,336                               | 16,103                               | 16,814                               | 16,826                       | 16,874                       |
| 2/1/2021  | 14,413                          | 14,151                     | 14,295                               | 14,182                               | 14,984                               | 14,349                       | 15,470                       |
| 3/1/2021  | 14,121                          | 13,697                     | 14,295                               | 14,336                               | 14,500                               | 14,259                       | 14,606                       |
| 4/1/2021  | 10,822                          | 11,004                     | 10,922                               | 10,828                               | 10,956                               | 11,062                       | 11,057                       |
| 5/1/2021  | 13,731                          | 13,588                     | 13,856                               | 13,941                               | 13,850                               | 14,035                       | 13,957                       |
| 6/1/2021  | 7,503                           | 7,490                      | 7,534                                | 7,525                                | 7,517                                | 7,566                        | 7,551                        |
| 7/1/2021  | 6,970                           | 6,957                      | 7,004                                | 6,994                                | 6,986                                | 7,037                        | 7,021                        |
| 8/1/2021  | 6,990                           | 6,977                      | 7,024                                | 7,014                                | 7,006                                | 7,058                        | 7,042                        |
| 9/1/2021  | 8,083                           | 8,218                      | 8,132                                | 8,320                                | 8,253                                | 8,160                        | 8,309                        |
| 10/1/2021 | 11,194                          | 10,908                     | 11,308                               | 11,468                               | 11,628                               | 11,643                       | 11,755                       |
| 11/1/2021 | 16,353                          | 16,501                     | 16,542                               | 16,126                               | 16,908                               | 16,738                       | 17,210                       |
| 12/1/2021 | 19,261                          | 20,229                     | 20,036                               | 21,677                               | 22,726                               | 23,657                       | 23,518                       |
| 1/1/2022  | 16,514                          | 16,677                     | 16,657                               | 16,700                               | 17,023                               | 16,820                       | 17,212                       |
| 2/1/2022  | 16,728                          | 17,134                     | 17,136                               | 16,705                               | 17,992                               | 17,360                       | 18,259                       |
| 3/1/2022  | 15,223                          | 15,018                     | 15,369                               | 15,156                               | 15,159                               | 15,198                       | 15,177                       |
| 4/1/2022  | 10,955                          | 11,011                     | 11,108                               | 10,982                               | 10,853                               | 11,422                       | 11,003                       |
| 5/1/2022  | 10,565                          | 10,597                     | 10,693                               | 11,669                               | 11,117                               | 11,281                       | 11,340                       |
| 6/1/2022  | 8,705                           | 8,832                      | 8,781                                | 8,715                                | 8,832                                | 8,962                        | 8,914                        |
| 7/1/2022  | 8,158                           | 8,285                      | 8,238                                | 8,159                                | 8,288                                | 8,421                        | 8,375                        |
| 8/1/2022  | 8,193                           | 8,320                      | 8,275                                | 8,192                                | 8,324                                | 8,456                        | 8,412                        |
| 9/1/2022  | 8,321                           | 8,170                      | 8,404                                | 8,184                                | 8,288                                | 8,360                        | 8,376                        |
| 10/1/2022 | 11,446                          | 11,626                     | 11,611                               | 11,707                               | 11,938                               | 12,017                       | 12,128                       |
| 11/1/2022 | 16,096                          | 16,202                     | 16,387                               | 16,862                               | 16,929                               | 17,224                       | 17,324                       |
| 12/1/2022 | 20,693                          | 22,080                     | 21,932                               | 22,702                               | 22,861                               | 24,136                       | 23,771                       |
| 1/1/2023  | 16,619                          | 16,698                     | 16,901                               | 17,056                               | 17,016                               | 17,583                       | 17,686                       |
| 2/1/2023  | 16,939                          | 16,416                     | 17,378                               | 17,941                               | 17,786                               | 17,719                       | 18,179                       |
| 3/1/2023  | 14,910                          | 14,912                     | 15,105                               | 15,162                               | 15,237                               | 15,167                       | 15,298                       |
| 4/1/2023  | 10,932                          | 11,048                     | 11,126                               | 11,663                               | 11,312                               | 11,798                       | 11,523                       |
| 5/1/2023  | 10,050                          | 10,588                     | 10,070                               | 9,935                                | 10,424                               | 10,230                       | 10,468                       |
| 6/1/2023  | 8,952                           | 8,790                      | 9,072                                | 9,132                                | 9,020                                | 9,170                        | 9,141                        |
| 7/1/2023  | 8,308                           | 8,138                      | 8,461                                | 8,529                                | 8,409                                | 8,542                        | 8,511                        |
| 8/1/2023  | 8,339                           | 8,169                      | 8,493                                | 8,564                                | 8,442                                | 8,577                        | 8,544                        |
| 9/1/2023  | 8,659                           | 8,346                      | 8,789                                | 8,578                                | 8,480                                | 8,512                        | 8,601                        |
| 10/1/2023 | 11,800                          | 11,976                     | 12,028                               | 12,057                               | 12,702                               | 12,677                       | 12,977                       |
| 11/1/2023 | 16,528                          | 16,769                     | 17,019                               | 16,939                               | 17,004                               | 17,358                       | 17,347                       |
| 12/1/2023 | 20,553                          | 20,775                     | 21,698                               | 21,946                               | 22,653                               | 22,958                       | 23,781                       |
| 1/1/2024  | 15,859                          | 16,245                     | 16,283                               | 16,897                               | 16,503                               | 17,230                       | 16,732                       |
| 2/1/2024  | 16,253                          | 15,989                     | 16,560                               | 16,213                               | 16,612                               | 17,314                       | 17,573                       |
| 3/1/2024  | 15,824                          | 16,073                     | 16,333                               | 16,417                               | 16,486                               | 16,541                       | 16,585                       |
| 4/1/2024  | 11,712                          | 11,548                     | 11,976                               | 12,375                               | 12,181                               | 12,600                       | 12,470                       |
| 5/1/2024  | 13,889                          | 14,273                     | 14,080                               | 14,621                               | 14,740                               | 14,351                       | 14,905                       |
| 6/1/2024  | 7,951                           | 7,744                      | 8,062                                | 7,952                                | 7,857                                | 8,301                        | 7,979                        |
| 7/1/2024  | 8,221                           | 8,006                      | 8,371                                | 8,254                                | 8,155                                | 8,583                        | 8,248                        |
| 8/1/2024  | 8,237                           | 8,020                      | 8,388                                | 8,270                                | 8,170                                | 8,593                        | 8,263                        |
| 9/1/2024  | 8,372                           | 8,319                      | 8,495                                | 8,665                                | 8,566                                | 8,882                        | 8,714                        |
| 10/1/2024 | 13,031                          | 12,895                     | 13,348                               | 13,561                               | 13,602                               | 13,987                       | 13,960                       |
| 11/1/2024 | 17,567                          | 16,817                     | 18,110                               | 17,693                               | 17,984                               | 17,872                       | 18,489                       |
| 12/1/2024 | 21,196                          | 21,983                     | 23,235                               | 23,722                               | 26,261                               | 24,921                       | 28,407                       |
| 1/1/2025  | 16,768                          | 16,649                     | 17,067                               | 17,204                               | 17,192                               | 17,713                       | 17,418                       |
| 2/1/2025  | 16,987                          | 17,335                     | 17,434                               | 17,576                               | 17,507                               | 19,231                       | 18,483                       |
| 3/1/2025  | 16,401                          | 16,377                     | 16,820                               | 16,971                               | 17,050                               | 16,804                       | 17,074                       |
| 4/1/2025  | 12,737                          | 12,560                     | 13,064                               | 12,824                               | 13,135                               | 13,419                       | 13,512                       |
| 5/1/2025  | 10,551                          | 10,719                     | 10,534                               | 10,351                               | 10,530                               | 11,036                       | 10,524                       |
| 6/1/2025  | 10,389                          | 10,712                     | 10,594                               | 10,660                               | 10,638                               | 10,833                       | 10,836                       |



|           | Total System Cost (\$000)       |                            |                                      |                                      |                                      |                              |                              |
|-----------|---------------------------------|----------------------------|--------------------------------------|--------------------------------------|--------------------------------------|------------------------------|------------------------------|
|           | Low Growth -<br>Minimum Weather | Low Growth - 1%<br>Weather | Expected Growth -<br>Minimum Weather | Expected Growth -<br>Average Weather | Expected Growth -<br>Maximum Weather | High Growth -<br>99% Weather | High Growth -<br>Max Weather |
| 7/1/2025  | 9,310                           | 9,255                      | 9,668                                | 9,736                                | 9,713                                | 9,654                        | 9,912                        |
| 8/1/2025  | 9,313                           | 9,243                      | 9,677                                | 9,747                                | 9,723                                | 9,642                        | 9,902                        |
| 9/1/2025  | 9,445                           | 9,270                      | 9,620                                | 9,577                                | 9,704                                | 9,579                        | 9,925                        |
| 10/1/2025 | 12,468                          | 12,986                     | 12,807                               | 13,463                               | 14,000                               | 14,006                       | 14,436                       |
| 11/1/2025 | 17,358                          | 17,704                     | 17,994                               | 17,961                               | 17,947                               | 18,526                       | 18,463                       |
| 12/1/2025 | 21,638                          | 21,275                     | 24,028                               | 24,220                               | 26,306                               | 28,701                       | 28,357                       |
| 1/1/2026  | 17,341                          | 17,259                     | 17,666                               | 17,662                               | 17,793                               | 19,469                       | 18,825                       |
| 2/1/2026  | 18,004                          | 17,707                     | 18,821                               | 17,959                               | 18,531                               | 20,197                       | 19,738                       |
| 3/1/2026  | 16,684                          | 16,783                     | 17,299                               | 17,376                               | 17,457                               | 17,206                       | 17,347                       |
| 4/1/2026  | 12,534                          | 12,499                     | 12,973                               | 13,308                               | 13,081                               | 13,637                       | 13,512                       |
| 5/1/2026  | 10,138                          | 10,153                     | 10,335                               | 10,380                               | 10,359                               | 10,743                       | 10,698                       |
| 6/1/2026  | 9,592                           | 9,592                      | 9,792                                | 9,888                                | 10,178                               | 10,148                       | 10,126                       |
| 7/1/2026  | 9,768                           | 9,785                      | 10,163                               | 10,261                               | 10,196                               | 10,361                       | 10,339                       |
| 8/1/2026  | 9,773                           | 9,772                      | 10,176                               | 10,274                               | 10,209                               | 10,347                       | 10,325                       |
| 9/1/2026  | 9,836                           | 9,716                      | 10,035                               | 10,170                               | 10,069                               | 10,441                       | 10,370                       |
| 10/1/2026 | 12,884                          | 13,377                     | 13,374                               | 13,353                               | 13,881                               | 14,357                       | 14,347                       |
| 11/1/2026 | 17,570                          | 17,376                     | 18,357                               | 18,453                               | 18,436                               | 19,628                       | 19,126                       |
| 12/1/2026 | 21,995                          | 21,023                     | 24,380                               | 25,473                               | 25,905                               | 27,266                       | 28,667                       |
| 1/1/2027  | 17,493                          | 17,566                     | 17,977                               | 17,723                               | 18,865                               | 18,330                       | 19,986                       |
| 2/1/2027  | 16,876                          | 18,256                     | 18,163                               | 18,953                               | 18,949                               | 19,734                       | 20,552                       |
| 3/1/2027  | 16,784                          | 16,857                     | 17,639                               | 17,414                               | 17,558                               | 17,422                       | 17,286                       |
| 4/1/2027  | 12,633                          | 12,586                     | 13,313                               | 13,590                               | 13,177                               | 14,209                       | 13,679                       |
| 5/1/2027  | 10,227                          | 10,387                     | 10,437                               | 10,495                               | 10,719                               | 10,955                       | 11,114                       |
| 6/1/2027  | 9,742                           | 9,756                      | 9,978                                | 10,080                               | 10,025                               | 10,374                       | 10,321                       |
| 7/1/2027  | 9,888                           | 9,903                      | 10,364                               | 10,470                               | 10,413                               | 10,541                       | 10,486                       |
| 8/1/2027  | 9,895                           | 9,910                      | 10,381                               | 10,486                               | 10,429                               | 10,547                       | 10,496                       |
| 9/1/2027  | 10,046                          | 9,876                      | 10,317                               | 10,381                               | 10,204                               | 10,482                       | 10,495                       |
| 10/1/2027 | 12,384                          | 13,054                     | 13,069                               | 13,786                               | 14,033                               | 14,776                       | 14,623                       |
| 11/1/2027 | 17,641                          | 17,438                     | 18,517                               | 18,380                               | 18,125                               | 19,396                       | 18,842                       |
| 12/1/2027 | 23,260                          | 21,476                     | 27,071                               | 25,600                               | 26,907                               | 29,715                       | 31,047                       |
| 1/1/2028  | 17,714                          | 17,717                     | 18,122                               | 18,335                               | 18,170                               | 18,332                       | 18,957                       |
| 2/1/2028  | 18,462                          | 18,404                     | 19,716                               | 19,476                               | 20,126                               | 21,947                       | 21,938                       |
| 3/1/2028  | 16,820                          | 16,860                     | 17,581                               | 17,697                               | 17,781                               | 17,517                       | 17,485                       |
| 4/1/2028  | 12,485                          | 12,342                     | 12,996                               | 13,429                               | 13,419                               | 14,221                       | 14,020                       |
| 5/1/2028  | 10,426                          | 10,316                     | 10,689                               | 10,668                               | 10,908                               | 11,215                       | 11,292                       |
| 6/1/2028  | 9,764                           | 9,780                      | 10,157                               | 10,205                               | 10,322                               | 10,396                       | 10,508                       |
| 7/1/2028  | 9,977                           | 9,919                      | 10,561                               | 10,610                               | 10,731                               | 10,566                       | 10,722                       |
| 8/1/2028  | 9,988                           | 9,930                      | 10,588                               | 10,638                               | 10,758                               | 10,607                       | 10,732                       |
| 9/1/2028  | 10,034                          | 9,984                      | 10,322                               | 10,420                               | 10,569                               | 10,694                       | 10,836                       |
| 10/1/2028 | 13,638                          | 13,497                     | 14,247                               | 13,792                               | 14,390                               | 15,659                       | 15,086                       |
| 11/1/2028 | 17,653                          | 17,363                     | 18,693                               | 19,337                               | 19,512                               | 20,130                       | 20,755                       |
| 12/1/2028 | 22,532                          | 22,686                     | 27,095                               | 26,998                               | 27,580                               | 30,567                       | 30,971                       |
| 1/1/2029  | 17,717                          | 17,623                     | 18,196                               | 18,217                               | 18,279                               | 20,729                       | 19,967                       |
| 2/1/2029  | 16,033                          | 15,879                     | 17,101                               | 19,394                               | 19,089                               | 21,191                       | 22,224                       |
| 3/1/2029  | 16,795                          | 16,879                     | 17,695                               | 17,659                               | 17,677                               | 17,407                       | 17,331                       |
| 4/1/2029  | 12,942                          | 12,542                     | 13,826                               | 13,282                               | 13,851                               | 15,027                       | 14,626                       |
| 5/1/2029  | 10,402                          | 10,454                     | 10,657                               | 10,690                               | 10,660                               | 11,084                       | 11,045                       |
| 6/1/2029  | 9,708                           | 9,760                      | 10,050                               | 10,193                               | 10,261                               | 10,359                       | 10,443                       |
| 7/1/2029  | 9,905                           | 9,941                      | 10,471                               | 10,618                               | 10,689                               | 10,600                       | 10,638                       |
| 8/1/2029  | 9,933                           | 9,954                      | 10,502                               | 10,650                               | 10,720                               | 10,612                       | 10,668                       |
| 9/1/2029  | 10,121                          | 10,112                     | 10,376                               | 10,407                               | 10,524                               | 10,769                       | 10,817                       |
| 10/1/2029 | 13,762                          | 13,961                     | 14,754                               | 14,585                               | 14,933                               | 15,122                       | 15,847                       |
| 11/1/2029 | 17,818                          | 18,276                     | 18,978                               | 18,740                               | 18,363                               | 20,111                       | 19,348                       |
| 12/1/2029 | 22,830                          | 21,454                     | 28,802                               | 28,772                               | 29,868                               | 32,725                       | 33,517                       |
| 1/1/2030  | 17,710                          | 17,666                     | 18,320                               | 18,546                               | 18,296                               | 20,544                       | 19,435                       |
| 2/1/2030  | 15,874                          | 15,738                     | 17,192                               | 20,756                               | 19,136                               | 22,438                       | 23,394                       |
| 3/1/2030  | 16,862                          | 16,965                     | 17,814                               | 17,844                               | 17,785                               | 17,830                       | 17,556                       |
| 4/1/2030  | 13,290                          | 13,310                     | 14,231                               | 13,770                               | 14,455                               | 14,829                       | 15,216                       |
| 5/1/2030  | 10,560                          | 10,594                     | 10,942                               | 10,938                               | 10,700                               | 11,309                       | 11,120                       |
| 6/1/2030  | 9,831                           | 9,843                      | 10,331                               | 10,453                               | 10,261                               | 10,571                       | 10,465                       |

|           | Total System Cost (\$000)       |                            |                                      |                                      |                                      |                              |                              |
|-----------|---------------------------------|----------------------------|--------------------------------------|--------------------------------------|--------------------------------------|------------------------------|------------------------------|
|           | Low Growth -<br>Minimum Weather | Low Growth - 1%<br>Weather | Expected Growth -<br>Minimum Weather | Expected Growth -<br>Average Weather | Expected Growth -<br>Maximum Weather | High Growth -<br>99% Weather | High Growth -<br>Max Weather |
| 7/1/2030  | 10,039                          | 10,032                     | 10,760                               | 10,885                               | 10,687                               | 10,812                       | 10,638                       |
| 8/1/2030  | 10,052                          | 10,046                     | 10,793                               | 10,918                               | 10,720                               | 10,825                       | 10,651                       |
| 9/1/2030  | 10,157                          | 10,327                     | 10,553                               | 10,669                               | 10,479                               | 11,289                       | 10,810                       |
| 10/1/2030 | 13,496                          | 13,528                     | 14,477                               | 15,042                               | 15,298                               | 15,754                       | 16,174                       |
| 11/1/2030 | 18,048                          | 17,545                     | 19,445                               | 18,884                               | 19,678                               | 21,113                       | 21,005                       |
| 12/1/2030 | 21,384                          | 21,407                     | 24,373                               | 24,737                               | 26,405                               | 30,647                       | 30,683                       |
| 1/1/2031  | 17,792                          | 18,319                     | 21,222                               | 22,616                               | 21,704                               | 24,702                       | 24,840                       |
| 2/1/2031  | 17,649                          | 19,010                     | 20,148                               | 21,164                               | 20,868                               | 23,089                       | 23,262                       |
| 3/1/2031  | 16,886                          | 16,935                     | 17,969                               | 17,850                               | 18,075                               | 18,140                       | 18,244                       |
| 4/1/2031  | 13,199                          | 13,321                     | 14,074                               | 13,981                               | 14,549                               | 15,208                       | 15,152                       |
| 5/1/2031  | 10,395                          | 10,556                     | 10,784                               | 10,884                               | 10,940                               | 11,429                       | 11,513                       |
| 6/1/2031  | 9,832                           | 9,775                      | 10,413                               | 10,441                               | 10,452                               | 10,634                       | 10,698                       |
| 7/1/2031  | 10,004                          | 9,950                      | 10,852                               | 10,881                               | 10,892                               | 10,797                       | 10,962                       |
| 8/1/2031  | 10,017                          | 9,963                      | 10,885                               | 10,914                               | 10,925                               | 10,810                       | 10,976                       |
| 9/1/2031  | 10,372                          | 10,193                     | 10,758                               | 10,742                               | 10,795                               | 11,126                       | 11,179                       |
| 10/1/2031 | 13,892                          | 13,799                     | 14,880                               | 15,273                               | 16,313                               | 15,832                       | 17,088                       |
| 11/1/2031 | 18,249                          | 17,639                     | 19,928                               | 19,266                               | 19,945                               | 21,619                       | 21,900                       |
| 12/1/2031 | 21,786                          | 21,936                     | 27,998                               | 30,112                               | 29,717                               | 34,924                       | 33,167                       |
| 1/1/2032  | 18,027                          | 18,327                     | 19,021                               | 18,708                               | 20,244                               | 24,131                       | 23,834                       |
| 2/1/2032  | 18,794                          | 18,856                     | 21,117                               | 21,663                               | 22,902                               | 24,755                       | 25,749                       |
| 3/1/2032  | 16,911                          | 17,098                     | 18,294                               | 18,044                               | 18,358                               | 18,851                       | 19,647                       |
| 4/1/2032  | 13,562                          | 13,304                     | 14,808                               | 14,083                               | 14,032                               | 15,810                       | 14,657                       |
| 5/1/2032  | 10,602                          | 10,486                     | 10,985                               | 10,908                               | 11,170                               | 11,416                       | 11,780                       |
| 6/1/2032  | 9,891                           | 9,873                      | 10,449                               | 10,467                               | 10,538                               | 10,677                       | 10,688                       |
| 7/1/2032  | 10,039                          | 9,983                      | 10,900                               | 10,919                               | 10,992                               | 10,857                       | 11,082                       |
| 8/1/2032  | 10,053                          | 9,997                      | 10,936                               | 10,954                               | 11,027                               | 10,871                       | 11,096                       |
| 9/1/2032  | 10,014                          | 9,912                      | 10,784                               | 10,790                               | 10,994                               | 10,966                       | 11,122                       |
| 10/1/2032 | 13,995                          | 15,072                     | 15,284                               | 15,505                               | 15,468                               | 16,855                       | 16,217                       |
| 11/1/2032 | 18,014                          | 18,162                     | 20,002                               | 20,798                               | 20,460                               | 23,008                       | 22,633                       |
| 12/1/2032 | 21,778                          | 21,929                     | 27,591                               | 31,922                               | 31,355                               | 35,790                       | 36,779                       |
| 1/1/2033  | 18,358                          | 18,408                     | 19,733                               | 19,076                               | 20,222                               | 21,799                       | 22,851                       |
| 2/1/2033  | 17,376                          | 17,809                     | 20,448                               | 21,945                               | 20,339                               | 22,660                       | 22,601                       |
| 3/1/2033  | 16,925                          | 16,832                     | 18,969                               | 18,017                               | 19,501                               | 20,243                       | 21,042                       |
| 4/1/2033  | 12,930                          | 12,946                     | 14,348                               | 14,373                               | 14,738                               | 14,742                       | 15,392                       |
| 5/1/2033  | 10,650                          | 10,689                     | 10,977                               | 11,084                               | 11,365                               | 11,865                       | 12,022                       |
| 6/1/2033  | 9,889                           | 9,874                      | 10,546                               | 10,591                               | 10,751                               | 10,800                       | 10,920                       |
| 7/1/2033  | 10,200                          | 10,207                     | 11,008                               | 11,054                               | 11,220                               | 11,201                       | 11,325                       |
| 8/1/2033  | 10,214                          | 10,222                     | 11,046                               | 11,092                               | 11,258                               | 11,215                       | 11,339                       |
| 9/1/2033  | 10,193                          | 10,023                     | 11,049                               | 10,906                               | 11,006                               | 11,166                       | 11,178                       |
| 10/1/2033 | 14,019                          | 13,190                     | 15,653                               | 15,482                               | 15,600                               | 15,315                       | 16,289                       |
| 11/1/2033 | 17,701                          | 17,931                     | 19,853                               | 20,317                               | 21,118                               | 22,576                       | 23,496                       |
| 12/1/2033 | 22,097                          | 22,901                     | 28,043                               | 28,432                               | 30,863                               | 34,544                       | 35,903                       |
| 1/1/2034  | 18,308                          | 18,595                     | 21,096                               | 20,948                               | 22,913                               | 25,336                       | 26,259                       |
| 2/1/2034  | 18,224                          | 18,122                     | 21,451                               | 21,643                               | 21,293                               | 26,325                       | 24,293                       |
| 3/1/2034  | 16,800                          | 16,902                     | 18,650                               | 19,043                               | 19,670                               | 21,311                       | 21,414                       |
| 4/1/2034  | 12,857                          | 13,336                     | 14,435                               | 14,069                               | 14,953                               | 16,136                       | 15,607                       |
| 5/1/2034  | 10,763                          | 10,727                     | 11,171                               | 11,272                               | 11,295                               | 11,742                       | 12,125                       |
| 6/1/2034  | 9,884                           | 9,988                      | 10,709                               | 10,859                               | 10,796                               | 10,935                       | 11,054                       |
| 7/1/2034  | 10,259                          | 10,262                     | 11,187                               | 11,342                               | 11,276                               | 11,078                       | 11,466                       |
| 8/1/2034  | 10,276                          | 10,278                     | 11,229                               | 11,384                               | 11,318                               | 11,095                       | 11,483                       |
| 9/1/2034  | 10,297                          | 10,215                     | 11,091                               | 11,208                               | 11,101                               | 11,138                       | 11,292                       |
| 10/1/2034 | 13,651                          | 14,041                     | 15,391                               | 14,547                               | 14,979                               | 15,939                       | 15,564                       |
| 11/1/2034 | 18,520                          | 18,075                     | 20,887                               | 21,260                               | 20,598                               | 23,758                       | 23,152                       |
| 12/1/2034 | 22,795                          | 22,544                     | 30,141                               | 29,679                               | 32,017                               | 36,178                       | 36,843                       |
| 1/1/2035  | 18,608                          | 18,591                     | 19,806                               | 21,231                               | 20,593                               | 24,084                       | 24,071                       |
| 2/1/2035  | 18,579                          | 17,724                     | 23,119                               | 22,805                               | 22,595                               | 25,672                       | 25,782                       |
| 3/1/2035  | 17,195                          | 17,048                     | 19,263                               | 20,500                               | 19,485                               | 21,576                       | 21,571                       |
| 4/1/2035  | 13,116                          | 13,210                     | 14,716                               | 14,706                               | 14,413                               | 15,862                       | 15,452                       |
| 5/1/2035  | 10,874                          | 10,512                     | 11,410                               | 11,179                               | 11,357                               | 12,006                       | 12,002                       |
| 6/1/2035  | 9,949                           | 9,860                      | 10,928                               | 10,714                               | 10,990                               | 11,080                       | 11,035                       |
| 7/1/2035  | 10,328                          | 10,012                     | 11,419                               | 11,197                               | 11,481                               | 11,497                       | 11,449                       |
| 8/1/2035  | 10,345                          | 10,030                     | 11,463                               | 11,240                               | 11,525                               | 11,514                       | 11,466                       |
| 9/1/2035  | 10,159                          | 10,068                     | 11,190                               | 11,014                               | 11,400                               | 11,270                       | 11,422                       |

|           | Total System Cost (\$000)       |                            |                                      |                                      |                                      |                              |                              |
|-----------|---------------------------------|----------------------------|--------------------------------------|--------------------------------------|--------------------------------------|------------------------------|------------------------------|
|           | Low Growth -<br>Minimum Weather | Low Growth - 1%<br>Weather | Expected Growth -<br>Minimum Weather | Expected Growth -<br>Average Weather | Expected Growth -<br>Maximum Weather | High Growth -<br>99% Weather | High Growth -<br>Max Weather |
| 10/1/2035 | 14,191                          | 13,678                     | 15,988                               | 15,785                               | 15,422                               | 17,573                       | 16,515                       |
| 11/1/2035 | 18,571                          | 18,181                     | 21,093                               | 20,908                               | 21,971                               | 24,285                       | 24,617                       |
| 12/1/2035 | 22,667                          | 23,286                     | 31,141                               | 30,284                               | 32,924                               | 37,480                       | 38,208                       |
| 1/1/2036  | 18,752                          | 19,276                     | 20,286                               | 20,639                               | 21,536                               | 24,969                       | 25,785                       |
| 2/1/2036  | 19,501                          | 19,707                     | 23,685                               | 22,609                               | 22,910                               | 27,808                       | 26,508                       |
| 3/1/2036  | 16,934                          | 17,386                     | 18,985                               | 19,742                               | 20,441                               | 22,665                       | 22,505                       |
| 4/1/2036  | 12,539                          | 12,317                     | 14,194                               | 14,589                               | 15,300                               | 14,985                       | 16,574                       |
| 5/1/2036  | 11,034                          | 10,901                     | 11,668                               | 11,565                               | 11,411                               | 12,456                       | 12,060                       |
| 6/1/2036  | 10,062                          | 9,986                      | 11,042                               | 11,226                               | 11,000                               | 11,444                       | 11,031                       |
| 7/1/2036  | 10,447                          | 10,368                     | 11,541                               | 11,731                               | 11,498                               | 11,873                       | 11,447                       |
| 8/1/2036  | 10,465                          | 10,386                     | 11,586                               | 11,777                               | 11,543                               | 11,891                       | 11,465                       |
| 9/1/2036  | 10,380                          | 10,418                     | 11,336                               | 11,576                               | 11,163                               | 11,743                       | 11,151                       |
| 10/1/2036 | 14,162                          | 14,832                     | 16,112                               | 15,136                               | 16,497                               | 16,854                       | 17,911                       |
| 11/1/2036 | 18,309                          | 19,260                     | 21,241                               | 21,390                               | 21,616                               | 26,496                       | 24,548                       |
| 12/1/2036 | 23,194                          | 22,863                     | 30,081                               | 32,616                               | 32,463                               | 39,801                       | 38,254                       |
| 1/1/2037  | 19,074                          | 18,647                     | 22,014                               | 22,657                               | 22,735                               | 26,995                       | 26,758                       |
| 2/1/2037  | 16,720                          | 18,485                     | 21,193                               | 22,389                               | 21,952                               | 25,941                       | 25,582                       |
| 3/1/2037  | 17,286                          | 16,958                     | 19,781                               | 20,255                               | 20,224                               | 23,114                       | 22,799                       |
| 4/1/2037  | 13,216                          | 12,963                     | 14,667                               | 14,370                               | 13,790                               | 15,141                       | 15,189                       |
| 5/1/2037  | 10,848                          | 10,726                     | 11,734                               | 11,742                               | 11,615                               | 12,925                       | 12,304                       |
| 6/1/2037  | 10,051                          | 9,879                      | 11,306                               | 11,318                               | 11,171                               | 11,937                       | 11,226                       |
| 7/1/2037  | 10,447                          | 10,269                     | 11,844                               | 11,857                               | 11,703                               | 12,394                       | 11,608                       |
| 8/1/2037  | 10,464                          | 10,286                     | 11,889                               | 11,901                               | 11,747                               | 11,813                       | 11,625                       |
| 9/1/2037  | 10,218                          | 10,044                     | 11,522                               | 11,500                               | 11,506                               | 12,011                       | 11,654                       |
| 10/1/2037 | 13,972                          | 13,948                     | 15,549                               | 16,095                               | 15,535                               | 15,498                       | 17,250                       |
| 11/1/2037 | 18,820                          | 17,508                     | 22,314                               | 23,865                               | 23,005                               | 26,018                       | 25,902                       |
| 12/1/2037 | 24,120                          | 23,846                     | 28,994                               | 27,489                               | 27,698                               | 35,092                       | 32,962                       |
| 1/1/2038  | 20,792                          | 19,370                     | 27,813                               | 26,799                               | 27,873                               | 33,101                       | 33,705                       |
| 2/1/2038  | 19,084                          | 18,027                     | 22,794                               | 24,121                               | 24,087                               | 28,027                       | 28,167                       |
| 3/1/2038  | 16,989                          | 17,205                     | 20,276                               | 21,683                               | 21,702                               | 24,010                       | 23,925                       |
| 4/1/2038  | 13,708                          | 12,765                     | 14,647                               | 13,351                               | 14,551                               | 16,379                       | 15,508                       |
| 5/1/2038  | 11,370                          | 11,596                     | 12,188                               | 12,090                               | 12,120                               | 12,915                       | 13,035                       |
| 6/1/2038  | 10,389                          | 10,520                     | 11,842                               | 11,672                               | 11,775                               | 11,785                       | 12,329                       |
| 7/1/2038  | 10,156                          | 10,292                     | 12,497                               | 12,321                               | 12,426                               | 11,596                       | 12,159                       |
| 8/1/2038  | 10,156                          | 10,292                     | 12,556                               | 12,380                               | 12,485                               | 11,596                       | 12,159                       |
| 9/1/2038  | 10,627                          | 10,162                     | 12,308                               | 12,008                               | 12,080                               | 11,755                       | 12,097                       |
| 10/1/2038 | 13,842                          | 12,969                     | 14,787                               | 14,807                               | 14,756                               | 17,473                       | 15,592                       |
| 11/1/2038 | 19,288                          | 18,151                     | 23,361                               | 24,068                               | 22,647                               | 26,605                       | 25,821                       |
| 12/1/2038 | 24,471                          | 24,298                     | 30,121                               | 30,600                               | 29,946                               | 34,558                       | 34,626                       |
| 1/1/2039  | 19,922                          | 19,950                     | 25,632                               | 24,781                               | 26,653                               | 31,255                       | 33,730                       |
| 2/1/2039  | 19,662                          | 17,906                     | 24,121                               | 24,099                               | 24,704                               | 29,411                       | 28,958                       |
| 3/1/2039  | 17,523                          | 17,479                     | 21,741                               | 22,483                               | 21,784                               | 24,680                       | 24,575                       |
| 4/1/2039  | 12,530                          | 12,672                     | 13,501                               | 13,194                               | 13,754                               | 15,719                       | 14,759                       |
| 5/1/2039  | 10,742                          | 10,701                     | 12,103                               | 12,374                               | 12,240                               | 12,719                       | 12,528                       |
| 6/1/2039  | 10,154                          | 10,236                     | 11,738                               | 11,993                               | 11,741                               | 12,153                       | 11,842                       |
| 7/1/2039  | 10,587                          | 10,671                     | 12,384                               | 12,646                               | 12,387                               | 12,650                       | 12,330                       |
| 8/1/2039  | 10,609                          | 10,693                     | 12,442                               | 12,704                               | 12,445                               | 11,932                       | 12,352                       |
| 9/1/2039  | 10,372                          | 10,494                     | 12,038                               | 12,301                               | 12,018                               | 12,402                       | 11,982                       |
| 10/1/2039 | 13,397                          | 13,967                     | 14,909                               | 15,818                               | 15,829                               | 15,489                       | 17,175                       |
| 11/1/2039 | 19,041                          | 18,181                     | 23,799                               | 25,129                               | 23,628                               | 26,447                       | 26,829                       |
| 12/1/2039 | 24,795                          | 24,481                     | 28,620                               | 29,579                               | 29,215                               | 36,438                       | 36,564                       |

Appendix H

Avoided Cost

2020 OR IRP

## **Appendix H – Introduction**

The purpose of this document is to present the inputs into Cascade’s avoided cost calculation, as well as the sources for these inputs. The format of this appendix has been modified for the 2020 OR IRP to align with the OPUC UM 1893 filing template.

The elements of the Company’s avoided cost calculation comply with UM 1893. The data itself is sourced from a number of processes integral to the 2020 IRP, specifically the resource integration and distribution system planning sections.

Once calculated, these figures are sent to the Energy Trust of Oregon (ETO), where they are used to generate Cascade’s Conservation Potential Assessment (CPA). The Company appreciates its partnership with ETO, as the CPA is a vital element to forecasting energy efficiency savings over the 20-year planning horizon. Additionally, if acknowledged, this data will be used complete Cascade’s 2020 filing for the UM 1893 docket.

| Global Assumptions Inputs   |                             |        | SOURCING                       |                           |                                  |   |              |
|---|-----------------------------|--------|--------------------------------|---------------------------|----------------------------------|---|--------------|
| Provide as much detail as possible with sourcing including a link. Ensure that dollar years listed here are the same as the source. |                             |        |                                |                           |                                  |   |              |
| Avoided Cost Element  | Units                       | Value  | Source                         | Source Page #             | Table # (if applicable)          | Source Link or File Name  | Source Notes |
| Discount Rate (Company's Real after-tax weighted average cost of capital (WACC))  | Percent                     | 7.33%  | CNGC Spring Earnings Review    | 13                        | Interest Coordination Adjustment | <a href="https://edocs.puc.state.or.us/efdocs/HAQ/rg36haq91248.pdf">https://edocs.puc.state.or.us/efdocs/HAQ/rg36haq91248.pdf</a> |              |
| Inflation Rate - 2020   | Percent                     | 2.48%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2021   | Percent                     | 2.66%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2022   | Percent                     | 2.86%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2023   | Percent                     | 3.01%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2024   | Percent                     | 3.18%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2025   | Percent                     | 3.32%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2026   | Percent                     | 3.45%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2027   | Percent                     | 3.56%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2028   | Percent                     | 3.65%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2029   | Percent                     | 3.73%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2030   | Percent                     | 3.79%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2031   | Percent                     | 3.83%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2032   | Percent                     | 3.85%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2033   | Percent                     | 3.86%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2034   | Percent                     | 3.88%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2035   | Percent                     | 3.89%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2036   | Percent                     | 3.90%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2037   | Percent                     | 3.91%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2038   | Percent                     | 3.92%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2039   | Percent                     | 3.92%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2040   | Percent                     | 3.93%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2041   | Percent                     | 3.93%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2042   | Percent                     | 3.94%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2043   | Percent                     | 3.94%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2044   | Percent                     | 3.94%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2045   | Percent                     | 3.94%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2046   | Percent                     | 3.94%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2047   | Percent                     | 3.94%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2048   | Percent                     | 3.95%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2049   | Percent                     | 3.94%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Inflation Rate - 2050   | Percent                     | 3.95%  | Woods & Poole 2019 Projections | 36                        | 4                                |   |              |
| Regional Act Credit   | Percent                     | 10.00% | N/A                            | 1980 Northwest Power Act: |                                  |   |              |
| Forecast Period Calendar Start Year   | Year                        | 2020   | N/A                            |                           |                                  |   |              |
| Real Dollar Base Year   | Year                        | 2019   |                                |                           |                                  |   |              |
| System Peak Definition  | Calendar Month/Day/Hour     | Day    |                                |                           |                                  |   |              |
| System Peak Coincident Day Factor   | Peak Day/Annual Load Ratio  | 0.0513 | 2020 CNGC OR IRP, Appendix B   |                           |                                  |   |              |
| System Peak Coincident Hour Factor  | Peak Hour/Annual Load Ratio | 0.0005 |                                |                           |                                  |   |              |

| CNGC Appendix H - Avoided Cost  |  |
|---|--|
| Definitions   |  |
| <b>1) Global Inputs</b>   |  |
| <> Standard economic assumptions of the avoided costs are input into this tab, including inflation and discount rates, as well as real dollar year and forecast start year.   | <> In addition to the standard economic assumptions, CNGC provides the system peak definition of the utility (calendar Month/Day/Hour) and the peak-day/annual load and peak-hour/Annual Load Ratios for the utility system. |
| <b>2) Commodity and Transport</b>   |  |
| <> Commodity and Transport price forecast by month  |  |
| <> Forecast is in real dollars  |  |
| <b>3) Environmental Compliance</b>  |  |
| <> \$/Metric Ton of CO2 is the most likely carbon forecast for each year of the avoided cost calculation  |  |
| <> Metric ton of CO2/dekatherm is constant for each year of the forecast  |  |
| <> Column 'F' is a calculated field, which multiplies the \$/metric ton of CO2 by the CO2/dekatherm   |  |
| <> Alternative carbon inputs provided in 3a) and 3b)  |  |
| <b>4) Infrastructure Capacity</b>   |  |
| <> Supply Infrastructure Capacity Cost provided in a \$/Dth/Day format for each year available of the forecast period   |  |
| <> Distribution Infrastructure Capacity Cost provided in a \$/Dth/Day and \$/Dth/Hour format for each year available of the forecast period   |  |
| <b>5) Risk Reduction</b>  |  |
| <> Risk Reduction value provided in a \$/Dth format if available for each year available of the forecast period   |  |
| <> The box in cell C7 calculates the levelized net present value of all years of the forecast period. This is used when negative values occur in any year of the forecast period. If the levelized risk reduction value is negative, zero will be assigned as the final value. This is due to the premise that the risk reduction value is meant to be a benefit. |  |
| <b>6) Monthly Load Shape</b>  |  |
| <> Monthly share of annual load for Cascade's system.   |  |

**Commodity Price Inputs**

|                  |                                     |
|------------------|-------------------------------------|
| Real or Nominal? | Real                                |
| Source:          | CNGC Price forecast as of 9-30-2019 |

**Gas Commodity and Transportation/Storage Costs (Real 2019\$/Dth)**

| Year # | Calendar Year | JAN    | FEB    | MAR    | APR    | MAY    | JUN    | JUL    | AUG    | SEP    | OCT    | NOV    | DEC    |
|--------|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1      | 2020          | \$2.99 | \$2.65 | \$2.09 | \$1.86 | \$1.46 | \$1.48 | \$2.05 | \$2.35 | \$2.56 | \$2.16 | \$2.18 | \$2.51 |
| 2      | 2021          | \$2.66 | \$2.47 | \$2.05 | \$1.71 | \$1.57 | \$1.57 | \$1.86 | \$1.90 | \$1.92 | \$1.91 | \$2.12 | \$2.41 |
| 3      | 2022          | \$2.53 | \$2.44 | \$2.05 | \$1.77 | \$1.66 | \$1.68 | \$1.93 | \$1.96 | \$1.97 | \$2.02 | \$2.21 | \$2.47 |
| 4      | 2023          | \$2.54 | \$2.48 | \$2.11 | \$1.86 | \$1.74 | \$1.71 | \$2.02 | \$2.06 | \$2.08 | \$2.13 | \$2.28 | \$2.50 |
| 5      | 2024          | \$2.57 | \$2.48 | \$2.17 | \$1.93 | \$1.79 | \$1.89 | \$2.10 | \$2.14 | \$2.13 | \$2.27 | \$2.43 | \$2.76 |
| 6      | 2025          | \$2.76 | \$2.68 | \$2.37 | \$2.17 | \$2.08 | \$2.12 | \$2.41 | \$2.49 | \$2.45 | \$2.41 | \$2.59 | \$2.95 |
| 7      | 2026          | \$2.92 | \$2.85 | \$2.51 | \$2.30 | \$2.19 | \$2.22 | \$2.52 | \$2.60 | \$2.58 | \$2.53 | \$2.69 | \$3.07 |
| 8      | 2027          | \$3.00 | \$2.92 | \$2.57 | \$2.36 | \$2.26 | \$2.28 | \$2.58 | \$2.67 | \$2.65 | \$2.58 | \$2.73 | \$3.09 |
| 9      | 2028          | \$3.01 | \$2.92 | \$2.62 | \$2.40 | \$2.29 | \$2.31 | \$2.61 | \$2.73 | \$2.69 | \$2.60 | \$2.77 | \$3.13 |
| 10     | 2029          | \$3.07 | \$3.00 | \$2.71 | \$2.46 | \$2.37 | \$2.41 | \$2.76 | \$2.88 | \$2.82 | \$2.75 | \$2.95 | \$3.28 |
| 11     | 2030          | \$3.28 | \$3.19 | \$2.89 | \$2.60 | \$2.50 | \$2.60 | \$2.90 | \$3.02 | \$2.96 | \$2.89 | \$3.13 | \$3.39 |
| 12     | 2031          | \$3.47 | \$3.31 | \$2.98 | \$2.70 | \$2.61 | \$2.68 | \$2.97 | \$3.08 | \$3.03 | \$2.95 | \$3.17 | \$3.42 |
| 13     | 2032          | \$3.50 | \$3.31 | \$2.99 | \$2.71 | \$2.62 | \$2.70 | \$3.00 | \$3.10 | \$3.05 | \$2.97 | \$3.21 | \$3.46 |
| 14     | 2033          | \$3.54 | \$3.38 | \$3.05 | \$2.75 | \$2.67 | \$2.76 | \$3.06 | \$3.16 | \$3.10 | \$3.03 | \$3.28 | \$3.55 |
| 15     | 2034          | \$3.61 | \$3.44 | \$3.09 | \$2.80 | \$2.71 | \$2.79 | \$3.11 | \$3.21 | \$3.15 | \$3.07 | \$3.34 | \$3.62 |
| 16     | 2035          | \$3.65 | \$3.48 | \$3.13 | \$2.84 | \$2.75 | \$2.84 | \$3.14 | \$3.25 | \$3.19 | \$3.11 | \$3.38 | \$3.65 |
| 17     | 2036          | \$3.70 | \$3.52 | \$3.15 | \$2.87 | \$2.78 | \$2.87 | \$3.18 | \$3.28 | \$3.23 | \$3.14 | \$3.43 | \$3.70 |
| 18     | 2037          | \$3.77 | \$3.59 | \$3.23 | \$2.95 | \$2.83 | \$2.91 | \$3.27 | \$3.36 | \$3.30 | \$3.26 | \$3.55 | \$3.84 |
| 19     | 2038          | \$4.18 | \$3.88 | \$3.44 | \$3.03 | \$3.03 | \$3.14 | \$3.68 | \$3.80 | \$3.70 | \$3.50 | \$3.87 | \$4.31 |
| 20     | 2039          | \$4.27 | \$3.96 | \$3.50 | \$3.15 | \$3.18 | \$3.24 | \$3.75 | \$3.86 | \$3.80 | \$3.59 | \$3.96 | \$4.35 |
| 21     | 2040          | \$4.34 | \$4.01 | \$3.55 | \$3.50 | \$3.26 | \$3.27 | \$3.95 | \$4.21 | \$4.44 | \$3.92 | \$3.89 | \$4.26 |
| 22     | 2041          | \$4.38 | \$4.05 | \$3.58 | \$3.53 | \$3.29 | \$3.30 | \$3.99 | \$4.25 | \$4.48 | \$3.96 | \$3.93 | \$4.31 |
| 23     | 2042          | \$4.42 | \$4.09 | \$3.62 | \$3.57 | \$3.33 | \$3.33 | \$4.03 | \$4.29 | \$4.53 | \$4.00 | \$3.97 | \$4.35 |
| 24     | 2043          | \$4.47 | \$4.13 | \$3.66 | \$3.60 | \$3.36 | \$3.37 | \$4.07 | \$4.34 | \$4.57 | \$4.04 | \$4.01 | \$4.39 |
| 25     | 2044          | \$4.51 | \$4.18 | \$3.69 | \$3.64 | \$3.39 | \$3.40 | \$4.11 | \$4.38 | \$4.62 | \$4.08 | \$4.05 | \$4.44 |
| 26     | 2045          | \$4.56 | \$4.22 | \$3.73 | \$3.68 | \$3.43 | \$3.43 | \$4.15 | \$4.42 | \$4.66 | \$4.12 | \$4.09 | \$4.48 |
| 27     | 2046          | \$4.60 | \$4.26 | \$3.77 | \$3.71 | \$3.46 | \$3.47 | \$4.19 | \$4.47 | \$4.71 | \$4.16 | \$4.13 | \$4.53 |
| 28     | 2047          | \$4.65 | \$4.30 | \$3.81 | \$3.75 | \$3.50 | \$3.50 | \$4.23 | \$4.51 | \$4.76 | \$4.20 | \$4.17 | \$4.57 |
| 29     | 2048          | \$4.70 | \$4.35 | \$3.84 | \$3.79 | \$3.53 | \$3.54 | \$4.27 | \$4.56 | \$4.80 | \$4.24 | \$4.21 | \$4.62 |
| 30     | 2049          | \$4.74 | \$4.39 | \$3.88 | \$3.83 | \$3.57 | \$3.57 | \$4.32 | \$4.60 | \$4.85 | \$4.29 | \$4.26 | \$4.66 |
| 31     | 2050          | \$4.79 | \$4.43 | \$3.92 | \$3.86 | \$3.60 | \$3.61 | \$4.36 | \$4.65 | \$4.90 | \$4.33 | \$4.30 | \$4.71 |
| 32     | 2051          | \$4.84 | \$4.48 | \$3.96 | \$3.90 | \$3.64 | \$3.64 | \$4.40 | \$4.69 | \$4.95 | \$4.37 | \$4.34 | \$4.76 |
| 33     | 2052          | \$4.89 | \$4.52 | \$4.00 | \$3.94 | \$3.68 | \$3.68 | \$4.45 | \$4.74 | \$5.00 | \$4.42 | \$4.38 | \$4.81 |
| 34     | 2053          | \$4.94 | \$4.57 | \$4.04 | \$3.98 | \$3.71 | \$3.72 | \$4.49 | \$4.79 | \$5.05 | \$4.46 | \$4.43 | \$4.85 |
| 35     | 2054          | \$4.98 | \$4.61 | \$4.08 | \$4.02 | \$3.75 | \$3.75 | \$4.54 | \$4.84 | \$5.10 | \$4.50 | \$4.47 | \$4.90 |
| 36     | 2055          | \$5.03 | \$4.66 | \$4.12 | \$4.06 | \$3.79 | \$3.79 | \$4.58 | \$4.89 | \$5.15 | \$4.55 | \$4.52 | \$4.95 |
| 37     | 2056          | \$5.08 | \$4.71 | \$4.16 | \$4.10 | \$3.82 | \$3.83 | \$4.63 | \$4.93 | \$5.20 | \$4.59 | \$4.56 | \$5.00 |
| 38     | 2057          | \$5.14 | \$4.75 | \$4.20 | \$4.14 | \$3.86 | \$3.87 | \$4.68 | \$4.98 | \$5.25 | \$4.64 | \$4.61 | \$5.05 |
| 39     | 2058          | \$5.19 | \$4.80 | \$4.25 | \$4.18 | \$3.90 | \$3.91 | \$4.72 | \$5.03 | \$5.31 | \$4.69 | \$4.65 | \$5.10 |
| 40     | 2059          | \$5.24 | \$4.85 | \$4.29 | \$4.23 | \$3.94 | \$3.95 | \$4.77 | \$5.08 | \$5.36 | \$4.73 | \$4.70 | \$5.15 |
| 41     | 2060          | \$5.29 | \$4.90 | \$4.33 | \$4.27 | \$3.98 | \$3.99 | \$4.82 | \$5.13 | \$5.41 | \$4.78 | \$4.75 | \$5.20 |
| 42     | 2061          | \$5.34 | \$4.95 | \$4.37 | \$4.31 | \$4.02 | \$4.03 | \$4.87 | \$5.19 | \$5.47 | \$4.83 | \$4.80 | \$5.26 |
| 43     | 2062          | \$5.40 | \$5.00 | \$4.42 | \$4.35 | \$4.06 | \$4.07 | \$4.91 | \$5.24 | \$5.52 | \$4.88 | \$4.84 | \$5.31 |
| 44     | 2063          | \$5.45 | \$5.05 | \$4.46 | \$4.40 | \$4.10 | \$4.11 | \$4.96 | \$5.29 | \$5.58 | \$4.93 | \$4.89 | \$5.36 |
| 45     | 2064          | \$5.51 | \$5.10 | \$4.51 | \$4.44 | \$4.14 | \$4.15 | \$5.01 | \$5.34 | \$5.63 | \$4.98 | \$4.94 | \$5.41 |



### Environmental Compliance Cost Inputs

|                  |  |
|------------------|--|
| Real or Nominal? | Real   |
| Source           | 2019 CEC Carbon Pricing - Carbon Price Mid Price |

### Environmental Compliance Cost

| Year # | Calendar Year | Environmental Compliance Cost (Real 2019\$/MTCO2e) | Carbon Intesity (MTCO2e/Dth) | Environmental Compliance Cost (Real 2019\$/Dth) |
|--------|---------------|--|------------------------------|---|
| 1      | 2020          | \$0.00   | 0.0583                       | \$0.000   |
| 2      | 2021          | \$21.13  | 0.0583                       | \$1.233   |
| 3      | 2022          | \$26.16  | 0.0583                       | \$1.526   |
| 4      | 2023          | \$26.77  | 0.0583                       | \$1.562   |
| 5      | 2024          | \$30.14  | 0.0583                       | \$1.758   |
| 6      | 2025          | \$33.95  | 0.0583                       | \$1.980   |
| 7      | 2026          | \$38.24  | 0.0583                       | \$2.230   |
| 8      | 2027          | \$43.06  | 0.0583                       | \$2.512   |
| 9      | 2028          | \$48.50  | 0.0583                       | \$2.829   |
| 10     | 2029          | \$54.61  | 0.0583                       | \$3.185   |
| 11     | 2030          | \$61.50  | 0.0583                       | \$3.587   |
| 12     | 2031          | \$61.50  | 0.0583                       | \$3.587   |
| 13     | 2032          | \$61.50  | 0.0583                       | \$3.587   |
| 14     | 2033          | \$61.50  | 0.0583                       | \$3.587   |
| 15     | 2034          | \$61.50  | 0.0583                       | \$3.587   |
| 16     | 2035          | \$61.50  | 0.0583                       | \$3.587   |
| 17     | 2036          | \$61.50  | 0.0583                       | \$3.587   |
| 18     | 2037          | \$61.50  | 0.0583                       | \$3.587   |
| 19     | 2038          | \$61.50  | 0.0583                       | \$3.587   |
| 20     | 2039          | \$61.50  | 0.0583                       | \$3.587   |
| 21     | 2040          | \$61.50  | 0.0583                       | \$3.587   |
| 22     | 2041          | \$61.50  | 0.0583                       | \$3.587   |
| 23     | 2042          | \$61.50  | 0.0583                       | \$3.587   |
| 24     | 2043          | \$61.50  | 0.0583                       | \$3.587   |
| 25     | 2044          | \$61.50  | 0.0583                       | \$3.587   |
| 26     | 2045          | \$61.50  | 0.0583                       | \$3.587   |
| 27     | 2046          | \$61.50  | 0.0583                       | \$3.587   |
| 28     | 2047          | \$61.50  | 0.0583                       | \$3.587   |
| 29     | 2048          | \$61.50  | 0.0583                       | \$3.587   |
| 30     | 2049          | \$61.50  | 0.0583                       | \$3.587   |
| 31     | 2050          | \$61.50  | 0.0583                       | \$3.587   |
| 32     | 2051          | \$61.50  | 0.0583                       | \$3.587   |
| 33     | 2052          | \$61.50  | 0.0583                       | \$3.587   |
| 34     | 2053          | \$61.50  | 0.0583                       | \$3.587   |
| 35     | 2054          | \$61.50  | 0.0583                       | \$3.587   |
| 36     | 2055          | \$61.50  | 0.0583                       | \$3.587   |
| 37     | 2056          | \$61.50  | 0.0583                       | \$3.587   |
| 38     | 2057          | \$61.50  | 0.0583                       | \$3.587   |
| 39     | 2058          | \$61.50  | 0.0583                       | \$3.587   |
| 40     | 2059          | \$61.50  | 0.0583                       | \$3.587   |
| 41     | 2060          | \$61.50  | 0.0583                       | \$3.587   |
| 42     | 2061          | \$61.50  | 0.0583                       | \$3.587   |
| 43     | 2062          | \$61.50  | 0.0583                       | \$3.587   |
| 44     | 2063          | \$61.50  | 0.0583                       | \$3.587   |
| 45     | 2064          | \$61.50  | 0.0583                       | \$3.587   |

### Alternative Environmental Compliance Cost Inputs - SCC

|                  |  |
|------------------|--|
| Real or Nominal? | Real   |
| Source           | Interagency Working Group on Social Cost of Greenhouse Gases |

### Environmental Compliance Cost

| Year # | Calendar Year | Environmental Compliance Cost<br>(Real 2019\$/MTCO2e) | Carbon Intesity<br>(MTCO2e/Dth) | Environmental Compliance Cost<br>(Real 2019\$/Dth) |
|--------|---------------|---|---------------------------------|--|
| 1      | 2020          | \$0.00  | 0.0583                          | \$0.000  |
| 2      | 2021          | \$52.47   | 0.0583                          | \$3.060  |
| 3      | 2022          | \$53.69   | 0.0583                          | \$3.131  |
| 4      | 2023          | \$54.91   | 0.0583                          | \$3.202  |
| 5      | 2024          | \$56.13   | 0.0583                          | \$3.274  |
| 6      | 2025          | \$57.35   | 0.0583                          | \$3.345  |
| 7      | 2026          | \$58.57   | 0.0583                          | \$3.416  |
| 8      | 2027          | \$59.79   | 0.0583                          | \$3.487  |
| 9      | 2028          | \$59.79   | 0.0583                          | \$3.487  |
| 10     | 2029          | \$61.01   | 0.0583                          | \$3.558  |
| 11     | 2030          | \$62.23   | 0.0583                          | \$3.629  |
| 12     | 2031          | \$63.45   | 0.0583                          | \$3.701  |
| 13     | 2032          | \$64.67   | 0.0583                          | \$3.772  |
| 14     | 2033          | \$65.89   | 0.0583                          | \$3.843  |
| 15     | 2034          | \$67.11   | 0.0583                          | \$3.914  |
| 16     | 2035          | \$68.33   | 0.0583                          | \$3.985  |
| 17     | 2036          | \$69.55   | 0.0583                          | \$4.056  |
| 18     | 2037          | \$70.77   | 0.0583                          | \$4.128  |
| 19     | 2038          | \$71.99   | 0.0583                          | \$4.199  |
| 20     | 2039          | \$73.21   | 0.0583                          | \$4.270  |
| 21     | 2040          | \$74.43   | 0.0583                          | \$4.341  |
| 22     | 2041          | \$74.43   | 0.0583                          | \$4.341  |
| 23     | 2042          | \$75.65   | 0.0583                          | \$4.412  |
| 24     | 2043          | \$76.87   | 0.0583                          | \$4.483  |
| 25     | 2044          | \$78.09   | 0.0583                          | \$4.555  |
| 26     | 2045          | \$79.31   | 0.0583                          | \$4.626  |
| 27     | 2046          | \$80.53   | 0.0583                          | \$4.697  |
| 28     | 2047          | \$81.75   | 0.0583                          | \$4.768  |
| 29     | 2048          | \$82.97   | 0.0583                          | \$4.839  |
| 30     | 2049          | \$84.19   | 0.0583                          | \$4.910  |
| 31     | 2050          | \$85.41   | 0.0583                          | \$4.982  |
| 32     | 2051          | \$86.63   | 0.0583                          | \$5.053  |
| 33     | 2052          | \$87.85   | 0.0583                          | \$5.124  |
| 34     | 2053          | \$89.07   | 0.0583                          | \$5.195  |
| 35     | 2054          | \$90.29   | 0.0583                          | \$5.266  |
| 36     | 2055          | \$91.51   | 0.0583                          | \$5.337  |
| 37     | 2056          | \$92.73   | 0.0583                          | \$5.409  |
| 38     | 2057          | \$93.96   | 0.0583                          | \$5.480  |
| 39     | 2058          | \$95.18   | 0.0583                          | \$5.551  |
| 40     | 2059          | \$96.40   | 0.0583                          | \$5.622  |
| 41     | 2060          | \$97.62   | 0.0583                          | \$5.693  |
| 42     | 2061          | \$98.84   | 0.0583                          | \$5.764  |
| 43     | 2062          | \$100.06  | 0.0583                          | \$5.836  |
| 44     | 2063          | \$101.28  | 0.0583                          | \$5.907  |
| 45     | 2064          | \$102.51  | 0.0583                          | \$5.979  |

**Alternative Environmental Compliance Cost Inputs - Market Choice**

|                         |  |
|-------------------------|--|
| <b>Real or Nominal?</b> | Real   |
| <b>Source</b>           | 2018 House bill - Modernizing America with Rebuilding to Kickstart the Economy of the Twenty-First Century with a Historic Infrastructure-Centered Expansion Act |

**Environmental Compliance Cost**

| Year # | Calendar Year | Environmental Compliance Cost (Real 2019\$/MTCO2e) | Carbon Intesity (MTCO2e/Dth) | Environmental Compliance Cost (Real 2019\$/Dth) |
|--------|---------------|--|------------------------------|---|
| 1      | 2020          | \$0.00   | 0.0583                       | \$0.000   |
| 2      | 2021          | \$24.48  | 0.0583                       | \$1.428   |
| 3      | 2022          | \$24.97  | 0.0583                       | \$1.456   |
| 4      | 2023          | \$25.47  | 0.0583                       | \$1.485   |
| 5      | 2024          | \$25.98  | 0.0583                       | \$1.515   |
| 6      | 2025          | \$26.50  | 0.0583                       | \$1.545   |
| 7      | 2026          | \$27.03  | 0.0583                       | \$1.576   |
| 8      | 2027          | \$27.57  | 0.0583                       | \$1.608   |
| 9      | 2028          | \$28.12  | 0.0583                       | \$1.640   |
| 10     | 2029          | \$28.68  | 0.0583                       | \$1.673   |
| 11     | 2030          | \$29.26  | 0.0583                       | \$1.706   |
| 12     | 2031          | \$29.84  | 0.0583                       | \$1.740   |
| 13     | 2032          | \$30.44  | 0.0583                       | \$1.775   |
| 14     | 2033          | \$31.05  | 0.0583                       | \$1.811   |
| 15     | 2034          | \$31.67  | 0.0583                       | \$1.847   |
| 16     | 2035          | \$32.30  | 0.0583                       | \$1.884   |
| 17     | 2036          | \$32.95  | 0.0583                       | \$1.922   |
| 18     | 2037          | \$33.61  | 0.0583                       | \$1.960   |
| 19     | 2038          | \$34.28  | 0.0583                       | \$1.999   |
| 20     | 2039          | \$34.96  | 0.0583                       | \$2.039   |
| 21     | 2040          | \$35.66  | 0.0583                       | \$2.080   |
| 22     | 2041          | \$36.38  | 0.0583                       | \$2.122   |
| 23     | 2042          | \$37.10  | 0.0583                       | \$2.164   |
| 24     | 2043          | \$37.85  | 0.0583                       | \$2.207   |
| 25     | 2044          | \$38.60  | 0.0583                       | \$2.251   |
| 26     | 2045          | \$39.37  | 0.0583                       | \$2.296   |
| 27     | 2046          | \$40.16  | 0.0583                       | \$2.342   |
| 28     | 2047          | \$40.97  | 0.0583                       | \$2.389   |
| 29     | 2048          | \$41.78  | 0.0583                       | \$2.437   |
| 30     | 2049          | \$42.62  | 0.0583                       | \$2.486   |
| 31     | 2050          | \$43.47  | 0.0583                       | \$2.535   |
| 32     | 2051          | \$44.34  | 0.0583                       | \$2.586   |
| 33     | 2052          | \$45.23  | 0.0583                       | \$2.638   |
| 34     | 2053          | \$46.13  | 0.0583                       | \$2.691   |
| 35     | 2054          | \$47.06  | 0.0583                       | \$2.744   |
| 36     | 2055          | \$48.00  | 0.0583                       | \$2.799   |
| 37     | 2056          | \$48.96  | 0.0583                       | \$2.855   |
| 38     | 2057          | \$49.94  | 0.0583                       | \$2.912   |
| 39     | 2058          | \$50.94  | 0.0583                       | \$2.971   |
| 40     | 2059          | \$51.95  | 0.0583                       | \$3.030   |
| 41     | 2060          | \$52.99  | 0.0583                       | \$3.091   |
| 42     | 2061          | \$54.05  | 0.0583                       | \$3.153   |
| 43     | 2062          | \$55.13  | 0.0583                       | \$3.216   |
| 44     | 2063          | \$56.24  | 0.0583                       | \$3.280   |
| 45     | 2064          | \$57.36  | 0.0583                       | \$3.345   |

**Infrastructure Capacity Cost Inputs**

|                         |  |
|-------------------------|--|
| <b>Real or Nominal?</b> | <b>Real</b>  |
| <b>Source</b>           | Peak Day costs are calculated by pulling CNGC Margin numbers from Tariffs 101, 104, 105, 111, 170, 502, 503, 504, 505, 511, 570, 577, then calculating what % of total load each rate class accounts for on peak day. This number is then multiplied by the % of projects related to growth specifically, and then multiplied by the ratio of peak day demand to average daily demand. Peak hour demand is calculated by looking at a recent historical cold week on Cascade's system (1/10/17-1/16-17) and pulling actual hourly demand data, indentifying the highest demand hour on the system from a representative sample of citygates, and calculating what % of the day's demand that hour accounted for. This hourly impact is then multiplied by the Peak Day figure. |

**Infrastructure Capacity Costs**

| Year # | Calendar Year | Infrastructure Capacity Costs   |  |  |
|--------|---------------|---------------------------------|--|--|
|        |               | Supply<br>(Real 2019\$/Dth/Day) | Distribution Peak DAY<br>(Real 2019\$/Dth/Day) | Distribution Peak HOUR<br>(Real 2019\$/Dth/Hour) |
| 1      | 2020          | \$0.00                          | \$0.119  | \$0.006  |
| 2      | 2021          | \$0.00                          | \$0.127  | \$0.007  |
| 3      | 2022          | \$0.00                          | \$0.130  | \$0.007  |
| 4      | 2023          | \$0.00                          | \$0.121  | \$0.006  |
| 5      | 2024          | \$0.00                          | \$0.141  | \$0.007  |
| 6      | 2025          | \$0.00                          | \$0.126  | \$0.006  |
| 7      | 2026          | \$0.00                          | \$0.126  | \$0.006  |
| 8      | 2027          | \$0.00                          | \$0.128  | \$0.007  |
| 9      | 2028          | \$0.00                          | \$0.128  | \$0.007  |
| 10     | 2029          | \$0.00                          | \$0.129  | \$0.007  |
| 11     | 2030          | \$0.00                          | \$0.129  | \$0.007  |
| 12     | 2031          | \$0.00                          | \$0.128  | \$0.007  |
| 13     | 2032          | \$0.23                          | \$0.128  | \$0.007  |
| 14     | 2033          | \$0.23                          | \$0.130  | \$0.007  |
| 15     | 2034          | \$0.23                          | \$0.130  | \$0.007  |
| 16     | 2035          | \$0.23                          | \$0.131  | \$0.007  |
| 17     | 2036          | \$0.23                          | \$0.131  | \$0.007  |
| 18     | 2037          | \$0.23                          | \$0.129  | \$0.007  |
| 19     | 2038          | \$0.23                          | \$0.131  | \$0.007  |
| 20     | 2039          | \$0.23                          | \$0.132  | \$0.007  |
| 21     | 2040          | \$0.23                          | \$0.131  | \$0.007  |
| 22     | 2041          | \$0.23                          | \$0.000  | \$0.000  |
| 23     | 2042          | \$0.23                          | \$0.000  | \$0.000  |
| 24     | 2043          | \$0.23                          | \$0.000  | \$0.000  |
| 25     | 2044          | \$0.23                          | \$0.000  | \$0.000  |
| 26     | 2045          | \$0.23                          | \$0.000  | \$0.000  |
| 27     | 2046          | \$0.23                          | \$0.000  | \$0.000  |
| 28     | 2047          | \$0.23                          | \$0.000  | \$0.000  |
| 29     | 2048          | \$0.23                          | \$0.000  | \$0.000  |
| 30     | 2049          | \$0.23                          | \$0.000  | \$0.000  |
| 31     | 2050          | \$0.23                          | \$0.000  | \$0.000  |
| 32     | 2051          | \$0.23                          | \$0.000  | \$0.000  |
| 33     | 2052          | \$0.23                          | \$0.000  | \$0.000  |
| 34     | 2053          | \$0.23                          | \$0.000  | \$0.000  |
| 35     | 2054          | \$0.23                          | \$0.000  | \$0.000  |
| 36     | 2055          | \$0.23                          | \$0.000  | \$0.000  |
| 37     | 2056          | \$0.23                          | \$0.000  | \$0.000  |
| 38     | 2057          | \$0.23                          | \$0.000  | \$0.000  |
| 39     | 2058          | \$0.23                          | \$0.000  | \$0.000  |
| 40     | 2059          | \$0.23                          | \$0.000  | \$0.000  |
| 41     | 2060          | \$0.23                          | \$0.000  | \$0.000  |
| 42     | 2061          | \$0.23                          | \$0.000  | \$0.000  |
| 43     | 2062          | \$0.23                          | \$0.000  | \$0.000  |
| 44     | 2063          | \$0.23                          | \$0.000  | \$0.000  |
| 45     | 2064          | \$0.23                          | \$0.000  | \$0.000  |

### Risk Reduction Value Inputs

|                  |                                     |
|------------------|-------------------------------------|
| Real or Nominal? | Real                                |
| Source           | CNGC Price forecast as of 9-30-2019 |

-\$0.13

= Levelized Risk Reduction Value (for use when negative values occur in any years of the forecast period). If this value is negative, then zero will be assigned as the final value.

### Risk Reduction Value

| Year # | Calendar Year | Risk Reduction Value<br>(Real 2019\$/Dth) |
|--------|---------------|---|
| 1      | 2020          | -\$0.159                                  |
| 2      | 2021          | -\$0.139                                  |
| 3      | 2022          | -\$0.108                                  |
| 4      | 2023          | -\$0.067                                  |
| 5      | 2024          | -\$0.104                                  |
| 6      | 2025          | -\$0.245                                  |
| 7      | 2026          | -\$0.301                                  |
| 8      | 2027          | -\$0.221                                  |
| 9      | 2028          | -\$0.109                                  |
| 10     | 2029          | -\$0.078                                  |
| 11     | 2030          | -\$0.105                                  |
| 12     | 2031          | -\$0.069                                  |
| 13     | 2032          | \$0.000                                   |
| 14     | 2033          | -\$0.001                                  |
| 15     | 2034          | -\$0.016                                  |
| 16     | 2035          | -\$0.030                                  |
| 17     | 2036          | -\$0.057                                  |
| 18     | 2037          | -\$0.141                                  |
| 19     | 2038          | -\$0.459                                  |
| 20     | 2039          | -\$0.304                                  |



**TOTAL AVOIDED COSTS - Base Case Carbon Scenario (2019  
CEC Projections)**

| <b>TOTAL AVOIDED COSTS - Annual Values</b> |            |             |                    |                    |                      |
|--|------------|-------------|--------------------|--------------------|----------------------|
| <b>Lifetime</b>                            | <b>DHW</b> | <b>FLAT</b> | <b>Res Heating</b> | <b>Com Heating</b> | <b>Clotheswasher</b> |
| 2020                                       | \$0.26     | \$0.26      | \$0.28             | \$0.28             | \$0.26               |
| 2021                                       | \$0.39     | \$0.39      | \$0.40             | \$0.41             | \$0.39               |
| 2022                                       | \$0.43     | \$0.43      | \$0.45             | \$0.45             | \$0.43               |
| 2023                                       | \$0.45     | \$0.45      | \$0.46             | \$0.47             | \$0.45               |
| 2024                                       | \$0.50     | \$0.50      | \$0.52             | \$0.52             | \$0.50               |
| 2025                                       | \$0.54     | \$0.54      | \$0.56             | \$0.56             | \$0.54               |
| 2026                                       | \$0.58     | \$0.57      | \$0.60             | \$0.60             | \$0.57               |
| 2027                                       | \$0.61     | \$0.61      | \$0.63             | \$0.64             | \$0.61               |
| 2028                                       | \$0.67     | \$0.66      | \$0.68             | \$0.69             | \$0.66               |
| 2029                                       | \$0.73     | \$0.72      | \$0.75             | \$0.75             | \$0.72               |
| 2030                                       | \$0.78     | \$0.78      | \$0.80             | \$0.81             | \$0.78               |
| 2031                                       | \$0.79     | \$0.78      | \$0.81             | \$0.81             | \$0.78               |
| 2032                                       | \$0.83     | \$0.82      | \$1.02             | \$1.00             | \$0.81               |
| 2033                                       | \$0.83     | \$0.83      | \$1.02             | \$1.00             | \$0.81               |
| 2034                                       | \$0.84     | \$0.83      | \$1.03             | \$1.01             | \$0.82               |
| 2035                                       | \$0.84     | \$0.84      | \$1.03             | \$1.01             | \$0.82               |
| 2036                                       | \$0.85     | \$0.85      | \$1.04             | \$1.02             | \$0.83               |
| 2037                                       | \$0.89     | \$0.88      | \$1.08             | \$1.06             | \$0.87               |
| 2038                                       | \$0.90     | \$0.89      | \$1.09             | \$1.07             | \$0.88               |
| 2039                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2040                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2041                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2042                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2043                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2044                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2045                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2046                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2047                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2048                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2049                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2050                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2051                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2052                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2053                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2054                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2055                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2056                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2057                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2058                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2059                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2060                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2061                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2062                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2063                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2064                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2065                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2066                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2067                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2068                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |
| 2069                                       | \$0.92     | \$0.91      | \$1.11             | \$1.09             | \$0.90               |

**TOTAL AVOIDED COSTS - Base Case Carbon Scenario (2019  
CEC Projections)**

| <b>TOTAL AVOIDED COSTS - Net Present Value</b> |         |         |             |             |               |
|--|---------|---------|-------------|-------------|---------------|
| Lifetime                                       | DHW     | FLAT    | Res Heating | Com Heating | Clotheswasher |
| 2020   | \$0.25  | \$0.25  | \$0.26      | \$0.27      | \$0.25        |
| 2021   | \$0.61  | \$0.60  | \$0.63      | \$0.64      | \$0.60        |
| 2022   | \$0.99  | \$0.98  | \$1.03      | \$1.03      | \$0.98        |
| 2023   | \$1.36  | \$1.36  | \$1.42      | \$1.42      | \$1.35        |
| 2024   | \$1.76  | \$1.76  | \$1.83      | \$1.84      | \$1.75        |
| 2025   | \$2.18  | \$2.17  | \$2.26      | \$2.27      | \$2.16        |
| 2026   | \$2.60  | \$2.59  | \$2.70      | \$2.71      | \$2.58        |
| 2027   | \$3.03  | \$3.02  | \$3.14      | \$3.16      | \$3.01        |
| 2028   | \$3.48  | \$3.47  | \$3.60      | \$3.62      | \$3.46        |
| 2029   | \$3.95  | \$3.93  | \$4.08      | \$4.10      | \$3.92        |
| 2030   | \$4.43  | \$4.42  | \$4.58      | \$4.60      | \$4.40        |
| 2031   | \$4.90  | \$4.88  | \$5.06      | \$5.07      | \$4.86        |
| 2032   | \$5.36  | \$5.34  | \$5.63      | \$5.64      | \$5.32        |
| 2033   | \$5.81  | \$5.79  | \$6.18      | \$6.18      | \$5.76        |
| 2034   | \$6.25  | \$6.22  | \$6.71      | \$6.70      | \$6.18        |
| 2035   | \$6.66  | \$6.63  | \$7.22      | \$7.20      | \$6.59        |
| 2036   | \$7.07  | \$7.03  | \$7.71      | \$7.68      | \$6.98        |
| 2037   | \$7.47  | \$7.43  | \$8.20      | \$8.17      | \$7.37        |
| 2038   | \$7.86  | \$7.81  | \$8.68      | \$8.63      | \$7.75        |
| 2039   | \$8.24  | \$8.19  | \$9.14      | \$9.08      | \$8.13        |
| 21   | \$8.61  | \$8.55  | \$9.58      | \$9.52      | \$8.48        |
| 22   | \$8.96  | \$8.90  | \$10.00     | \$9.93      | \$8.82        |
| 23   | \$9.29  | \$9.23  | \$10.40     | \$10.33     | \$9.15        |
| 24   | \$9.61  | \$9.55  | \$10.79     | \$10.71     | \$9.46        |
| 25   | \$9.92  | \$9.85  | \$11.16     | \$11.08     | \$9.76        |
| 26   | \$10.21 | \$10.14 | \$11.51     | \$11.42     | \$10.05       |
| 27   | \$10.49 | \$10.42 | \$11.85     | \$11.76     | \$10.32       |
| 28   | \$10.76 | \$10.68 | \$12.18     | \$12.08     | \$10.58       |
| 29   | \$11.01 | \$10.94 | \$12.49     | \$12.38     | \$10.83       |
| 30   | \$11.26 | \$11.18 | \$12.78     | \$12.67     | \$11.07       |
| 31   | \$11.50 | \$11.42 | \$13.07     | \$12.95     | \$11.30       |
| 32   | \$11.72 | \$11.64 | \$13.34     | \$13.22     | \$11.52       |
| 33   | \$11.94 | \$11.85 | \$13.60     | \$13.48     | \$11.73       |
| 34   | \$12.14 | \$12.06 | \$13.85     | \$13.72     | \$11.93       |
| 35   | \$12.34 | \$12.25 | \$14.09     | \$13.96     | \$12.13       |
| 36   | \$12.53 | \$12.44 | \$14.32     | \$14.18     | \$12.31       |
| 37   | \$12.71 | \$12.62 | \$14.53     | \$14.39     | \$12.49       |
| 38   | \$12.88 | \$12.79 | \$14.74     | \$14.60     | \$12.66       |
| 39   | \$13.05 | \$12.95 | \$14.94     | \$14.80     | \$12.82       |
| 40   | \$13.20 | \$13.11 | \$15.13     | \$14.98     | \$12.97       |
| 41   | \$13.35 | \$13.26 | \$15.32     | \$15.16     | \$13.12       |
| 42   | \$13.50 | \$13.40 | \$15.49     | \$15.34     | \$13.26       |
| 43   | \$13.64 | \$13.54 | \$15.66     | \$15.50     | \$13.40       |
| 44   | \$13.77 | \$13.67 | \$15.82     | \$15.66     | \$13.52       |
| 45   | \$13.90 | \$13.80 | \$15.97     | \$15.81     | \$13.65       |
| 46   | \$14.02 | \$13.92 | \$16.12     | \$15.95     | \$13.77       |
| 47   | \$14.14 | \$14.03 | \$16.26     | \$16.09     | \$13.88       |
| 48   | \$14.25 | \$14.14 | \$16.40     | \$16.23     | \$13.99       |
| 49   | \$14.35 | \$14.25 | \$16.52     | \$16.35     | \$14.09       |
| 50   | \$14.45 | \$14.35 | \$16.65     | \$16.47     | \$14.19       |



**TOTAL AVOIDED COSTS - Social Cost of Carbon  
Scenario (SCC 3% discount)**

| <b>TOTAL AVOIDED COSTS - Annual Values</b> |        |        |             |             |               |
|--|--------|--------|-------------|-------------|---------------|
| Lifetime                                   | DHW    | FLAT   | Res Heating | Com Heating | Clotheswasher |
| 1  | \$0.26 | \$0.26 | \$0.28      | \$0.28      | \$0.26        |
| 2  | \$0.61 | \$0.60 | \$0.62      | \$0.62      | \$0.60        |
| 3  | \$0.62 | \$0.62 | \$0.64      | \$0.64      | \$0.62        |
| 4  | \$0.64 | \$0.64 | \$0.66      | \$0.66      | \$0.64        |
| 5  | \$0.68 | \$0.68 | \$0.70      | \$0.70      | \$0.67        |
| 6  | \$0.70 | \$0.70 | \$0.72      | \$0.72      | \$0.70        |
| 7  | \$0.72 | \$0.71 | \$0.74      | \$0.74      | \$0.71        |
| 8  | \$0.73 | \$0.73 | \$0.75      | \$0.75      | \$0.73        |
| 9  | \$0.74 | \$0.74 | \$0.76      | \$0.76      | \$0.74        |
| 10   | \$0.77 | \$0.77 | \$0.79      | \$0.79      | \$0.77        |
| 11   | \$0.79 | \$0.79 | \$0.81      | \$0.81      | \$0.78        |
| 12   | \$0.80 | \$0.80 | \$0.82      | \$0.82      | \$0.80        |
| 13   | \$0.85 | \$0.84 | \$1.04      | \$1.02      | \$0.83        |
| 14   | \$0.86 | \$0.86 | \$1.05      | \$1.03      | \$0.84        |
| 15   | \$0.88 | \$0.87 | \$1.06      | \$1.05      | \$0.86        |
| 16   | \$0.89 | \$0.88 | \$1.08      | \$1.06      | \$0.87        |
| 17   | \$0.91 | \$0.90 | \$1.10      | \$1.08      | \$0.89        |
| 18   | \$0.95 | \$0.95 | \$1.14      | \$1.13      | \$0.93        |
| 19   | \$0.97 | \$0.96 | \$1.16      | \$1.15      | \$0.95        |
| 20   | \$1.00 | \$0.99 | \$1.19      | \$1.17      | \$0.98        |
| 21   | \$1.01 | \$1.00 | \$1.20      | \$1.18      | \$0.99        |
| 22   | \$1.01 | \$1.00 | \$1.20      | \$1.18      | \$0.99        |
| 23   | \$1.02 | \$1.01 | \$1.21      | \$1.19      | \$1.00        |
| 24   | \$1.03 | \$1.02 | \$1.22      | \$1.20      | \$1.00        |
| 25   | \$1.03 | \$1.03 | \$1.23      | \$1.21      | \$1.01        |
| 26   | \$1.04 | \$1.03 | \$1.23      | \$1.22      | \$1.02        |
| 27   | \$1.05 | \$1.04 | \$1.24      | \$1.23      | \$1.03        |
| 28   | \$1.06 | \$1.05 | \$1.25      | \$1.23      | \$1.04        |
| 29   | \$1.07 | \$1.06 | \$1.26      | \$1.24      | \$1.05        |
| 30   | \$1.08 | \$1.07 | \$1.27      | \$1.25      | \$1.05        |
| 31   | \$1.08 | \$1.08 | \$1.28      | \$1.26      | \$1.06        |
| 32   | \$1.09 | \$1.08 | \$1.29      | \$1.27      | \$1.07        |
| 33   | \$1.10 | \$1.09 | \$1.29      | \$1.28      | \$1.08        |
| 34   | \$1.11 | \$1.10 | \$1.30      | \$1.28      | \$1.09        |
| 35   | \$1.12 | \$1.11 | \$1.31      | \$1.29      | \$1.10        |
| 36   | \$1.13 | \$1.12 | \$1.32      | \$1.30      | \$1.10        |
| 37   | \$1.13 | \$1.13 | \$1.33      | \$1.31      | \$1.11        |
| 38   | \$1.14 | \$1.13 | \$1.34      | \$1.32      | \$1.12        |
| 39   | \$1.15 | \$1.14 | \$1.34      | \$1.33      | \$1.13        |
| 40   | \$1.16 | \$1.15 | \$1.35      | \$1.33      | \$1.14        |
| 41   | \$1.17 | \$1.16 | \$1.36      | \$1.34      | \$1.15        |
| 42   | \$1.18 | \$1.17 | \$1.37      | \$1.35      | \$1.16        |
| 43   | \$1.19 | \$1.18 | \$1.38      | \$1.36      | \$1.16        |
| 44   | \$1.19 | \$1.19 | \$1.39      | \$1.37      | \$1.17        |
| 45   | \$1.20 | \$1.19 | \$1.39      | \$1.38      | \$1.18        |
| 46   | \$1.20 | \$1.19 | \$1.39      | \$1.38      | \$1.18        |
| 47   | \$1.20 | \$1.19 | \$1.39      | \$1.38      | \$1.18        |
| 48   | \$1.20 | \$1.19 | \$1.39      | \$1.38      | \$1.18        |
| 49   | \$1.20 | \$1.19 | \$1.39      | \$1.38      | \$1.18        |
| 50   | \$1.20 | \$1.19 | \$1.39      | \$1.38      | \$1.18        |

**TOTAL AVOIDED COSTS - Social Cost of Carbon  
Scenario (SCC 3% discount)**

| <b>TOTAL AVOIDED COSTS - Net Present Value</b> |         |         |             |             |               |
|--|---------|---------|-------------|-------------|---------------|
| Lifetime                                       | DHW     | FLAT    | Res Heating | Com Heating | Clotheswasher |
| 1  | \$0.25  | \$0.25  | \$0.26      | \$0.27      | \$0.25        |
| 2  | \$0.80  | \$0.80  | \$0.83      | \$0.84      | \$0.80        |
| 3  | \$1.35  | \$1.35  | \$1.39      | \$1.40      | \$1.34        |
| 4  | \$1.89  | \$1.88  | \$1.94      | \$1.95      | \$1.88        |
| 5  | \$2.43  | \$2.43  | \$2.50      | \$2.51      | \$2.42        |
| 6  | \$2.97  | \$2.96  | \$3.05      | \$3.06      | \$2.95        |
| 7  | \$3.50  | \$3.49  | \$3.59      | \$3.61      | \$3.48        |
| 8  | \$4.01  | \$4.00  | \$4.12      | \$4.13      | \$3.99        |
| 9  | \$4.51  | \$4.50  | \$4.63      | \$4.65      | \$4.49        |
| 10   | \$5.01  | \$4.99  | \$5.14      | \$5.16      | \$4.98        |
| 11   | \$5.49  | \$5.48  | \$5.64      | \$5.66      | \$5.46        |
| 12   | \$5.97  | \$5.95  | \$6.12      | \$6.14      | \$5.93        |
| 13   | \$6.44  | \$6.42  | \$6.71      | \$6.72      | \$6.40        |
| 14   | \$6.91  | \$6.88  | \$7.28      | \$7.28      | \$6.85        |
| 15   | \$7.36  | \$7.33  | \$7.83      | \$7.82      | \$7.30        |
| 16   | \$7.81  | \$7.77  | \$8.36      | \$8.34      | \$7.73        |
| 17   | \$8.23  | \$8.20  | \$8.88      | \$8.85      | \$8.15        |
| 18   | \$8.67  | \$8.62  | \$9.40      | \$9.36      | \$8.57        |
| 19   | \$9.09  | \$9.04  | \$9.90      | \$9.86      | \$8.98        |
| 20   | \$9.50  | \$9.45  | \$10.40     | \$10.34     | \$9.39        |
| 21   | \$9.90  | \$9.85  | \$10.87     | \$10.81     | \$9.78        |
| 22   | \$10.29 | \$10.23 | \$11.33     | \$11.26     | \$10.15       |
| 23   | \$10.66 | \$10.60 | \$11.77     | \$11.70     | \$10.52       |
| 24   | \$11.01 | \$10.95 | \$12.19     | \$12.11     | \$10.86       |
| 25   | \$11.36 | \$11.29 | \$12.60     | \$12.52     | \$11.20       |
| 26   | \$11.69 | \$11.62 | \$12.99     | \$12.90     | \$11.53       |
| 27   | \$12.01 | \$11.94 | \$13.37     | \$13.28     | \$11.84       |
| 28   | \$12.32 | \$12.24 | \$13.74     | \$13.64     | \$12.14       |
| 29   | \$12.62 | \$12.54 | \$14.09     | \$13.98     | \$12.43       |
| 30   | \$12.90 | \$12.83 | \$14.43     | \$14.32     | \$12.72       |
| 31   | \$13.18 | \$13.10 | \$14.75     | \$14.64     | \$12.99       |
| 32   | \$13.45 | \$13.37 | \$15.07     | \$14.95     | \$13.25       |
| 33   | \$13.70 | \$13.62 | \$15.37     | \$15.25     | \$13.50       |
| 34   | \$13.95 | \$13.87 | \$15.66     | \$15.53     | \$13.75       |
| 35   | \$14.19 | \$14.10 | \$15.94     | \$15.81     | \$13.98       |
| 36   | \$14.42 | \$14.33 | \$16.21     | \$16.08     | \$14.21       |
| 37   | \$14.65 | \$14.56 | \$16.47     | \$16.33     | \$14.43       |
| 38   | \$14.86 | \$14.77 | \$16.72     | \$16.58     | \$14.64       |
| 39   | \$15.07 | \$14.97 | \$16.97     | \$16.82     | \$14.84       |
| 40   | \$15.27 | \$15.17 | \$17.20     | \$17.05     | \$15.03       |
| 41   | \$15.46 | \$15.36 | \$17.42     | \$17.27     | \$15.22       |
| 42   | \$15.64 | \$15.55 | \$17.64     | \$17.48     | \$15.41       |
| 43   | \$15.82 | \$15.72 | \$17.85     | \$17.69     | \$15.58       |
| 44   | \$16.00 | \$15.89 | \$18.04     | \$17.88     | \$15.75       |
| 45   | \$16.16 | \$16.06 | \$18.24     | \$18.07     | \$15.91       |
| 46   | \$16.32 | \$16.22 | \$18.42     | \$18.26     | \$16.07       |
| 47   | \$16.47 | \$16.37 | \$18.60     | \$18.43     | \$16.22       |
| 48   | \$16.62 | \$16.51 | \$18.77     | \$18.60     | \$16.36       |
| 49   | \$16.76 | \$16.65 | \$18.93     | \$18.76     | \$16.50       |
| 50   | \$16.89 | \$16.78 | \$19.08     | \$18.91     | \$16.63       |

**TOTAL AVOIDED COSTS - Social Cost of Carbon  
Scenario (SCC 3% discount)**

| % Difference from Base Case |     |      |             |             |               |
|-----------------------------|-----|------|-------------|-------------|---------------|
| Lifetime                    | DHW | FLAT | Res Heating | Com Heating | Clotheswasher |
| 1                           | 0%  | 0%   | 0%          | 0%          | 0%            |
| 2                           | 55% | 56%  | 53%         | 53%         | 56%           |
| 3                           | 44% | 44%  | 42%         | 42%         | 44%           |
| 4                           | 43% | 43%  | 42%         | 42%         | 44%           |
| 5                           | 36% | 36%  | 35%         | 34%         | 36%           |
| 6                           | 30% | 30%  | 29%         | 29%         | 30%           |
| 7                           | 24% | 24%  | 24%         | 23%         | 24%           |
| 8                           | 19% | 19%  | 18%         | 18%         | 19%           |
| 9                           | 12% | 12%  | 11%         | 11%         | 12%           |
| 10                          | 6%  | 6%   | 6%          | 6%          | 6%            |
| 11                          | 1%  | 1%   | 1%          | 1%          | 1%            |
| 12                          | 2%  | 2%   | 2%          | 2%          | 2%            |
| 13                          | 3%  | 3%   | 2%          | 2%          | 3%            |
| 14                          | 4%  | 4%   | 3%          | 3%          | 4%            |
| 15                          | 5%  | 5%   | 4%          | 4%          | 5%            |
| 16                          | 6%  | 6%   | 5%          | 5%          | 6%            |
| 17                          | 6%  | 7%   | 5%          | 5%          | 7%            |
| 18                          | 7%  | 7%   | 6%          | 6%          | 7%            |
| 19                          | 8%  | 8%   | 7%          | 7%          | 8%            |
| 20                          | 9%  | 9%   | 7%          | 7%          | 9%            |
| 21                          | 10% | 10%  | 8%          | 8%          | 10%           |
| 22                          | 10% | 10%  | 8%          | 8%          | 10%           |
| 23                          | 11% | 11%  | 9%          | 9%          | 11%           |
| 24                          | 12% | 12%  | 10%         | 10%         | 12%           |
| 25                          | 12% | 13%  | 10%         | 10%         | 13%           |
| 26                          | 13% | 13%  | 11%         | 11%         | 14%           |
| 27                          | 14% | 14%  | 12%         | 12%         | 15%           |
| 28                          | 15% | 15%  | 13%         | 13%         | 16%           |
| 29                          | 16% | 16%  | 13%         | 14%         | 16%           |
| 30                          | 17% | 17%  | 14%         | 14%         | 17%           |
| 31                          | 18% | 18%  | 15%         | 15%         | 18%           |
| 32                          | 19% | 19%  | 16%         | 16%         | 19%           |
| 33                          | 20% | 20%  | 16%         | 17%         | 20%           |
| 34                          | 21% | 21%  | 17%         | 17%         | 21%           |
| 35                          | 22% | 22%  | 18%         | 18%         | 22%           |
| 36                          | 22% | 23%  | 19%         | 19%         | 23%           |
| 37                          | 23% | 24%  | 19%         | 20%         | 24%           |
| 38                          | 24% | 25%  | 20%         | 20%         | 25%           |
| 39                          | 25% | 25%  | 21%         | 21%         | 26%           |
| 40                          | 26% | 26%  | 22%         | 22%         | 27%           |
| 41                          | 27% | 27%  | 22%         | 23%         | 28%           |
| 42                          | 28% | 28%  | 23%         | 23%         | 29%           |
| 43                          | 29% | 29%  | 24%         | 24%         | 30%           |
| 44                          | 30% | 30%  | 25%         | 25%         | 30%           |
| 45                          | 31% | 31%  | 25%         | 26%         | 31%           |
| 46                          | 31% | 31%  | 25%         | 26%         | 31%           |
| 47                          | 31% | 31%  | 25%         | 26%         | 31%           |
| 48                          | 31% | 31%  | 25%         | 26%         | 31%           |
| 49                          | 31% | 31%  | 25%         | 26%         | 31%           |
| 50                          | 31% | 31%  | 25%         | 26%         | 31%           |

**TOTAL AVOIDED COSTS - National Market Choice  
Proposal Carbon Scenario**

| <b>TOTAL AVOIDED COSTS - Annual Values</b> |            |             |                    |                    |                      |
|--|------------|-------------|--------------------|--------------------|----------------------|
| <b>Lifetime</b>                            | <b>DHW</b> | <b>FLAT</b> | <b>Res Heating</b> | <b>Com Heating</b> | <b>clotheswasher</b> |
| 1  | \$0.26     | \$0.26      | \$0.28             | \$0.28             | \$0.26               |
| 2  | \$0.41     | \$0.41      | \$0.43             | \$0.43             | \$0.41               |
| 3  | \$0.42     | \$0.42      | \$0.44             | \$0.44             | \$0.42               |
| 4  | \$0.44     | \$0.44      | \$0.46             | \$0.46             | \$0.44               |
| 5  | \$0.47     | \$0.47      | \$0.49             | \$0.49             | \$0.47               |
| 6  | \$0.49     | \$0.49      | \$0.51             | \$0.51             | \$0.49               |
| 7  | \$0.50     | \$0.50      | \$0.52             | \$0.52             | \$0.50               |
| 8  | \$0.51     | \$0.51      | \$0.53             | \$0.53             | \$0.50               |
| 9  | \$0.52     | \$0.52      | \$0.54             | \$0.55             | \$0.52               |
| 10   | \$0.55     | \$0.55      | \$0.57             | \$0.57             | \$0.54               |
| 11   | \$0.56     | \$0.56      | \$0.58             | \$0.58             | \$0.56               |
| 12   | \$0.57     | \$0.57      | \$0.59             | \$0.59             | \$0.56               |
| 13   | \$0.61     | \$0.61      | \$0.80             | \$0.78             | \$0.59               |
| 14   | \$0.62     | \$0.62      | \$0.81             | \$0.79             | \$0.60               |
| 15   | \$0.63     | \$0.63      | \$0.82             | \$0.80             | \$0.61               |
| 16   | \$0.64     | \$0.63      | \$0.83             | \$0.81             | \$0.62               |
| 17   | \$0.66     | \$0.65      | \$0.84             | \$0.83             | \$0.64               |
| 18   | \$0.70     | \$0.69      | \$0.89             | \$0.87             | \$0.68               |
| 19   | \$0.71     | \$0.70      | \$0.90             | \$0.89             | \$0.69               |
| 20   | \$0.74     | \$0.73      | \$0.93             | \$0.91             | \$0.72               |
| 21   | \$0.74     | \$0.73      | \$0.93             | \$0.92             | \$0.72               |
| 22   | \$0.75     | \$0.74      | \$0.94             | \$0.92             | \$0.73               |
| 23   | \$0.75     | \$0.74      | \$0.94             | \$0.93             | \$0.73               |
| 24   | \$0.76     | \$0.75      | \$0.95             | \$0.93             | \$0.74               |
| 25   | \$0.76     | \$0.75      | \$0.95             | \$0.94             | \$0.74               |
| 26   | \$0.77     | \$0.76      | \$0.96             | \$0.94             | \$0.75               |
| 27   | \$0.77     | \$0.76      | \$0.97             | \$0.95             | \$0.75               |
| 28   | \$0.78     | \$0.77      | \$0.97             | \$0.95             | \$0.76               |
| 29   | \$0.78     | \$0.78      | \$0.98             | \$0.96             | \$0.76               |
| 30   | \$0.79     | \$0.78      | \$0.98             | \$0.96             | \$0.77               |
| 31   | \$0.80     | \$0.79      | \$0.99             | \$0.97             | \$0.77               |
| 32   | \$0.80     | \$0.79      | \$0.99             | \$0.98             | \$0.78               |
| 33   | \$0.81     | \$0.80      | \$1.00             | \$0.98             | \$0.79               |
| 34   | \$0.81     | \$0.81      | \$1.01             | \$0.99             | \$0.79               |
| 35   | \$0.82     | \$0.81      | \$1.01             | \$0.99             | \$0.80               |
| 36   | \$0.83     | \$0.82      | \$1.02             | \$1.00             | \$0.81               |
| 37   | \$0.83     | \$0.82      | \$1.03             | \$1.01             | \$0.81               |
| 38   | \$0.84     | \$0.83      | \$1.03             | \$1.01             | \$0.82               |
| 39   | \$0.85     | \$0.84      | \$1.04             | \$1.02             | \$0.83               |
| 40   | \$0.85     | \$0.85      | \$1.05             | \$1.03             | \$0.83               |
| 41   | \$0.86     | \$0.85      | \$1.05             | \$1.04             | \$0.84               |
| 42   | \$0.87     | \$0.86      | \$1.06             | \$1.04             | \$0.85               |
| 43   | \$0.88     | \$0.87      | \$1.07             | \$1.05             | \$0.85               |
| 44   | \$0.88     | \$0.88      | \$1.08             | \$1.06             | \$0.86               |
| 45   | \$0.89     | \$0.88      | \$1.08             | \$1.07             | \$0.87               |
| 46   | \$0.89     | \$0.88      | \$1.08             | \$1.07             | \$0.87               |
| 47   | \$0.89     | \$0.88      | \$1.08             | \$1.07             | \$0.87               |
| 48   | \$0.89     | \$0.88      | \$1.08             | \$1.07             | \$0.87               |
| 49   | \$0.89     | \$0.88      | \$1.08             | \$1.07             | \$0.87               |
| 50   | \$0.89     | \$0.88      | \$1.08             | \$1.07             | \$0.87               |

**TOTAL AVOIDED COSTS - National Market Choice  
Proposal Carbon Scenario**

| <b>TOTAL AVOIDED COSTS - Net Present Value</b> |         |         |             |             |               |
|--|---------|---------|-------------|-------------|---------------|
| Lifetime                                       | DHW     | FLAT    | Res Heating | Com Heating | Clotheswasher |
| 1  | \$0.25  | \$0.25  | \$0.26      | \$0.27      | \$0.25        |
| 2  | \$0.63  | \$0.62  | \$0.66      | \$0.66      | \$0.62        |
| 3  | \$1.00  | \$1.00  | \$1.04      | \$1.05      | \$0.99        |
| 4  | \$1.37  | \$1.36  | \$1.42      | \$1.43      | \$1.36        |
| 5  | \$1.75  | \$1.74  | \$1.81      | \$1.82      | \$1.73        |
| 6  | \$2.12  | \$2.11  | \$2.20      | \$2.21      | \$2.10        |
| 7  | \$2.49  | \$2.48  | \$2.58      | \$2.60      | \$2.47        |
| 8  | \$2.85  | \$2.83  | \$2.95      | \$2.97      | \$2.82        |
| 9  | \$3.20  | \$3.19  | \$3.32      | \$3.34      | \$3.17        |
| 10   | \$3.55  | \$3.54  | \$3.69      | \$3.70      | \$3.52        |
| 11   | \$3.90  | \$3.88  | \$4.05      | \$4.06      | \$3.87        |
| 12   | \$4.23  | \$4.22  | \$4.39      | \$4.41      | \$4.20        |
| 13   | \$4.58  | \$4.56  | \$4.85      | \$4.85      | \$4.53        |
| 14   | \$4.92  | \$4.89  | \$5.28      | \$5.28      | \$4.86        |
| 15   | \$5.24  | \$5.21  | \$5.71      | \$5.70      | \$5.18        |
| 16   | \$5.56  | \$5.53  | \$6.12      | \$6.10      | \$5.48        |
| 17   | \$5.87  | \$5.83  | \$6.52      | \$6.49      | \$5.79        |
| 18   | \$6.19  | \$6.15  | \$6.92      | \$6.88      | \$6.09        |
| 19   | \$6.50  | \$6.45  | \$7.31      | \$7.27      | \$6.39        |
| 20   | \$6.80  | \$6.75  | \$7.70      | \$7.64      | \$6.69        |
| 21   | \$7.10  | \$7.04  | \$8.07      | \$8.01      | \$6.97        |
| 22   | \$7.38  | \$7.32  | \$8.42      | \$8.36      | \$7.25        |
| 23   | \$7.65  | \$7.59  | \$8.77      | \$8.69      | \$7.51        |
| 24   | \$7.92  | \$7.85  | \$9.10      | \$9.02      | \$7.77        |
| 25   | \$8.17  | \$8.11  | \$9.42      | \$9.33      | \$8.02        |
| 26   | \$8.42  | \$8.35  | \$9.72      | \$9.63      | \$8.25        |
| 27   | \$8.65  | \$8.58  | \$10.01     | \$9.92      | \$8.48        |
| 28   | \$8.88  | \$8.80  | \$10.30     | \$10.20     | \$8.70        |
| 29   | \$9.10  | \$9.02  | \$10.57     | \$10.46     | \$8.92        |
| 30   | \$9.31  | \$9.23  | \$10.83     | \$10.72     | \$9.12        |
| 31   | \$9.51  | \$9.43  | \$11.08     | \$10.97     | \$9.32        |
| 32   | \$9.71  | \$9.62  | \$11.33     | \$11.21     | \$9.51        |
| 33   | \$9.90  | \$9.81  | \$11.56     | \$11.44     | \$9.69        |
| 34   | \$10.08 | \$9.99  | \$11.79     | \$11.66     | \$9.87        |
| 35   | \$10.25 | \$10.17 | \$12.00     | \$11.87     | \$10.04       |
| 36   | \$10.42 | \$10.33 | \$12.21     | \$12.08     | \$10.21       |
| 37   | \$10.59 | \$10.50 | \$12.41     | \$12.27     | \$10.37       |
| 38   | \$10.74 | \$10.65 | \$12.61     | \$12.46     | \$10.52       |
| 39   | \$10.90 | \$10.80 | \$12.79     | \$12.65     | \$10.67       |
| 40   | \$11.04 | \$10.95 | \$12.97     | \$12.82     | \$10.81       |
| 41   | \$11.19 | \$11.09 | \$13.15     | \$13.00     | \$10.95       |
| 42   | \$11.32 | \$11.22 | \$13.31     | \$13.16     | \$11.08       |
| 43   | \$11.45 | \$11.35 | \$13.48     | \$13.32     | \$11.21       |
| 44   | \$11.58 | \$11.48 | \$13.63     | \$13.47     | \$11.34       |
| 45   | \$11.70 | \$11.60 | \$13.78     | \$13.62     | \$11.46       |
| 46   | \$11.82 | \$11.72 | \$13.92     | \$13.76     | \$11.57       |
| 47   | \$11.93 | \$11.83 | \$14.06     | \$13.89     | \$11.68       |
| 48   | \$12.04 | \$11.94 | \$14.19     | \$14.02     | \$11.79       |
| 49   | \$12.15 | \$12.04 | \$14.32     | \$14.14     | \$11.89       |
| 50   | \$12.24 | \$12.14 | \$14.44     | \$14.26     | \$11.98       |

**TOTAL AVOIDED COSTS - National Market Choice  
Proposal Carbon Scenario**

| <b>% Difference from Base Case</b> |            |             |                    |                    |                      |
|------------------------------------|------------|-------------|--------------------|--------------------|----------------------|
| <b>Lifetime</b>                    | <b>DHW</b> | <b>FLAT</b> | <b>Res Heating</b> | <b>Com Heating</b> | <b>clotheswasher</b> |
| 1                                  | 0%         | 0%          | 0%                 | 0%                 | 0%                   |
| 2                                  | 6%         | 6%          | 6%                 | 6%                 | 6%                   |
| 3                                  | -2%        | -2%         | -2%                | -2%                | -2%                  |
| 4                                  | -2%        | -2%         | -2%                | -2%                | -2%                  |
| 5                                  | -6%        | -6%         | -6%                | -6%                | -6%                  |
| 6                                  | -9%        | -10%        | -9%                | -9%                | -10%                 |
| 7                                  | -13%       | -13%        | -13%               | -13%               | -13%                 |
| 8                                  | -17%       | -17%        | -17%               | -17%               | -17%                 |
| 9                                  | -21%       | -21%        | -20%               | -20%               | -21%                 |
| 10                                 | -25%       | -25%        | -24%               | -24%               | -25%                 |
| 11                                 | -28%       | -28%        | -28%               | -28%               | -29%                 |
| 12                                 | -28%       | -28%        | -27%               | -27%               | -28%                 |
| 13                                 | -26%       | -26%        | -21%               | -21%               | -26%                 |
| 14                                 | -25%       | -25%        | -21%               | -21%               | -26%                 |
| 15                                 | -24%       | -25%        | -20%               | -20%               | -25%                 |
| 16                                 | -24%       | -24%        | -20%               | -20%               | -24%                 |
| 17                                 | -23%       | -23%        | -19%               | -19%               | -24%                 |
| 18                                 | -22%       | -22%        | -18%               | -18%               | -22%                 |
| 19                                 | -21%       | -21%        | -17%               | -17%               | -21%                 |
| 20                                 | -20%       | -20%        | -16%               | -17%               | -20%                 |
| 21                                 | -19%       | -20%        | -16%               | -16%               | -20%                 |
| 22                                 | -19%       | -19%        | -16%               | -16%               | -19%                 |
| 23                                 | -18%       | -18%        | -15%               | -15%               | -19%                 |
| 24                                 | -18%       | -18%        | -15%               | -15%               | -18%                 |
| 25                                 | -17%       | -17%        | -14%               | -14%               | -18%                 |
| 26                                 | -17%       | -17%        | -14%               | -14%               | -17%                 |
| 27                                 | -16%       | -16%        | -13%               | -13%               | -16%                 |
| 28                                 | -15%       | -16%        | -13%               | -13%               | -16%                 |
| 29                                 | -15%       | -15%        | -12%               | -12%               | -15%                 |
| 30                                 | -14%       | -14%        | -12%               | -12%               | -14%                 |
| 31                                 | -13%       | -14%        | -11%               | -11%               | -14%                 |
| 32                                 | -13%       | -13%        | -11%               | -11%               | -13%                 |
| 33                                 | -12%       | -12%        | -10%               | -10%               | -12%                 |
| 34                                 | -12%       | -12%        | -10%               | -10%               | -12%                 |
| 35                                 | -11%       | -11%        | -9%                | -9%                | -11%                 |
| 36                                 | -10%       | -10%        | -8%                | -9%                | -10%                 |
| 37                                 | -9%        | -9%         | -8%                | -8%                | -10%                 |
| 38                                 | -9%        | -9%         | -7%                | -7%                | -9%                  |
| 39                                 | -8%        | -8%         | -7%                | -7%                | -8%                  |
| 40                                 | -7%        | -7%         | -6%                | -6%                | -7%                  |
| 41                                 | -6%        | -6%         | -5%                | -5%                | -7%                  |
| 42                                 | -6%        | -6%         | -5%                | -5%                | -6%                  |
| 43                                 | -5%        | -5%         | -4%                | -4%                | -5%                  |
| 44                                 | -4%        | -4%         | -3%                | -3%                | -4%                  |
| 45                                 | -3%        | -3%         | -3%                | -3%                | -3%                  |
| 46                                 | -3%        | -3%         | -3%                | -3%                | -3%                  |
| 47                                 | -3%        | -3%         | -3%                | -3%                | -3%                  |
| 48                                 | -3%        | -3%         | -3%                | -3%                | -3%                  |
| 49                                 | -3%        | -3%         | -3%                | -3%                | -3%                  |
| 50                                 | -3%        | -3%         | -3%                | -3%                | -3%                  |

Appendix I

Distribution System Planning

2020 OR IRP

## **Appendix I - Introduction**

The purpose of this document is to show the Company's five-year budget for its engineering projects. These projects were identified by Cascade's engineers through the Distribution Scenario Decision-Making Process that can be seen on Page 9-9 of the IRP. For Oregon projects, the Company identified several projects in Pendleton, Southern Hermiston, Bend, Prineville, Redmond, and Baker City. These projects are areas that the Company is forecasting growth to a point where there may be capacity issues and therefore has begun budgeting to improve capacity needs. Cascade is in the process of creating a uniform reporting process and documentation for Distribution System plans that are put in the budget, therefore, there are different types of reports seen in this appendix. Also, projects will include more detail if they're earlier in the budget timeline compared to those towards the end of the budget timeline.



| Description                                     | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|------|------|------|------|------|
| FP-306990 - PENDLETON 4" IP REINFORCEMENT       |      |      |      |      |      |
| FP-306991 - PENDLETON 4" HP REINFORCEMENT       |      |      |      |      |      |
| FP-306992 - PENDLETON KORVOLA ROAD 4" PE REINF. |      |      |      |      |      |
| FP-316851 - South Hermiston to Feedville Rd HP  |      |      |      |      |      |
| FP-316854 - BEND GATE REBUILD                   |      |      |      |      |      |
| FP-316863 - Prineville Gate Rebuild             |      |      |      |      |      |
| FP-317586 - RF-REDM-6"S-4,750'-VETERANS WY      |      |      |      |      |      |
| FP-318466 - RF-Baker-GT-NW Baker Gate           |      |      |      |      |      |
| FP-318468 - RF-Baker-GT-NW Baker Regulation     |      |      |      |      |      |
| FP-318469 - RF-Baker-GT-NW Baker Gate Odorizer  |      |      |      |      |      |
| FP-318475 - RF-Baker-GT-NW Baker GT Line Heater |      |      |      |      |      |
| FP-318682 - RF-BEND-6"S-1100'-SHEVLIN PK        |      |      |      |      |      |
| FP-318733 - RF-BEND-6"S-2MI-SHEVLIN PK          |      |      |      |      |      |
| FP-318737 - RF-BEND-R-SHEVLIN PK RD 2" STD      |      |      |      |      |      |
| FP-318741 - RF-BEND-6"PE-1200'-PONDEROSA ST     |      |      |      |      |      |
| FP-318744 - RP-PRINEVILLE-GT-TRANSCANADA        |      |      |      |      |      |
| FP-318745 - RP-BEND-GT-TRANSCANADA              |      |      |      |      |      |
| FP-318770 - RF-REDM-R-VETERANS WAY-2" STD       |      |      |      |      |      |

**THIS PAGE IS REPLACING PAGE 4-26 FROM  
APPENDIX I – DISTRIBUTION SYSTEM PLANNING (C)  
AS IT CONTAINS CONFIDENTIAL INFORMATION.**

Appendix J

Renewable Natural Gas

2020 OR IRP

## **Appendix J - Introduction**

The purpose of this document is to provide IRP stakeholders the details of specific projects Cascade has been in expanded discussions with regarding Cascade purchasing RNG as a supply resource. For each project, Cascade will give a brief summary, supply values, capital costs, impact to rates, prudence, and the customer commitment. The details of these projects are confidential.

**THIS PAGE IS REPLACING PAGE 3-6 FROM APPENDIX  
J – RENEWABLE NATURAL GAS(C) AS IT CONTAINS  
CONFIDENTIAL INFORMATION.**

Appendix K  
Comments Matrix  
2020 OR IRP

The following comments are informal comments the Company received on the Draft Integrated Resource Plan. Cascade has provided a response for each comment.

**Item 1: With regard to IRP Guideline 1, the Company appears to have evaluated resources on a consistent and comparable basis. Staff appreciates the inclusion of renewable natural gas (RNG) project data with the draft IRP filing. Staff believes it could be helpful in the final IRP to utilize this project data in an example cost effectiveness assessment. This could illustrate the Company's thinking about RNG and how the Company's cost effectiveness calculation differs from and is similar to the proposed methodology found in Docket No. UM 2030. If the Company is able to provide this example in the final IRP, Staff would interpret this as a non-binding "snapshot" or case study of how RNG cost effectiveness may be evaluated to further the long-term conversation about this emerging resource.**

Response: Cascade has included the cost-effectiveness evaluation model on the RNG project that is included in Appendix J. Cascade agrees that this should be treated as a non-binding "snapshot" or case study and would appreciate any and all feedback on Appendix J.

**Item 2: Additionally, it appears that CNGC's analyses include greater consideration of risks and uncertainties in this IRP than in LC 69. Staff wishes to express two substantive concerns regarding IRP Guideline 1. First, it is not clear to Staff how the 2020 IRP captures the potential severity of negative outcomes (1.c.1). Staff hope to see greater clarification of this in the final IRP.**

Response: There are several risks that the Company must analyze throughout the 20-year planning horizon. Those risks involve change in price, change in customer forecast, as well as several other scenario's Cascade runs to evaluate the Company's portfolio. These scenarios can be found on page 9-31 in Chapter 9. Cascade also provides the results of these scenarios on pages 73-109 of Appendix E, Current & Alternative Resources. These results include net present value over the 20-year planning horizon, average cost per therm, unserved demand amount, and served demand amount. Furthermore, Cascade includes an analysis of the potential severity of a couple of negative impact scenarios on page 9-32 and 9-33. Cascade has added the following language to the Action Plan: The Company commits to working with Staff and Stakeholders to develop a more effective presentation for the severity of negative outcomes. Cascade will report on the status of this action item when filing the 2021 OR IRP Update.

**Item 3: Staff does not believe the limited discussion of the impact of Governor Brown's recent Greenhouse Gas (GHG) executive order (E.O. 20-04) is sufficient to meet IRP Guideline 1d. The topic should be more thoroughly addressed in the final IRP. While the Governor issued E.O. 20-04 recently, in March 2020, the order contains substantive direction, and in combination with the May 15, 2020 response from the Oregon Department of Environmental Quality (ODEQ) on "Cap-and-Reduce," the Company's final 2020 IRP could include a preliminary discussion of the possible impacts of the order as well as some preliminary data. Such preliminary data would help Staff and stakeholders meaningfully engage with the Company on the scope of Cap-and-Reduce efforts. This data could include, but not be limited to:**

- Quantification of CNGC's past annual GHG emissions,
- Quantification of forecasted emissions from the preferred portfolio, and
- Comparison of the Company's forecasted emissions from the preferred portfolio to a Company-level, cap-and-reduce emission level reflective of the percentage based, GHG reduction level goals found in the Executive Order (i.e., 45% below 1990 emission by 2035).

Response:

- Cap and Invest

- o The Oregon State Legislature did not reach consensus on a direction this year regarding cap and invest legislation. As a result, Governor Kate Brown issued Executive Order 20-04, directing state commissions and agencies to facilitate achievement of new GHG emissions goals of at least 45% below 1990 levels by 2035, and at least 80% below 1990 levels by 2050. The order specifically directs the Environmental Quality Council and Department of Environmental Quality to take actions necessary to cap and reduce GHG emissions. The implications of the Governor's directive can be found below.

- Executive Order 20-04

- o At the end of the 2020 legislative session, Governor Brown issued Executive Order 20-04, which is intended to build on Executive Order 17-20, Accelerating Efficiency in Oregon's Built Environment to Reduce Greenhouse Gas Emissions and Address Climate Change, and to further Oregon's goal of reducing greenhouse gas emissions. The EO provides 13 directives to multiple state agencies, with reporting requirements and deadlines. Specifically, the EO directs the Environmental Quality Council (EQC) and Department of Environmental Quality (DEQ) to take actions necessary to cap and reduce GHG emissions, consistent with the new GHG emissions goals from large stationary sources, transportation fuels, and other liquid and gaseous fuels, including natural gas. The EO directs DEQ to commence cap and reduce program options no later than January 1, 2022.

The first reporting deadline associated with EO 20-04 was on May 15, 2020. The Governor designated state agencies to report on proposed actions within their statutory authority to reduce greenhouse gases and mitigate climate change impacts. DEQ offered a preliminary report which describes the EQC's legal authority to cap and reduce GHG emissions, proposes a process to engage the public and stakeholders in gathering input into program design options, provides a preview of policy considerations and initial core program design elements, and describes the public comment process on the preliminary report. DEQ also sought public input on a list of questions designed to inform DEQ's final work plan and a final report was submitted to Governor Brown by June 30, 2020.

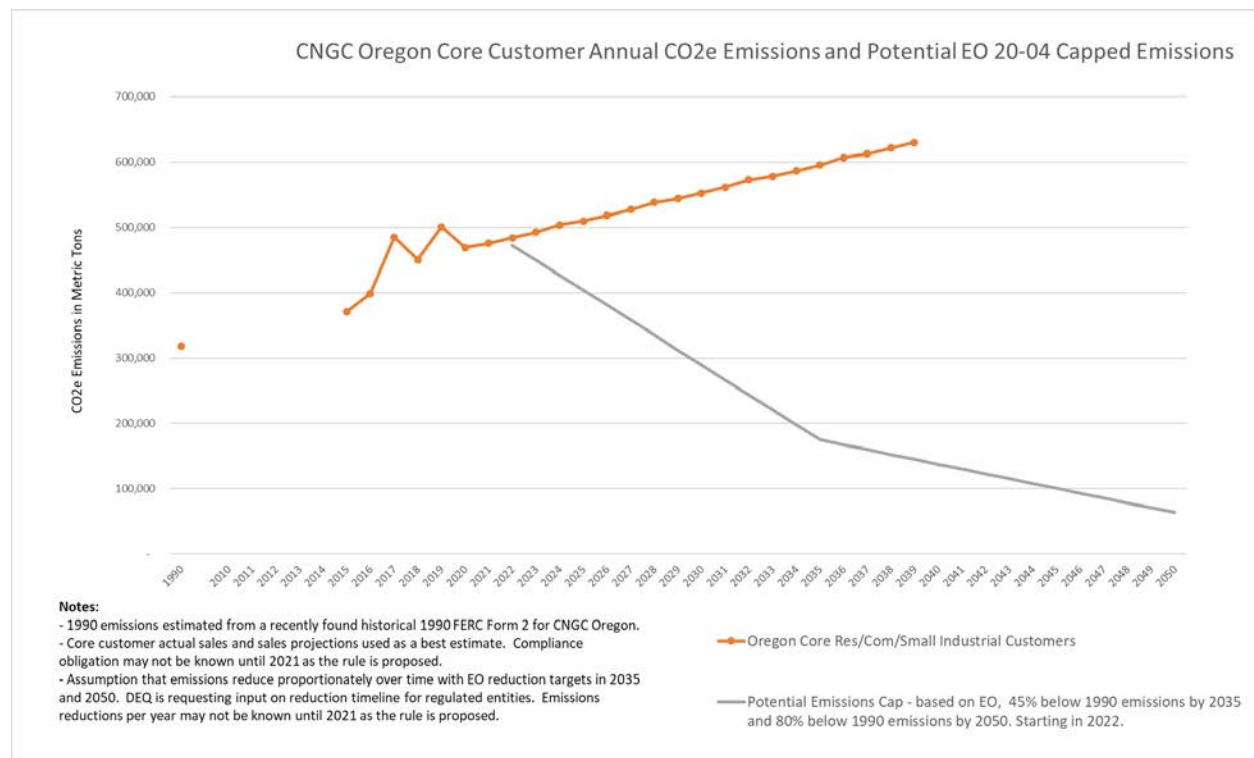
On June 15, 2020, Cascade submitted comments in response to the DEQ's report and associated questions. The Company identified areas of potential impact to Cascade's 75,000 customers in Oregon. As part of its planning efforts, Cascade intends to coordinate with other state agencies, specifically the OPUC and the Oregon Department of Energy (ODOE) to further understand existing program and compliance obligations that may interplay with the Department's cap and reduce efforts. Cascade will work closely with all relevant agencies to consider and manage the fiscal impacts of GHG reductions to natural gas consumers and businesses. Additional considerations may be needed if reduction requirements are difficult to achieve and compliance flexibility is limited.

The GHG reductions for natural gas suppliers are likely to have substantive impacts to Cascade's customers. The Company has previously estimated cost increases to the company's natural gas customers under the legislative approaches from 2019 to 2020, which incorporated the same GHG reduction goals as published in EO 20-04. Although we expect DEQ's rulemaking could be different, the same goals are stated. If the same reduction goals are applied to natural gas distribution utilities, Cascade's residential and commercial customers may see rate increases in their bills starting in the first year the reductions are to be implemented and would be projected to spike to a 46 percent increase by 2035 and would be expected to increase further as the cap reduces beyond 2035. This projection was anticipated under a legislative approach which included flexibility in the form of allowances, offset



purchases and trading. If DEQ’s authority is constrained and cannot legally provide compliance flexibility and alternative compliance options, costs will be even higher for natural gas distribution utilities and customers. Emissions reductions required within the strict goal timelines as identified in the EO could result in noticeable increases in energy costs to customers without sufficient compliance flexibility. Cascade will continue to monitor these potential impacts as part of its resource planning.

DEQ plans to commence formal rulemaking work with the appointment of a rules advisory committee (RAC) in late 2020. DEQ plans to host RAC meetings and any additional public or invited stakeholder meetings in early 2021 and to release a notice of rulemaking packet for public comment in Summer/Fall 2021. The rulemaking packet is expected to be provided to the EQC in Fall 2021. DEQ has not determined a final cap and reduce timeline/trajectory or compliance obligation for regulated entities. However, Cascade has developed a preliminary graph showing past and projected core customer emissions, using the preferred portfolio forecast, representing the combustion of natural gas sold to customers that may potentially be regulated by DEQ under Cascade’s compliance requirement. The chart also has a projected emissions reduction trajectory that was estimated by applying a proportionate amount of reduction over time considering the EO’s goal of 45 percent reduction of 1990 emissions by 2035 and 80% reduction of 1990 emissions by 2050. Absent a baseline and final trajectory provided by DEQ, Cascade has used an estimate of 1990 emissions from core customer sales volumes provided on a recently located 1990 FERC Form 2 schedule and applies a baseline in 2022 of a three-year average of core customer actual emissions from 2017-2019. Depending on DEQ’s approach to rulemaking and designation of a specific emissions baseline, Cascade’s compliance obligations may be very different from what is presented here. As DEQ’s rulemaking process commences, Cascade is expected to have a clearer picture of compliance obligations.



Cascade is also monitoring possible increases to the market price of renewable natural gas as competition for renewable natural gas as a compliance option for multiple sectors increases. Cascade understands that DEQ is planning a rulemaking to increase landfill methane capture in Oregon. The Company has encouraged DEQ to ensure regulations allow for natural gas utilities to utilize landfill gas as a compliance option to reduce GHG emissions for utility customers. The determination of whether landfill gas is allowed as part of cap and reduce compliance will have impacts on the total available RNG potential for Cascade as it increases its planning in this area.

In addition to its engagement with DEQ, Cascade submitted comments to ODOE in response to their implementation report submitted to Governor Brown in May 2020. Cascade understands that ODOE will launch a rulemaking process in Summer of 2020 to establish new rules for energy efficient products by September 1, 2020. In addition, ODOE plans to work with the Building Codes Division (BCD) to adopt building efficiency goals for 2030 for new residential and commercial construction. ODOE also plans to work with BCD to report on current progress toward achieving a goal of at least 60 percent reduction in new building annual site energy consumption, and to develop metrics to inform the baseline and reduction associated with code updates. Cascade supports the work of ODOE in establishing and updating energy efficiency standards for appliances.

Through its experience operating energy efficiency programs in Washington, Cascade has observed that as more stringent energy efficiency rules take effect for appliances, opportunities for energy efficiency incentives tend to narrow. This is because typically, under current rules, energy efficiency rebates cannot be offered for equipment at code efficiency. If the equipment standards raise, but the market is not able to rapidly adjust to these standards (older equipment still on trucks, vendors slow on compliance with new standards) there will be a difference between technical requirements and what is available to be physically installed in a home or building. To that end, Cascade intends to work with the OPUC and Energy Trust to determine if some additional market mechanisms and incentives would be reasonable if allowed for a certain transitional period to support uptake of the new standard and ensure accessibility for small businesses and those on fixed or limited incomes. Cascade is also monitoring other potential impacts and increases to program offerings necessitated by EO 20-04 and will work closely with the Energy Trust to understand what changes may result to conservation potential levels and EE program design.

Cascade will continue to monitor agency developments in response to Executive Order 20-04, We will continue to encourage the integration of programs that reduce energy burden and protect low income ratepayers while meeting the objectives of the Governor. Of particular interest to the Company are ways we can work with ODOE and OPUC to expand low income offerings or engage in pilots that reduce low income energy burden and support deeper energy efficiency opportunities. Cascade believes it is fully compliant with Governor Brown's recent Greenhouse Gas (GHG) executive order (E.O. 20-04), sufficient to meet IRP Guideline 1d given the status of the State's process, the timing of Cascade's IRP filing, and its responsive comments and analysis as discussed above. This language has been added to Chapter 6, Demand Side Management.

**Item 4: In addition, IRP Guidelines 4, 6, 7, 8, 11 and 13 are the most relevant of the remaining guidelines for Staff's review of this draft IRP. Generally, the draft IRP appears to meet the requirements for IRP planning components in Guideline 4. With regard to conservation requirements (Guideline 6), Staff noted in a meeting with the Company that the draft IRP only contains two years of**

**energy efficiency forecast data, though it should contain four years pursuant to Commission order. CNGC has already agreed to change the action plan forecast for this item from two-years to four-years. With regard to demand response (Guideline 7), CNGC only mentions this resource once, in Chapter 6. Staff would note that other Oregon natural gas local distribution companies have begun to explore pilots for demand response offerings, and that CNGC should begin looking into this Demand Side Management resource.**

Response: Cascade has updated the table in the four-year action plan to include 2022 and 2023 savings. The Company is aware of the other natural gas LDCs efforts and have been monitoring their progress with the demand response offerings. Cascade appreciates Staff's suggestion to look into pilots for demand response offerings, so the Company has reached out to ETO in which they provided a "to-do" list to get started. Cascade will work with ETO to consider possible targeted DSM. The Company will provide an update on those discussions no later than the filing of the 2021 Annual IRP Update.

**Item 5: Regarding Environmental Costs (Guideline 8), Staff appreciates the approach of utilizing California Cap-and-Trade program values for carbon emissions. However, Staff would like greater clarity on the range of values used over time. In particular, Staff would like to know why the Company has capped the value at \$61.50 per metric ton of CO<sub>2</sub> equivalent, while the 2030 ceiling in the California program is approximately \$85 per ton. Further, Staff would like the Company to provide a clarification on how the significant change in value in 2021 (Figure 9-8) relates to ODEQ's future proposed Cap-and-Reduce program. In particular, Staff would like clarification of the Company's internal analysis that led to these operating assumptions. Staff would also note, in this regard, CNGC agreed with Staff in the Company's final comments of LC 69 that CNGC would improve its carbon price forecast and include additional justifications for the data to be used in the 2020 IRP. Staff hopes to see additional documentation in the finalized IRP around carbon values and associated risks.**

Response:

On the cover page of Cascade's source document for the 2019 CEC Carbon Pricing, it is stated: "When prices reach a given tier price, regulated entities may purchase from a pool of allowances set aside for that tier. The regulation reallocates allowances from the current reserve to each tier and to the price ceiling. If prices reach the ceiling, CARB must make unlimited allowances available at the price ceiling, although CARB has indicated it believes the price ceiling is extremely unlikely to be reached. Meanwhile, a greater supply of allowances at Tier 1 and Tier 2 will slow price increases at those levels. For the 2019 IEPR scenarios, therefore, staff uses the Tier 2 price in 2030 for the low demand (high price) case, the Tier 1 price for the mid case, and continue to use the Auction Reserve Price in the high demand (low price) case.

"Because credits are bankable over time, economic theory predicts that the price in any given year will equal the present discounted value of the final equilibrium price, so in the low consumption case, prices increase at the rate which produces a final nominal price of \$108. In the high consumption (low price) scenario, prices are assumed to stay at the auction reserve price, which escalates at the rate of the auction reserve price (Consumer Price Index +5%). In the mid case, the prices are escalated to reach the Tier 1 price by 2030."

Cascade has interpreted this to mean that prices will cap at the 2030 mid-price, which is on row 25 the "GHG Price Calculations" Tab. The jump in price seen in Figure 9-8 is related to Cascade's philosophy that carbon compliance costs will begin one year after the planning horizon begins. Cascade's carbon

forecast was locked in before Governor Brown's executive order so it would not be correct to say that it explicitly models ODEQ's future proposed Cap-and-Reduce program, but the intent is to capture the potential impact from a program such as the ODEQ proposed program. Cascade does appreciate Staff's feedback that more documentation would be valuable in the IRP and has included additional narrative around this subject on page 5-4 and 5-5.

**Item 6: In addition to Staff's concern, expressed above, regarding carbon cost data, Staff notes additional concerns about the Draft IRP related to CNGC's compliance with the Commission order acknowledging the Company's 2018 IRP. In particular, that order encouraged CNGC to use more granular city- and town- level usage data rather than citygate-level data in its 2020 IRP (Recommendation 1c). In the draft IRP, the Company offers no explanation as to why it continues to utilize citygate data. This data might be appropriate to use, but Staff expects the Company to explain in the final IRP why it chose not to work with more granular data. In addition, it is not clear to Staff how CNGC accounted for auto-correlation, an issue raised in the 2018 IRP comments. Staff would like the Company to provide greater detail to explain this issue in the final 2020 IRP.**

Response: At the time of the 2018 IRP, Cascade only had city- and town-level data so the Company had to allocate that data to the citygate level. Since the 2018 IRP, Cascade is now able to pull monthly billing data at the citygate level, therefore, no longer needing to allocate the data to the citygate level. It's Cascade's understanding that the purpose of this comment was to remove the allocation process, which Cascade has successfully done so. To say the city- and town-level data is more granular would now be inaccurate. The reason behind forecasting at the citygate level is because upstream transportation contracts have a receipt point at the citygates, not the cities and towns. Optimizing upstream transportation is an important step to minimizing costs as well as determining any shortfalls and needs for more capacity. Cascade has a rigorous model selection process that includes testing for autocorrelation. This methodology begins by first building a model based on historical data. Then, the residuals are tested for autocorrelation using the auto.arima functionality within the "forecast" package of R Studio (Statistical Software). The auto.arima function is used for displaying and analyzing time series data via state space models and automatic ARIMA modeling. The auto.arima function will analyze any necessary auto-regressive or moving average terms as well as the required amount of differencing.

**Item 7: Staff appreciated the thoroughness of the draft IRP. Below are some broad comments that only indicate general interest and future points of discussion once the 2020 IRP is finalized:**

- **Staff is interested in the IRP further exploring the competing forces of reduced load growth and the rapid increase in customers, and how that plays out in risk and acquisition strategies.**
- **Staff would like to better understand the drop in industrial load growth between the 2018 IRP and the 2020 IRP.**
- **Staff would like to see additional discussion of the driving factors behind the reduction in the range of per-therm avoided costs from \$0.42 - \$1.21 in the 2018 IRP to \$0.26 - \$1.11 in the 2020 IRP, despite the incorporation of higher carbon costs.**
- **Staff looks forward to one additional Technical Advisory Group (TAG) meeting, to be held June 30, 2020, which will focus on RNG-related topics.**
- **Finally, Staff looks forward to a more in-depth discussion in the final 2020 IRP of the proposed change from assessing weather on a "coldest day in 30 years" basis to the Company's new methodological approach for the next IRP."**

Response:

- The competing forces of reduced load growth and rapid increase in customers are quantified in the conservation potential assessment and customer growth forecasts, respectively. While these forecasts are not correlated *per se*, the independent results of these competing processes inform the impact to forecasted load. Cascade performs stochastic analyses of both of these processes in the form of its high and low growth scenarios for customer growth, and its various carbon sensitivities and their impact on conservation potential, all of which are discussed in detail in Chapter 9. These risk-based analyses inform the Company's resource acquisition strategy as discussed in the Supply Resource Optimization Process. Cascade added additional risk-based analysis of the carbon scenarios in Chapter 9. The Company will also add to the action plan that the Company will look into running more scenarios that involve fuel switching and climate action plans that ban natural gas in certain areas.
- The change in industrial growth was caused by several large volume customers moving from a non-core rate schedule over to a core rate schedule. The core and non-core forecasts are treated separately, so when a customer transfers from core to non-core or vice versa, it could impact each forecast differently. This change increased the core forecast by approximately 10-13 million therms and decreased the non-core forecast by approximately 10-13 million therms. Cascade is still serving those customers, so the overall industrial load Cascade is serving hasn't changed.
- In the results section of the Avoided Cost chapter, Cascade indicated that the main driver of the lower avoided cost was due to the falling commodity prices and low volatility, which kept Cascade's price forecast lower throughout the planning horizon. The commodity price from the 2018 OR IRP is approximately 33% higher than the commodity price in the 2020 OR IRP.
- Cascade held a successful TAG 6 meeting and discussed the preliminary cost-effective evaluation tool Cascade has proposed as a potential tool to evaluate Renewable Natural Gas. Cascade appreciates the feedback received during the TAG 6 meeting.
- For the 2020 IRP, Cascade used the coldest day in 30 years. The reason for the potential change is because the current peak day (12/21/1990) will fall outside the 30 years in the next IRP so Cascade is exploring other possibilities. One option is to continue using the 12/21/1990 peak day until there is another day that is colder. A second option would be running 10,000 Monte Carlo simulations, using the past 30-years of weather history, and taking the 99% draw as the peak day.

**Item 8: Keeping the above comments in mind, Staff believes the Company's draft 2020 IRP is well conceived and well organized and will lead to a robust dialogue regarding the Company's least-cost, least risk portfolio of resources over the planning period. Staff appreciates the care that CNGC has taken with the planning process thus far and looks forward to working with the Company and stakeholders in the coming months.**

Response: Cascade appreciates the feedback that has been received so far. Receiving stakeholder comments have only made the IRP a stronger and better prepared plan.