CASCADE NATURAL GAS CORPORATION
A Subsidiary of MDU Resources Group, Inc.
In the Community to Serve®

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July 17, 2015

Oregon Public Utility Commission
201 High Street SE, Suite 100
Salem, OR 97301

Re: 2014 IRP Filing (LC-059)

Attn: Filing Center

Attached is Cascade Natural Gas Corporation's 2014 Integrated Resource Plan ("IRP"). The original copy of this application is being sent via express mail.

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

Sincerely,
CASCADE NATURAL GAS CORPORATION

Mark Sellers-Vaughn
Manager, Supply Resource Planning

Enclosures

CERTIFICATE OF SERVICE

I certify that I have this day served the foregoing notice of Cascade's request regarding a filing extension for the 2014 Integrated Resource Plan upon all parties of record in the (LC 54) proceeding, by emailing an electronic copy to the following parties or attorneys of pm1ies:

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DATED at Kennewick, Washington, this 29 day of July 2014.

/s/Maryalice Rosales
Maryalice Rosales
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CASCADE NATURAL GAS CORPORATION

A Subsidiary of MDU Resources Group, Inc.

In the Community to Serve®

2014
Integrated Resource Plan

July 17, 2015

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Section 1

Executive Summary

Cascade's resource planning continues to focus on ensuring that the Company can meet the needs of our firm gas sales customers in a way that minimizes costs over the long term. Although some upstream pipeline gate stations indicate potential shortfalls, in aggregate, through 2014, Cascade has sufficient upstream pipeline capacity. However, as we move past the 2015-2016 winter heating season, primarily as a result of Cascade's growth in its residential and commercial customer base, Cascade's capacity will fall short of its design peak day demand forecast. As a result, Cascade is entering a period where it will need to acquire additional resources to meet the growing needs of these core customers. The following summarizes key findings from this plan.

Adequacy of Gas Supply

Physical gas supply is expected to be adequate to meet growing demand in the Pacific Northwest and North America. New supply development technologies continue to provide additional resources in British Columbia and the Rocky Mountain regions. Shale gas from the Horn River Basin, Montney and Marcellus are likely to keep sufficient supplies available in North America. Several sources believe that shale is set to comprise more than a third of the US production by the mid-2020s. Well performance in the Horn River play has improved over the past few years. Although players must overcome a multitude of challenges, including a remote operating environment, water availability and disposal issues, infrastructure constraints, and high upfront capital costs, Alberta production is expected to remain flat through 2025. British Columbia production is expected to grow from 3.5 to almost 5 bcfd by 2020, thanks to Montney and Horn River. It's worth noting that many industry experts anticipate that Montney production will be heavily directed at LNG development.

Still, due to on-going financial and regulatory issues, there is still some question as to whether or not a new pipeline will transport Alaskan gas into the North American market. The Mackenzie Gas Project, which would bring gas from the Canadian Arctic to Alberta, has been shelved indefinitely. The Alaska pipeline project, designed to deliver 4.5 (up to 5.9 Bcf/d under maximum compression) billion cubic feet per day from Alaska's North Slope into Alberta and/or the US Lower-48, is also facing struggles due to substantially lower prices for natural gas and increased used of extraction technology which has led to increases in supply but makes building a pipeline uneconomical.

Gas production from the Rocky Mountains region (including the San Juan Basin) is expected to average 12.1 bcfd in 2015, rising to 14 bcfd by 2020. Conventional gas and coalbed methane development have been ushered to the sidelines over the past few years as operators aggressively pursued oil-rich targets in the Williston and Denver-Julesburg Basins. While activity has slowed down in those areas, associated gas production is still expected to account for the bulk of the growth in the region. Conversely, production from the San Juan Basin is set to decline from 2.7 bcfd in 2015 to 2.2 bcfd in 2020. WPX and Encana lead activity in the basin but have scaled back development in the area in favor of higher-returning, more established portions of their respective portfolios.

Production growth can also be seen from traditional gas producing plays such as the Pinedale and the Piceance. The collapse in oil prices during the second half of 2014 has shrunk the advantage oil-weighted targets carried over quality gas plays. We estimate the

Pinedale will produce 1.7 bcfd in 2015, rising to 2.2 bcfd in 2020.

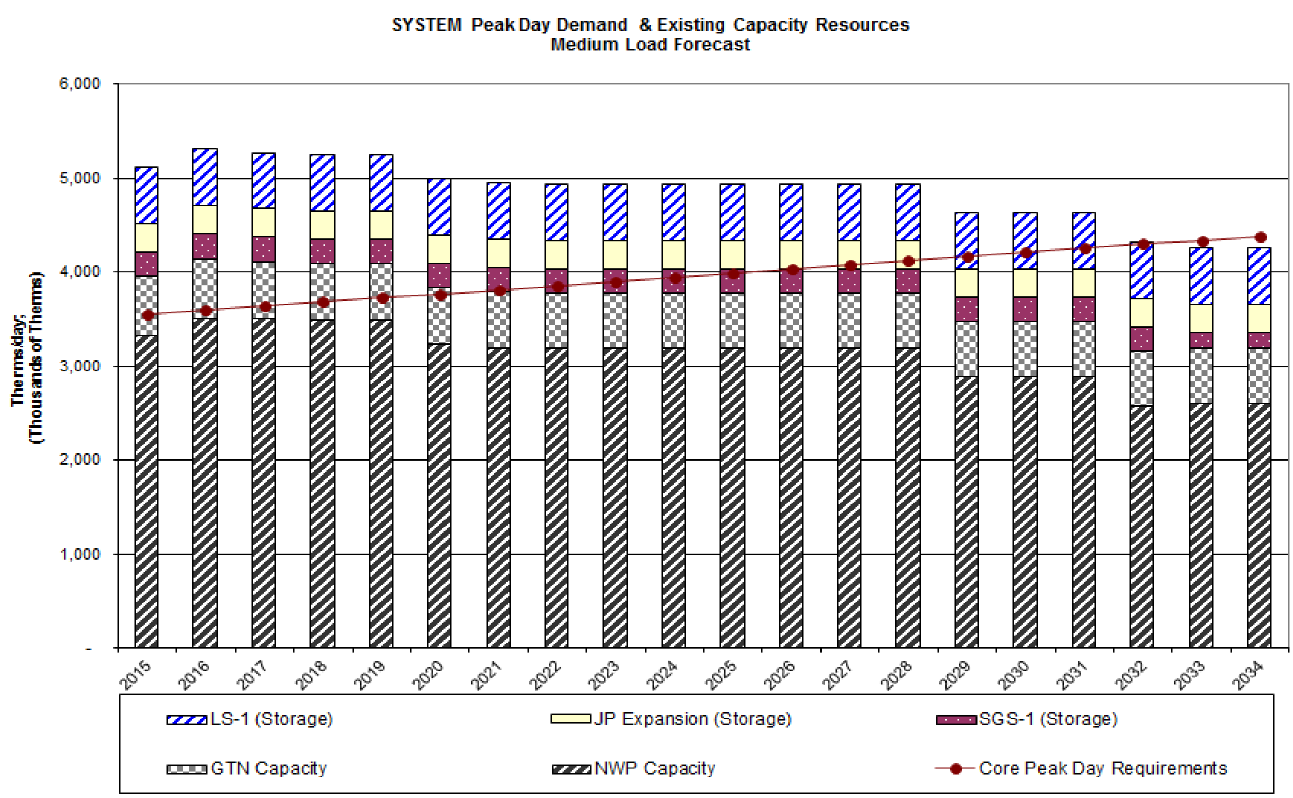
Rockies gas producers will be under pressure given the deteriorating price differential to Henry Hub. Natural gas pricing at the Rocky Mountain hubs of Cheyenne and Opal are forecast to decline. Additionally, natural gas from the region traditionally headed east toward major population and demand centers. However, given the prolific production from the Marcellus and Utica, gas from the northeast United States is actually heading westward, encouraging Rockies producers to find new markets. Mexico's energy deregulation plans will continue to lead to additional growth in exports to Mexico.

Load Resource Balance

During this planning cycle, Cascade continued to evaluate the impacts on both its load and resources and portfolio costs associated with its peak day planning criteria.

The following graph shows the peak day requirements compared to the Company's existing pipeline capacity resources under the various load growth forecasts. It is important to note that while it appears on a system wide basis Cascade appears to have sufficient capacity to meet load through approximately 2032, this is in fact misleading. Certain CityGates on the system have significant excess capacity due to low load growth and the shape of the capacity at the time the space was acquired. See Appendix C for specific zone and CityGate to capacity comparison charts.

Figure 1-A



Analytical Methods

Cascade continues to utilize the SENDOUT® model to assist with the analysis of resource alternatives. SENDOUT® is a linear optimization model that helps identify the long-term least cost combination of resources to meet stated loads. The model determines the optimal portfolio of resources that will minimize costs over the planning horizon based on a set of assumptions regarding resource alternatives, resource costs, demand growth and gas prices. Linear optimization models, such as SENDOUT®, are basically deterministic. In other words, they solve the "least cost problem" based upon the assumptions provided to the model. As a result, the Company, beginning with its 2007 IRP, expanded its uncertainty analysis through the purchase of VectorGas™ (an add-on product) that facilitated the ability to model gas price and load (driven by weather) uncertainty. The Monte-Carlo modeling capability provides additional information to decision-makers under conditions of uncertainty. The Monte-Carlo analysis was used in this plan to test the physical and financial risks associated with the optimal portfolio from the basecase planning scenario. This tool provides a valuable enhancement to the robustness of the Company's resource planning.

Generic Resources

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 can be added to its resource portfolio, including additional conservation programs, incremental off-system storage alternatives at MIST and Ryckman Creek, Wild Goose, Gill Ranch, additional transportation capacity on NWP, Ruby, NGTL, Foothills and GTN pipeline systems, several of the proposed pipelines to move Rockies gas to the northwest, along with on-system satellite LNG facilities, biogas, 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' worth 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.

Analytical Framework

Traditional integrated resource planning would include analyses targeted at identifying the optimal long-term resource portfolio to meet the demand of the gas utility's customers across a few customer growth and gas price scenarios. In this plan, Cascade's resource analysis includes different scenarios that focus solely on gas utility operations. In addition to scenario analysis, Cascade performed two different kinds of Monte-Carlo analyses to examine a variety of risks as noted above.

Summary of Key Findings

- Cascade anticipates its core customer base will continue to grow over the planning horizon and annual throughput is anticipated to increase between 1.0% and 1.2% per year.

- The projected costs for natural gas have declined significantly and long-term prices are estimated to range between $3 to $5 over the planning horizon compared to the $8 to $13 forecasted in the 2008 IRP. This improvement to the long-term gas supply outlook is a stark contrast to the diminishing supply outlook that was prevalent during the development of the Company's 2008 IRP.

- Cascade is able to pursue a Residential and Commercial/Industrial conservation portfolio with an average levelized cost of $0.4521, with a total avoided cost of $5.38 for a 20 year measure.

- Even with energy efficiency programs, 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 scenarios were run to test the viability of acquiring incremental storage and transportation resources either based on existing recourse rates, discounted rates and via capacity release through a third party. Basin prices in the model over the 20 year planning horizon have AECOs trading at a discount to Rockies, Malin and Sumas. While the modeling seems to indicate Ryckman Creek storage as a desired resource to acquire, we continue to have concerns about the facility's ability to be reliable resource for our service territory. Consequently, the acquisition of additional traditional pipeline capacity seems to represent the most reasonable resource to address most of our capacity shortfalls on a peak day.

- Many of the proposed pipeline projects will not be viable resources for some time. In the interim, capacity shortfalls will be met through the use of peaking and CityGate gas supply deliveries which will utilize third-party (non-Cascade) upstream pipeline transportation.

- Satellite LNG facilities that are located within Cascade's distribution system are also attractive alternatives. Satellite LNG may alleviate the need for incremental pipeline capacity and to the extent the facility could be strategically located on a portion of the distribution system, it could provide the further benefit of eliminating or reducing distribution system constraints. Cascade has considered bio natural gas (BNG) as an alternative, but at the time of this writing, there are no viable projects available to our distribution territory. Regardless, prior to any BNG supplies being added to the portfolio, gas quality issues will need to be satisfactorily addressed. In addition to Cascade, upstream pipelines, such as Northwest Pipeline are beginning to address gas quality issues regarding BNG. We will continue to monitor our market intelligence sources to see if viable BNG opportunities develop.

- 20 year portfolio costs on are expected to range between $4,796,510,000 to $5,718,027,716 for the planning period, with an average cost per therm ranging between $.48 and $.75.

Use and Relevance of the Integrated Resource Plan

Cascade's Integrated Resource Plan provides the strategic direction guiding the Company's long-term resource acquisition process. The plan does not commit Cascade to the acquisition of a specific resource type or facility, nor does it preclude the Company from pursuing a particular resource or technology. Rather, the plan identifies key factors related to resource decisions and provides a method for evaluating resources in terms of their cost and risk. Cascade recognizes that integrated resource planning is a dynamic process reflecting changing market forces and a changing regulatory environment.

Section 2

Introduction and Planning Overview

Company/Service Area Profile - Customers, Resource Maps

Beginning in 1953, Cascade Natural Gas Corporation began acquiring small local gas distribution companies in anticipation of the construction of an interstate pipeline to bring natural gas into the Pacific Northwest in 1956. The pipeline began in New Mexico and moved northwesterly into the northeast corner of Oregon and on into Washington, to the Canadian border near Sumas, Washington. Cascade's distribution system tapped into the pipeline at many places in Oregon and Washington. Usually, an industrial operation located in the area made it economically feasible for Cascade to construct its initial distribution system to serve the industrial customer and then branch out from there to serve the residential and commercial communities in the nearby area.

Today, Cascade's service territory covers about 32,000 square miles and extends over 700 highway miles from end to end, encompassing a richly diverse economic base as well as varying climatological areas (see service area map, Figure 2-A). Cascade serves 96 communities throughout Washington and Oregon consisting of about 270,000 customers. All of the communities Cascade serves are small cities and towns. This makes Cascade unique in the gas distribution business in the Pacific Northwest. Cascade's customer base currently includes approximately 237,000 residential customers, 35,000 commercial customers, and 640 industrial customers. Cascade's sales volumes reflect the ratio of approximately 75% in Washington and 25% in Oregon.

Bundled vs. Unbundled Service

Since Cascade began distributing natural gas in the Pacific Northwest, the Company has offered its customers a “bundled” natural gas distribution service. This bundled service included purchasing the gas supply, transporting that supply to Cascade's city gate, and distributing that transported supply to each Cascade customer through the Company’s local distribution system. Customers receiving traditional bundled services are referred to as core customers. In 1989, Cascade “unbundled” its rates and as a result approximately 200 of the 700 industrial customers have elected to become "non-core" customers. These customers have made the choice to rely on alternative methods of service rather than the traditional bundled gas supply and pipeline transportation services available to core customers for their gas requirements. Therefore, providing gas supply and transportation capacity resources to non-core customers is not considered part of this Integrated Resource Plan as such resources are separate from the supply and capacity contracts for the core customers who continue to utilize Cascade’s bundled system gas supplies and capacity. Although the resource needs for non-core customers are not included in either the conservation or supply side resource analysis, their contracted peak day delivery is considered in the distribution system planning analysis discussed in Section 4.

For the Calendar year ended December 2014, Cascade's residential customers represented approximately 12% of the total natural gas delivered on Cascade's system, while the commercial customers represented approximately 9% and the 500 core market industrial customers consumed approximately 2% of total gas throughput.

FIGURE 2-A

The remaining 200 non-core industrial customers represented about 77% of total throughput.

Cascade purchases natural gas from a variety of suppliers and transports gas supplies to its distribution system via two natural gas pipeline companies. Williams' Northwest Pipeline LLC (NWP) provides access to British Columbia and domestic Rocky Mountain gas while the Gas Transmission Northwest (GTN) provides access to Alberta gas. Cascade also holds transportation contracts upstream of these systems on TransCanada Pipeline's Foothills Pipeline (formerly ANG) and NOVA Gas Transmission Ltd. (also known as NGTL), as well as on Ruby Pipeline and Westcoast Energy, Inc. (Spectra Energy).

IRP Guidelines and Policies

Cascade utilizes integrated resource planning to maximize the efficiencies of the Company's utility operations. The planning process includes an assessment of current and future gas load requirements, the possible resource options for serving the projected load requirements, and a selection of the set of least cost resource alternatives with acceptable levels of reliability through the use of an optimization model. Monte-Carlo simulation tools are utilized to further analyze the results of the optimization model to quantify the range of uncertainty in market price and demand due to changes in weather.

Cascade is subject to regulatory oversight by the Washington Utilities and Transportation Commission (WUTC) and the Oregon Public Utility Commission (OPUC). Each commission has established a set of guidelines or rules, which the company's plan must meet. In Washington those guidelines are contained in WAC 480-90-238 and in Oregon the guidelines are found in the Commission Order No. 07-002 in docket UM 1056. In general, both Commissions' guidelines require that the utility develop a range of demand forecasts, examine all feasible resources for meeting that demand whether they are supply-side or demand side and compare them on an equal basis, considering the uncertainty over the planning horizon, develop a 2 year action plan and involve the public and the various stakeholders in the planning process.

Cascade believes that its IRP meets the substantive requirements of both the Washington and Oregon Commissions. This IRP includes a range of demand forecasts that encompass the anticipated forces, both economic and weather-driven, that will impact the load forecasts over the planning horizon. The demand side resource section includes an assessment of technically feasible improvements in the efficient use of natural gas. The supply resource section includes a discussion of the supply side resource options available including an assessment of conventional and commercially available non- conventional gas supplies, an assessment of opportunities for additional company-owned and contracted storage, and an assessment of the Company's existing pipeline transportation capability and reliability along with the opportunity for incremental pipeline transportation resources. The integration section provides a comparative evaluation of the cost of the various resource options on a consistent and comparable method. The resource integration section also describes the incorporation of the demand forecast and resource evaluations into a long range resource plan describing the strategies designed to reliably meet current and future needs at the lowest reasonable cost to Cascade's ratepayers. The short-term action plan describes the specific actions the utility will take to implement the long-range integrated resource plan during the next two years and reports on the Company's progress in meeting its prior 2-year action plan goals.

Cascade believes all resources described in this IRP have been evaluated on a consistent and comparable basis through the use of its optimization model. Uncertainty has been considered in each component of this plan. The demand forecast includes a reasonable range of uncertainty as quantified in the low, medium and high load growth scenarios along with the additional simulation analysis calculated through Sendout's® Monte-Carlo functionality that assesses the impacts of weather on the load forecasts. The demand side and supply side resource sections describe relative uncertainties regarding reliability, cost and operating constraints and external costs. Uncertainties associated with the environmental effects of carbon emissions have also been included through an analysis of the impact of carbon legislation on the portfolio. Price volatility and market risks and their impacts on the Company's long-term resource portfolio have been assessed through the use of the Sendout® model.

To involve public interests in the development stages of this IRP, Cascade has a Technical Advisory Group (TAG). Multiple meetings were held to discuss the major IRP topics including the demand forecast, demand side resources, and supply side resources. Regrettably, several planned TAG meetings were not held due to loss of key personnel to major illness. However, over the course to the process, the company received useful guidance from the forecast and capacity workshops. The TAG meetings were helpful to Cascade as questions were answered and varying points of view were explored. Appendix A contains an outline of the meeting content, a list of participants and the presentation materials.

Appendix A also provides additional information regarding the specific requirements or guidelines for each commission and how the company has met those requirements.

Resource Decision Making Process Overview

Cascade makes resource decisions based on the best quantitative and qualitative information available. The IRP tools that are continually evolving assist Cascade in formulating energy resource decisions in a logical, consistent and comparable manner. The steps outlined below are those utilized by Cascade for both its short-term and long-term resource decisions:

1. Utilizing our Load Forecasting Model application (LFM), construct a range of possible demand forecasts for the core market.

2. Calculate avoidable distribution system enhancement costs.

3. Provide the SENDOUT optimization model the forecast factors, existing supply side and demand side resource options to meet demand.

4. Run the optimization model to identify resource needs including the types of resources and their timing requirements. The existing portfolio is modeled under a range of demand forecast conditions.

5. Identify incremental supply and demand side resources to satisfy a range of incremental growth scenarios.

6. Run the optimization and Monte-Carlo simulation models to identify the best- fit portfolio given an expected range of forecasted core loads and operating conditions.

The resource decision-making process is dynamic and ongoing and the Company's resource strategy must constantly evolve to reflect dynamic market forces and a continually changing regulatory environment. This IRP document represents a snapshot in time similar to a balance sheet. It is not meant to be a prescription for all future energy resource decisions as conditions will change over the planning horizon and will impact areas covered by this IRP. Rather, this document is meant to describe the currently anticipated conditions over the long-term planning horizon, the anticipated resource selections, and most importantly, the process for making resource decisions.

Disclaimer –Important notice

Cascade makes the following cautionary statements in its Integrated Resource Plan and appendices to make applicable and to take advantage of the safe harbor provisions of the Private Securities Litigation Reform Act of 1995 for any forward-looking statements made by or on behalf of Cascade. This Plan, its appendices, and any amendments or supplements to it, include forward-looking statements, which are statements of expectations, beliefs, plans, objectives, and assumptions of future events or performance. Words or phrases such as "anticipates", "believes", "estimates", "expects", "intends", "plans", "predicts", "projects", "will likely result", "will continue" or similar expressions identify forward-looking statements.

Forward-looking statements involve risks and uncertainties which could cause actual results or outcomes to differ materially from those expressed. Cascade's expectations, beliefs, and projections are expressed in good faith and are believed by the Company to have a reasonable basis; however, there can be no assurance that Cascade's expectations, beliefs, or projections will be achieved or accomplished.

Any forward-looking statement speaks only as of the date on which such statement is made and except as required by law, Cascade undertakes no obligation to update any forward-looking statement to reflect events or circumstances after the date on which such statement is made or to reflect the occurrence of unanticipated events. New factors emerge from time to time and it is not possible for management to predict all such factors, nor can it assess the impact of any such factor on the business or the extent to which any factor, or combination of factors, may cause results to differ materially from those contained in any forward-looking statement. These materials and any forward-looking statements within them should not be construed as either projections or predictions, nor as business, legal, tax, financial, or accounting advice and should not be relied upon for any such purpose.

Section 3

Demand Forecast

Each year Cascade develops a 20-year forecast of customers, therm sales and peak requirements for use in short (annual budgeting) and long-term (distribution and integrated resource planning) planning processes. This forecast is a robust portfolio of estimates created by enhancing a single best-estimate forecast with various potential economic, demographic and marketplace eventualities into low, medium and high growth forecast scenarios. The scenarios are used for distribution system enhancement planning and as inputs in optimization models to determine the least cost portfolio of supply and DSM resources, revenue budgeting, and load forecasts associated with the purchase gas costs process.

Forecast Methodology

Cascade begins the forecast process by developing linear regression models for each of the Company's 47 CityGates and 8 CityGate Loops. Linear regression models for each CityGate and Loop, for a total of 55 regressions, predict therm volumes for the three main core customer classes – residential, commercial and industrial. Cascade has a total of 76 CityGates built in the forecast model. Two currently have no flow, nine that only feed non-core customers, and 65 that have at least one core customer behind it. Of the 65 CityGates that serve core customers, 18 CityGates are grouped into 8 different loops. Models are built from the CityGate level up as it is the smallest level at which there is a high degree of consistency and availability of raw data. This is a change of methodology from previous years where certain models were built from the district or zonal level. The CityGate results are rolled up into zones and districts which segregate Cascade's system based on pipelines and weather (see Appendix C).

Customer count forecasts are designed to reflect both demographic trends and economic conditions both in the short and long term. Cascade uses population and economic growth data derived from Woods & Poole. Woods & Poole growth forecasts are provided at the county level and are directly assigned to a CityGates previous years customer count. It should be noted that forecasts by Woods & Poole are adjusted based on near term billing information, whereas the internal intelligence about a demand area indicates a significant difference from Woods & Poole with regard to observed economic trends.

Past weather is sourced from Schneider Electric. Future weather is based on Cascade's 30-year normal developed in the forecast model. The forecast model takes the average of the 30 previous years of weather data by month to create a normal year. Natural gas prices are derived from various public (e.g., Energy Information Administration, NYMEX) and private (e.g., Bentek and Wood Mackenzie) industry sources with weights based on Cascade's general portfolio mix (Appendix E). These indicators and the functional forms illustrated on the following page were chosen over others as they were the most consistent in returning statistically valid results. For demand and customer counts, historical data used in the forecast model extend back to 2004 and 2010, respectively.

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 by applying Woods & Poole's forecasts to accurately predict Cascade's service territory's strongest and weakest performance over the next 20 years (Appendix B). These scenarios, along with the original best-estimate mid case scenario, encapsulate a range of most-likely possibilities given known data.. The most recent Woods & Poole data indicates average growth of 1.12% between 2015 and 2034, for Cascade's service territory. The projected customer growth can be viewed in Appendix B. Based on historical experience; Cascade expects system load will likely remain within a range bounded by the low and high growth scenarios, given expected weather.

Peak Day Forecast

In order to ensure satisfaction of core customer demand on the coldest days, Cascade develops peak day usage forecasts in conjunction with annual basis load forecasts. Peak day forecasts enable Cascade to make prudent distribution system and peak 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 of days in the event gas does not flow.

Historically, Cascade has developed peak day forecasts based on a 65 HDD day (0°F) to reflect the coldest day in Cascade's 60-year weather history. Cascade's 2008 IRP changed this practice to reflect the coldest day during the past 30 years. Cascade's 2014 IRP will be based on a 60 HDD day (0°F) and will continue to reflect the coldest day during the past 30 years. Cascade chose to switch from a 65°F to a 60°F reference temperature because Cascades demand does not begin to significantly increase until temperatures dropped below 60°F. For further explanation, refer to pages 8-10 of the Supporting Design Document. This was tested and proved by the improved correlation between weather and demand. The coldest day on record for the past 30 years was December 21, 1990 at 56 HDDs. The peak day forecast is developed by applying the December 21, 1990 HDD to each CityGates linear regression, by its respective weather location.

This method rests on the assumption that core market load shape does not significantly change throughout the forecast horizon. Cascade believes that the peak day forecast conservatively overestimates peak day usage as the base forecast does not explicitly include future conservation measures implemented by customers that would act to increase energy efficiency and reduce therm day usage.

Cascade will continue to investigate how the peak day standard affects those 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.

Forecast Results

Load growth across Cascade's system through 2034 is expected to fluctuate between 1.0% and 1.2% annually after smoothing the leap year anomaly. Load growth consists of a split between residential, commercial, and industrial with each expecting an annual increase of around 1.0%.

	Residential	Commercial	Industrial	System
2015 - 2019	1.30%	1.14%	0.95%	1.20%
2020 - 2024	1.24%	1.09%	0.94%	1.16%
2025 - 2029	1.17%	1.04%	0.92%	1.09%
2030 - 2034	1.09%	0.98%	0.89%	1.03%
2015 - 2034	1.20%	1.06%	0.93%	1.12%

Table 3-1: Expected Load Growth by Class

In absolute numbers, system load under normal weather conditions is expected to reach over 372 million therms in 2034. A majority of core load today is residential. Not only will this continue into the future, but since residential load growth is expected to be higher than commercial and industrial, residential customers will experience a slightly increased profile on Cascade's system.

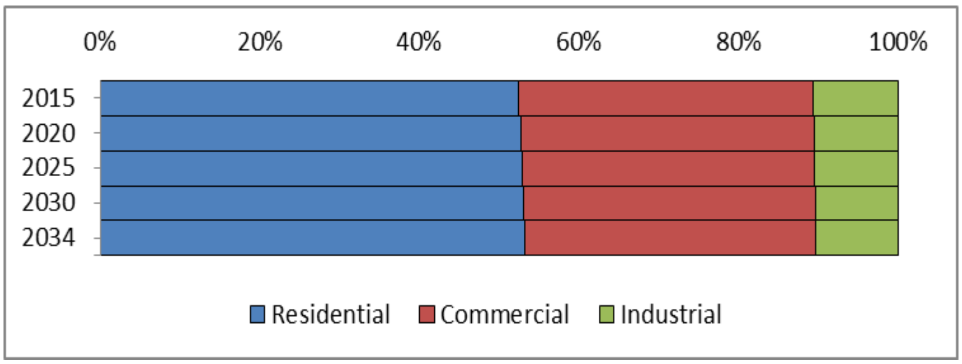


Figure 3-1: Relative Expected Load by Class

	Residential	Commercial	Industrial
2015	158,100,174	111,265,574	32,438,006
2020	169,412,430	118,241,251	34,141,844
2025	179,284,105	124,264,568	35,639,041
2030	189,901,713	130,788,411	37,300,397
2034	198,345,274	135,975,921	38,649,31
2015 - 2034	25.46%	22.21%	19.15%

Table 3-2: Expected Load by Class (volumes in therms)

Load growth is primarily a result of increased customer counts. The number of commercial and industrial customers is expected to increase slightly faster than therm usage. Several factors are believed to be the cause of this phenomenon; among them are soft conservation, building codes and improved efficient technologies.

	Residential	Commercial	Industrial
2015	237,257	34,995	639
2020	252,347	37,072	671
2025	267,634	39,180	704
2030	282,865	41,280	737
2034	294,977	42,949	763
2015 - 2034	24.33%	22.73%	19.34%

Table 3-3: Expected Customer Counts by Class

Geography

Load across Cascade's two-state service territory is expected to increase 24% over the planning horizon, with the Oregon portion outpacing Washington at 29% versus 22%.

	Washington	Oregon	System
2015	227,574,069	74,229,686	301,803,755
2020	241,511,842	80,283,682	321,795,524
2025	253,533,616	85,654,098	357,990,520
2030	266,637,222	91,353,298	357,990,520
2034	277,091,119	95,879,394	372,970,513

Table 3-4: Expected Load by State (volumes in therms)

Within Oregon, the Bend area is expected to grow significantly faster than the rest of Eastern Oregon over the planning horizon. Pendleton is expected to grow faster than Cascade's Baker/Ontario region, which is expected to experience minimal growth.

20-Year Load Growth	
Bend	38.3%
Ontario	4.4%
Pendleton	11.9%
Oregon	28.8%

Table 3-5: Oregon 20-Year Load Growth by District Peak Day

Within Washington, the western part of the state as well as Wenatchee and Kennewick is expected to see a large increase in growth. Yakima and Walla Walla, similar to Baker/Ontario of Oregon, is expected to experience minimal growth.

20-Year Load Growth	
Bellingham	36.6%
Mount Vernon	27.9%
Bremerton	20.8%
Longview	18.8%
Aberdeen	8.8%
Kennewick	23.3%
Walla Walla	-0.2%
Wenatchee	28.8%
Yakima	4.2%
Washington	21.5%

Table 3-6: Washington 20-Year Load Growth by District Peak Day

20-Year Load Growth	
Zone 10	6.3%
Zone 11	6.4%
Zone 20	24.6%
Zone 24	4.4%
Zone 26	19.5%
Zone 30-S	19.1%
Zone 30-W	32.5%
Zone GTN	38.3%
Zone ME-OR	11.9%
Zone ME-WA	0.9%

Table 3-6: System 20-Year Load Growth by Zonal Peak Day

Residential customers have higher temperature sensitivity than commercial or industrial. Because of their increasing profile on Cascade's system over the coming 20 years, weather-sensitive peak demand will increase faster than annual load. 2015 load on 56 HDDs is expected to be 3.5 million therms, rising to 4.4 million by 2034. Peak day load will increase at 1.12% annually while annual load also increases by 1.12%.

	Peak Growth		Peak Day Therms
2015 - 2019	1.20%	**2019**	3,725,548
2020 - 2024	1.15%	**2024**	3,945,213
2025 - 2029	1.08%	**2029**	4,165,098
2030 - 2034	1.02%	**2034**	4,383,788

Table 3-6: Expected Peak Day Growth and Therms (volumes in therms)

High and Low Scenarios

High and low scenarios were created by examining the percentage errors of previous Woods & Poole forecasts. The percentage errors show the average percentage difference between a Woods & Poole forecast and actual results. The previous forecasts averaged a percentage error of .5% or less of the actual forecast. Since Cascade is expecting about a 1.12% growth, a reasonable high and low scenario band is .5% above or below that growth level.

	Low	Mid	High
2015 - 2020	0.60%	1.20%	1.82%
2020 - 2025	0.57%	1.16%	1.76%
2025 - 2030	0.53%	1.09%	1.67%
2030 - 2034	0.50%	1.03%	1.59%
2015 - 2034	0.55%	1.12%	1.71%

Table 3-7: Expected Total System Load Growth across Scenarios

Load growth under poor economic conditions is expected to be around .5% annually over the forecast period while load growth under good economic conditions is expected to be around 1.12% annually. The cumulative effect of high growth over 20 years could result in additional load of 45 million therms while low growth will result in a load with 40 million therms less than predicted in the medium growth scenario.

	Low	Mid	High
2015	299,970,548	301,803,755	303,636,961
2020	310,390,084	321,795,524	333,666,127
2025	317,840,415	339,187,714	362,250,502
2030	326,362,761	357,990,520	393,367,474
2034	332,954,119	372,970,513	418,914,457
Deviation	(40,016,394)		45,943,944

Table 3-8: Expected Total System Load across Scenarios (volumes in therms)

Uncertainties

This forecast represents Cascade's best guess about future events. There are several important factors that make prediction of future load at this time particularly difficult – economic recovery, carbon legislation, building code changes, direct use campaigns, soft conservation, and long term weather patterns. The range of scenarios presented here encompasses 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 chosen 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 load. As a result, while Cascade believes that the numbers presented here are accurate, and that the scenarios presented represent the full range of possibility, there are and always will be uncertainties in predicting the future.

Section 4

Distribution System Enhancements

Forecasting by town allows Cascade to estimate the need for distribution system enhancements with a reasonable level of accuracy in the near term of the planning horizon. A localized forecast approach also allows a non-coincidental peak forecast to be developed which is necessary when estimating distribution system enhancement needs. Gas supply and pipeline transportation become secondary issues if the distribution system is constrained. An important part of the planning process is to determine potential areas of distribution system constraints, analyze possible solutions, and estimate costs for eliminating constraints.

Distribution System Modeling

Gas distribution networks rely on pressure differentials to move gas from one place 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, engineers 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. This process is known as "gas distribution system modeling".

The modeling process is important because it lets the engineer determine how much flow can be delivered at various places on the distribution system. For instance, when large customers are added to a distribution network, the engineer must determine if the network capacity is large enough to provide the additional flow needed to fulfill customer requirements. Modeling is also important when planning new distribution systems. The correct size main distribution pipes must be installed to allow for the flow needed to meet the requirements of current customers and reasonably anticipated future customers at reasonable costs.

It is desirable to know if an existing distribution system has enough capacity to satisfy new loads due to increasing numbers of customers in the future. The model can also be used to simulate increasing the gas flows through the existing pipes until the pressure loss in the pipes becomes unacceptable.

Engineering Modeling by Town

Utilizing computer software, individual models were 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 load 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 is determined to be a constraint area. When constraint areas are found, the analyst determines the most effective way of solving the problem. The solutions sometimes entail increasing the pressure in the system. However, in most situations where future constraint areas are identified, some amount of looping is also needed. The costs for the loops are determined based on system wide averages of past system reinforcements and extension projects. The average cost per foot is established for each area, and then the most cost-effective alternative to solving the pressure problem is found. After these costs are tabulated, potential reductions of demand within constraint areas due to conservation will be included in the analysis to determine whether any of the costs can be avoided or delayed.

The modeling output is compared to and, where appropriate, supplemented with data from local field personnel to provide forecasts by town. This allows the analyst to specifically determine, town by town, what reinforcement would be necessary to each system for each year. These town by town costs are then grouped together by gate station.

Key Findings

A summary of projects is listed in Table 4-1. Further details regarding these projects canbe found Appendix C. It should be noted that the proposed solutions are preliminary estimates of solutions and actual solutions may be different due to differences in actual growth patterns and/ or construction conditions from those assumed in the initial modeling.

These results were based on the best information available and included both the anticipated load growth for the core market from the medium demand forecast along with the contracted peak delivery for each of the non-core customers.

Equally important is to review the impacts of proposed conservation resources on anticipated distribution constraints. Although the Company historically provides utility sponsored conservation programs throughout a particular jurisdiction (i.e. all of Washington or all of Oregon), there may be instances where a more targeted approach could reduce or delay the estimated reinforcement for a specific area. However, as will be discussed in Section 5, the acquisition of conservation resources is entirely dependent upon the individual consumers' day-to-day purchasing and behavior decisions. Although the utility attempts to influence these decisions through its conservation programs, the consumer is still the ultimate decision maker regarding the purchase of a conservation measure. Therefore, the Company does not anticipate that the peak day load reductions resulting from incremental conservation will be adequate enough to eliminate distribution system constraint areas at this time. However, over the longer term, (the 2015 through 2025 timeframe) the opportunity for targeted conservation programs to provide a cumulative benefit that offsets potential constraint areas may be an effective strategy.

Table 4-1 2015-2019 SPECIFIC PROJECTS

Pipeline Projects	**District**	**Notes**
Anacortes Bare Steel Replacement - Phase III	Mt. Vernon	Bare steel replacement as part of Pipe Replacement Program. Carry over from 2013
Longview Bare Steel Replacement - Phase IV	Longview	Bare steel replacement as part of Pipe Replacement Program
Kelso Bare Steel Replacement - Phase I	Longview	Bare steel replacement as part of Pipe Replacement Program

12" Longview HP Replacement - Phase I	Longview	Bare steel replacement as part of Pipe Replacement Program
Kelso Mill Street Replacement	Longview	100 ft @ S. 11th
Kitsap Phase IV Construction	Aberdeen	Transmission line construction. 4.25 miles.
Kitsap Phase V ROW Acquisition	Aberdeen	ROW acquisition for transmission line
Kitsap Phase V Construction	Aberdeen	Transmission line construction. ≈ 3 miles
Shelton Bare Steel Replacement - Phase I	Aberdeen	Bare steel replacement as part of Pipe Replacement Program
McCleary 2" IP Reinforcement/Replacement	Aberdeen	Reinforce/replace 2" IP at gate with 3,100 ft of 4" HP
Vance Creek Exposure	Aberdeen	8" Grays Harbor Line - pipe exposed in creek. Replace approx. 800 ft. by HDD
Camp Creek Exposure	Aberdeen	8" Grays Harbor Line - pipe exposed in cree, off CC 100. Replace approx. 800 ft by HDD.
Ferndale Reinforcement	Bellingham	Reinforcement near Olson Road and Mountain View Road
Arlington 6" HP Reinforcement	Mt. Vernon	Previously on 5 year budget.
Stanwood Reinforcement	Mt. Vernon	≈ 1,500 ft of 4" PE (2017 Project)
Sedro Woolley IP Reinforcement	Mt. Vernon	≈ 500 ft at Highway 20 crossing (2016 project)
3" Burlington HP Line ROW	Mt. Vernon	2015 project
3" Burlington HP Line Construction	Mt. Vernon	6,700 ft HP steel. 2016 project
Burlington Reinforcement at Peterson Road	Mt. Vernon	Replace about 6,500 ft 2 in with larger pipe. 2017 project
8" Attalia HP Line - Phase I	Kennewick	Phase I of a multi-phase replacement between the gate and Snake River. 1950s pipeline. ≈ 1 mile.
Walla Walla HP Line	Walla Walla	HP Line from new Walla Walla gate

`	Kennewick	HP main to accommodate new growth and coordinate with City of Kennewick construction
Handord DOE	Kennewick	12" HP line to Hanford Nuclear Reservation
Bend Bare Steel Replacement - Phase IV	Bend	Continuation of bare steel replacement project.
12" Bend HP Line #1 Replacement	Bend	Replacing shallow/exposed line near high school and elementary
4" Madras HP Line	Bend	
Hermiston 2" Steel Reinforcement	Pendleton	≈ 1,000 ft of 2" steel, will allow retirement of R-26. 5 year plan to address Cold Springs area.
6" Pilot Rock Line Replacement	Pendleton	≈ 2,100 ft of 6" HP steel line to replace exisitng from rectifier @ Circle Road and CR-1386 to R-59.
4" Pilot Rock IP Reinforcement	Pendleton	4" plastic main reinforcement from R-64 to bridge in town. ≈ 2,500 ft
Umatilla 2" Reinforcement	Pendleton	Reinforce Umatilla IP system from the east, crossing under I-82, approx. 5,000 ft. 4 in HP steel
Yakima Bare Steel Replacement	Yakima	Multi phase project
Milton-Freewater Bare Steel Replacement	Pendleton	
Pendleton/Pilot Rock Bare Steel Replacement	Pendleton	
Pendleton 4" IP Reinforcement	Pendleton	2,800 ft of 4 in PE connecting Ladow Ave to Tutuilla Road
Pendleton 4" HP Reinforcement	Pendleton	2019 project
Pendleton Korvola Road 4 in PE Reinforcement	Pendleton	2,700 ft of 4 in PE from Korvola and 45th to McKay Creek crossing
4" Grandview HP Line #3 Replacement	Yakima	
8" Future High Pressure	Yakima	
River Road Reinforcement	Yakima	
Silverdale Reinforcement @ HWY3	Bremerton	

Port Orchard Reinforcement	Bremerton	≈ 1,850 ft of 4" PE. 2016 project.
Manchester Reinforcement	Bremerton	≈ 5,400 ft of 4" PE. 2017 project.
Othello Reinforcement	Wenatchee	Reinforcement along Reynolds/14th Avenue, approx. 5,300 ft, 2016 project
Ontario 6" IP Replacement	Eastern Oregon	≈ 300 feet long
Highway 3 Casing Removal	Bremerton	Replace casing/carrier pipe. High priority.
Sunnyside 2" IP Main	Yakima	Remove R-58 and replace house piping with 2" main and service lines at Sunnyside mental facility
Gate Projects	**District**	**Notes**
Arlington Gate Upgrade	Mt. Vernon	Carry over from 2013
McCleary Gate Heater	Aberdeen	Necessary for 2014 to coordinate with Williams
McCleary Gate Upgrade	Aberdeen	Station rebuild with R-10, R-52 and O-2. Also includes replacing 8" line between CNGC and Williams. Unodorized gas for ≈100ft, pitting @ regs and odorizer, incorporates heater.
Southridge Gate Station Project	Kennewick	Gate station to accommodate new growth
Sun River Gate Upgrade	Bend	Previously on 5 year budget
Ontario Gate Upgrade	Eastern Oregon	Part of Frys Foods upgrade - include odorizer
Bellingham Gate Upgrade	Bellingham	Carry over from 2014
New Walla Walla Gate	Walla Walla	
Odorizer Projects	**District**	**Notes**

Reg Projects	**District**	**Notes**
R-26 Relocate	Bremerton	Vault in narrow lot in residential area. Will require a new reg station with a building to reduce noise. Bremerton #2 priority.
R-64	Bremerton	Reg station in vault in street. Want to relocate, along with valve, to Walgreens property in Silverdale. Bremerton #5 priority.
Valve Projects	**District**	**Notes**
V-22	Bremerton	Burwell and Callow in Bremerton. 8" Rockwell plug valve located in drivline at bottom of hill. Need to relocate to parking area, out of driveline. Bremerton #4 priority.
Chico Check Meter	Bremerton	Leaking Cameron valves
V-23 Retirement and New Valve	Pendleton	Valve near college baseball fields and RR tracks. To be retired and replaced near R-52 to allow isolation of Pilot Rock line.
V-13	Bremerton	Sidney Avenue and Radey Street in Port Orchard. In a vault in drivelane with a bad lid. Want to relocate to back of ROW or in an easement
V-29	Pendleton	4" valve off of 8" Boardman line
V-9	Aberdeen	In a vault on Grays Harbor line
Bridge/Exposure Projects	**District**	**Notes**
Bellingham Bridge Crossing Removal	Bellingham	Removing pipe from bridges, installing new reg station & 1700ft of 2", and remove ≈ 25-30 reg stations
Squalicum Creek Exposure	Bellingham	Contractor bid from Michels Pipeline for $405,000. Commission has commented.
Shelton 4" IP Bridge Removal	Aberdeen	
Kelso Grade Street Bridge Removal	Longview	
Mt. Washington Bridge	Bend	Pedestrian bridge will be removed in the future.

American Lane Bridge	Bend	Pipeline is encased in concrete (thrust block?) from city water project. May require replacement due to City of Bend project in the future.
Forced Relocations	**District**	**Notes**
Dakota Creek Bridge Relocate - Blaine	Bellingham	
R-47 Relocate	Bremerton	County project to restore fish habitat. May replace or remove and add piping.
Bremerton R-146 Project - Tremont Road	Bremerton	Includes relocating R-146, ≈400 ft of 2" steel IP main, ≈300 ft of 2" steel HP main, ≈1,500 ft of 4" steel HP main, and ≈7 HPSS
Woodland Roundabout Forced Relocate	Longview	Lewis River Road and Old Pacific Highway
College Place CARS Project	Walla Walla	Forced relocation along College Avenue
Other Projects	**District**	**Notes**
16" N. Whatcom Valve Vaults	Bellingham	
Blanket FPs	**State**	**Notes**
Mains - OR	Oregon	
General Reinforcement - OR	Oregon	
General Relocation/Replacement	Oregon	Emerging relocation, pipe replacement, valve replacement
General Gate Station Upgrade or Reg Station Replacement	Oregon	Emerging gate station station upgrade, reg station replacement, odorizer replacement
Services - OR	Oregon	
Large Volume Meter Sets	Oregon	

Mains - WA	Washington	
General Reinforcement	Washington	
General Relocation/Replacement	Washington	Emerging relocation, pipe replacement, valve replacement
General Gate Station Upgrade or Reg Station Replacement	Washington	Emerging gate station upgrade, reg station replacement, odorizer replacement
Services - WA	Washington	
Large Volume Meter Sets	Washington	

Section 5

Supply Side Resources

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 degrees of service reliability and attain the lowest costs possible while providing an infrastructure that responds to the customers' concerns in meeting customer growth and provides all necessary administrative services to provide the stated services. Assuming such an infrastructure is in place and 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 components that constitute the "bundled services" required by core market customers.

Cascade's 20-year supply side resource goal is to continue to meet the energy needs of its core market customers with 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.

This section describes the various gas supply resource and transportation resource options that are available to the Company as supply side resources.

Gas Supply Resource Options

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 required to meet the needs of the broad seasonal peak and the needle peaks of the heating season in order to provide economical service to low load factor customers.

Firm Supply Contracts

Firm supply contracts commit both the seller and the buyer to deliver and take gas on a firm basis, except for *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 the obligation to serve and the lack of easily obtainable alternatives for consumers during periods of peak demand. Firm contracts can provide baseload services, seasonal peaking services during winter months, or be used to meet daily needle peaking requirements. Each of these services is discussed briefly below.

Baseload resources are those that are taken day in and day out, 365 days a year. As a result, baseload 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. Cascade's ability to contract for baseload supplies is limited because of the relatively low summer demand on the system. Baseload 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 3 to 5 month durations (primarily November through March). This enables the Company to ensure firm winter supplies without incurring obligations for high levels of take during periods of low demand in the summer months. Winter supplies combined with baseload supplies will be 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 producer must deliver the gas when the Company requires it, but the Company is not required to take gas unless needed to meet customer load requirements. Peaking resources typically allow the Company to take between 15 and 20 days of service during the winter period. These resources are more expensive than baseload or winter supplies and typically include fixed charges to cover the costs for the producers 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 of time. One source of needle peaking gas supply that is actually a form of demand side management may be obtained from Cascade's industrial customer base. These customers would be required to maintain standby or alternate fuel capability that Cascade would contract the right to request the customer switch to so Cascade could utilize (divert) their gas supply and transportation capacity to meet the Company’s core market requirements. The benefits associated with this type of resource would 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 through the use of propane air plants or on-site liquefied natural gas (LNG) facilities.

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. Some contracts have fixed reservation charges assessed each month, while others may have minimum daily or monthly take requirements. Most contain penalty provisions for failure to take the minimum supply according to the contract terms. Contract details will also vary from year to year, depending on company and supplier needs and the general trends in the market.

More specific descriptions of the alternatives appear later in this section. Appendix E summarizes the gas supply alternatives evaluated during this planning cycle.

Spot Market Supplies (also “just in time” or “day gas”)

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 are provided from gas supplies not under any long- term firm contract, as mentioned earlier. 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 until the price equates or exceeds that of alternate energy supplies (such as oil or electricity). Spot supplies can be expected to move to the markets that offer the highest price, which in turn can affect delivery reliability.

Due to the potential for interruption of the spot market, these supplies are not considered as reliable a 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. These available volumes are likely to vary daily, depending on production or the suppliers' ability to store un-marketed supply. Under a NAESB (North American Energy Standards Board) contract, which is the standard contract used by buyers and sellers when entering into short term supply transactions, parties have the ability to identify firm, variable or interruptible quantities for these supplies. Therefore, these spot volumes are more susceptible to daily operational constraints on the upstream pipelines. This is particularly true in the case of the Northwest Pipeline, which is a displacement pipeline with bi-directional flow. Depending on how gas is scheduled versus actually flowing between compressor stations, constraints can possibly occur. Complicating matters is that each of the pipelines has multiple supply scheduling deadlines, allowing scheduled volumes to be adjusted. As a result, at any given point in the process, constraints can occur, leading to the potential of the scheduled spot supply volumes being reduced or not delivered to the CityGate at all.

The role for spot market gas supply in the core market portfolio is based upon 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. For example, should prices in one basin drop radically compared to another basin, a contract may allow the flexibility to reduce takes in order to take advantage of supply from a lower priced basin. 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.

Other Unconventional Gas Supply Resources

Cascade considers Unconventional Gas Supply Resources such as supplies from a LNG Import Terminal, BNG or other manufactured gas supply opportunities as speculative supply side resources at this point in time. In most cases, unconventional gas supply resources would become an alternative to traditional gas supplies from the conventional gas fields in Canada or the Rockies and would have to compete for inclusion in the Company's portfolio planning. The two LNG Import Terminal projects, Jordan Cove and Oregon LNG, have shifted to export facilities. In early 2012, both facilities filed with FERC to withdraw their plans to import LNG. Jordan Cove re-filed with FERC to become an exporter; Oregon LNG followed suit. Recently, a natural gas power plant is being planned to be built in the Jordan Cover region to power the LNG exportation.

One of the potential impacts of having export facilities in the Pacific Northwest (including the Kitimat) is what effect the flow of natural gas to export facilities will have on competition and pricing of natural gas supplies. Demand for natural gas in Asia, coupled with relatively inexpensive and plentiful shale gas, may create a favorable long-term market opportunity for North American producers. Demand for energy will continue in Europe, as well as in China, as that country increasingly flexes its growing economic muscle and need for energy to drive its manufacturing base.

Infrastructure, such as the Williams' Companies' Pacific Connector Pipeline, will move natural gas to LNG or BNG facilities and provide the opportunity to divert some of these supplies to markets for LDCs (local distribution companies) that are located near the routes to the exportation facilities. In periods of great demand in Asia one would expect upward pressure on natural gas prices; correspondingly during periods of lower demand, prices would likely drop. Of course, if it is economical to do so, producers will increase the volumes of natural gas to this area, which will provide another supply resource alternative for Cascade. While it is much too early to tell (since exportations have yet to begin at any of these facilities), exportation facilities in the Pacific Northwest could potentially create a new pricing dynamic for the region; a dynamic which Cascade will be monitoring carefully as both public (EIA) and private (Wood MacKenzie, Bentek) intelligence becomes available.

A modified version of the Palomar/Blue Bridge project has as morphed into a cross-Cascade's pipeline project called the Northwest Market Area Expansion (N-MAX) has withdrawn its application for a certificate to build a natural gas pipeline in Oregon, and it has told the FERC (Federal Energy Regulatory Commission) that it continues to work with potential customers and a potential additional partner to provide a regional solution to the need for access to this important form of energy. Palomar said that while they will no longer seek to permit a pipeline to serve the previously proposed LNG terminal on the Columbia River, it will continue its effort to find commercial support for a new pipeline in Oregon to meet the needs of the Pacific Northwest.

Another alternative is BNG. Bio natural gas continues to receive increased attention as a possible resource. BNG typically refers to a gas produced by the biological breakdown of organic matter in the absence of oxygen. BNG originates from biogenic material and is a type of biofuel. One type of BNG is produced by anaerobic digestion or fermentation of biodegradable materials such as biomass, manure or sewage, municipal waste, green waste and energy crops. This type of BNG is comprised primarily of methane and carbon dioxide. The principal type of BNG is wood gas, which is created by gasification of wood or other biomass. This type of BNG is comprised primarily of nitrogen, hydrogen, and carbon monoxide, with trace amounts of methane.

The gases methane, hydrogen and carbon monoxide can be combusted or oxidized with oxygen. Air contains 21% oxygen. This energy release allows BNG to be used as a fuel. BNG can be used as a low-cost fuel in any country for any heating purpose, such as cooking. It can also be utilized in modern waste management facilities where it can be used to run any type of heat engine to generate either mechanical or electrical power. BNG is a renewable fuel, which can be used for transport and electricity production, so it

attracts renewable energy subsidies in some parts of the world.

In many cases, there is currently not enough pricing and supply information available to be considered in this planning cycle; however, where possible, we have endeavored to analyze those situations where we feel sufficient data is available. Cascade continues to monitor the BNG activities of companies such as Pacific Gas & Electric, Intermountain Gas, Sempra Utilities and Puget Sound Energy.

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 under pressure as compressed natural gas, or cooled to a liquid state, which is liquefied natural gas (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, therefore 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. 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 pipeline transportation and may limit the flexibility of the resource. Cascade does not own its own storage facility and therefore must contract with storage owners to access a portion of their storage capacity. In 1994, Cascade had two contracts for utilization of underground storage located at Jackson Prairie (SGS-1). SGS-1 service is contracted directly from NWP and additional SGS-1 service was assigned from Avista Corporation for Cascade's use. Both of these contracts provided daily deliverability and seasonal inventory capacity. However, Avista declined to extend its agreement with Cascade and the Avista storage service was no longer available following the 2006/07 heating season.

Consequently, Cascade entered into an Agreement with Northwest Pipeline for additional Jackson Prairie storage service that will replace the access to storage that was available through the Avista storage contract. The new Agreement will provide Cascade with twice the amount of daily deliverability of the Avista agreement (30,000 vs. 15,000 Dths/d) with approximately the same annual storage quantity. The Jackson Prairie expansion will be fully operational by late Fall 2012. Cascade has also entered into a companion Transportation Agreement with Northwest Pipeline for the transportation of gas supplies stored under this Agreement to Cascade's service area.

The Company also has contracted for service (LS-1) from NWP's Plymouth, Washington

LNG facility. Both Jackson Prairie facilities and the Plymouth facility 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. This type of operating flexibility would not necessarily be available with off-system storage. The Company's contracted storage services as of the last IRP (2010) are summarized below. Cascade has recently acquired two additional storage accounts at Jackson Prairie. Those will be discussed in more detail later in this section.

TABLE 5-1
Cascade's contracted storage services

Volumes in Therms		
	Storage Capacity	Withdrawal
Total	(therms)	(therms/day)
Jackson Prairie (Principle)	6,043,510	167,890
Jackson Prairie (Expansion)	3,500,000	300,000
Plymouth LNG	5,622,000	600,000
Jackson Prairie (new - 2012)	2,812,420	95,770

Withdrawal capabilities must also be accompanied by firm capacity on the transporting pipeline(s) to be of any value as a reliable source of gas supply. Cascade's SGS-1 and LS-1 service requires TF-2 firm transportation service for storage withdrawals; Cascade has sufficient firm TF-2 service to meet its storage daily deliverability levels.

Capacity Resource Options

Capacity options are either interstate pipeline transportation resources or capacity on Cascade's local distribution system. Cascade's local distribution system was built to serve the entire connected load in its various distribution service areas, on a coincidental demand basis, regardless of the type of service the customer may have been receiving.

Cascade generally has the distribution capacity available to deliver the gas to customers if the pipeline delivers the gas to the Company's CityGate stations. Core interruptible service relates to the spot market supplies and interruptible interstate pipeline transportation contracted to serve these markets. Cascade does not contract for firm supply or interstate transportation for these interruptible customers. Cascade's interruptible rates also reflect the fact that no firm supply or transportation services are purchased on behalf of interruptible customers.

Interstate Pipeline Transportation Services

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 gas supplies have been "bundled" by the supplier, 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 (twenty to thirty year) contracts.

Cascade has several long-term annual contracts with NWP, two long-term annual contracts and three long-term winter-only contracts with GTN (including the upstream capacity on Trans Canada Pipeline's Foothills and Alberta systems), a long-term winter-only contract with Ruby Pipeline and one long-term annual contract with Spectra in British Columbia, Canada. These contracts do not include storage or other peaking services that provide additional delivery capability rights ranging from 9 to 120 days.

As noted earlier, available capacity exists on two of the three upstream pipelines serving the region: Spectra Energy's T-South Mainline from Northeast BC to the BC-Washington Border at Sumas, and TransCanada's GTN System that takes natural gas from Alberta at Kingsgate, Idaho and ships it to and through the region. The Company constantly reviews existing capacity options and works to negotiate contract terms that make sense for both parties when we determine a project is viable.

Additionally, pipeline capacity is a tradable commodity through each pipeline's Electronic Bulletin Board (EBB). Should a utility have temporarily underutilized transportation capacity, it can release that capacity to third parties. Such activities allow holders of pipeline capacity contracts to recoup a portion of the fixed costs incurred. The value of the capacity will fluctuate depending upon market conditions. Any pipeline capacity in excess of core requirements can be offered to qualified buyers. The capacity is offered to any credit-worthy market through the respective pipeline's EBB.

Cascade's utilization of pipeline transportation and peak day capacity for core and contracted for non-core firm transportation gradually changes over the planning horizon. Current company-acquired firm supplies utilize existing core firm transportation capacity. A portion of future core market growth utilizes non-core firm transportation capacity that will be converted to core market firm transportation capacity as core market growth occurs.

Total Zone 20	**11,884**	**(6,229)**	**(15,963)**
Total Zone ME	**32,648**	**27,952**	**28,083**
Total Zone 24	**3,628**	**3,919**	**3,804**
Total MDDOs	**48,445**	**(10,131)**	**(44,467)**

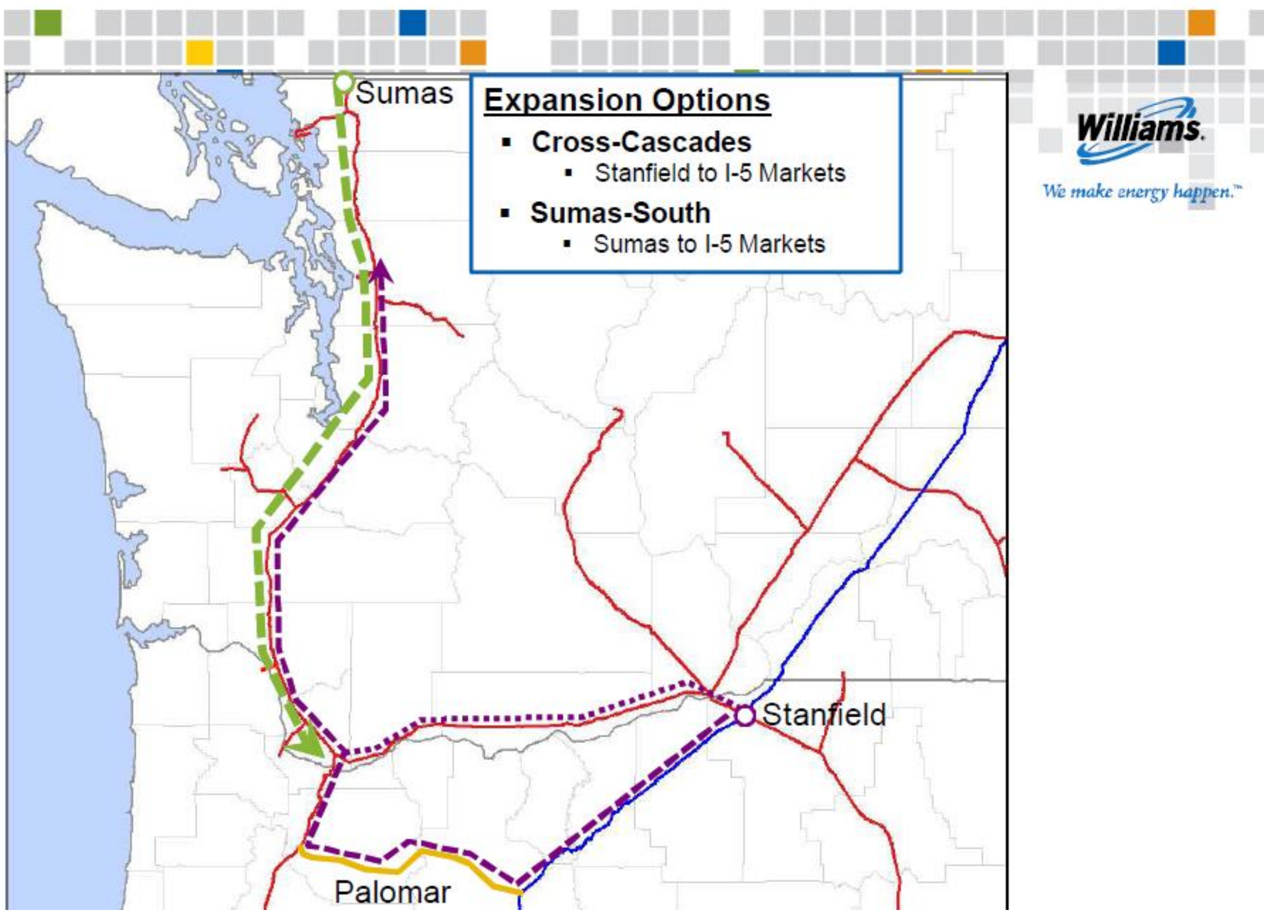
Other Resource Options

Some of the growth will require Cascade to look at alternatives to pipeline mainline capacity such as LNG satellite facilities located near or within the Company's distribution system. The Company is continuing to study the viability of LNG satellite facilities to meet these needs.

The Wenatchee lateral is an example where an LNG satellite facility may be more cost effective than the traditional solution of pipeline expansion for solving the upcoming capacity constraints on the lateral. Preliminary cost studies indicate that an LNG satellite facility solution may be 1/3 to 1/2 the cost of a pipeline expansion project that would provide the same peak day incremental capacity.

Additionally, the historic load growth the Company enjoyed throughout much of its service areas has begun to create the need to increase the physical capabilities of some of the pipeline's CityGates. Even though Cascade may have an adequate amount of transportation capacity available on the pipeline, we may not have the contractual or physical capabilities at the CityGate to meet the incremental load requirements. LNG satellite facilities or trucked in LNG re-gasification facilities or other similar type solutions may provide lower cost alternatives to the cost of city gate rebuilding projects. The Company will continue to study the viability of these alternatives.

Proposed and New Pipelines
Additionally, several pipeline projects have been proposed by a variety of developers to serve the region.



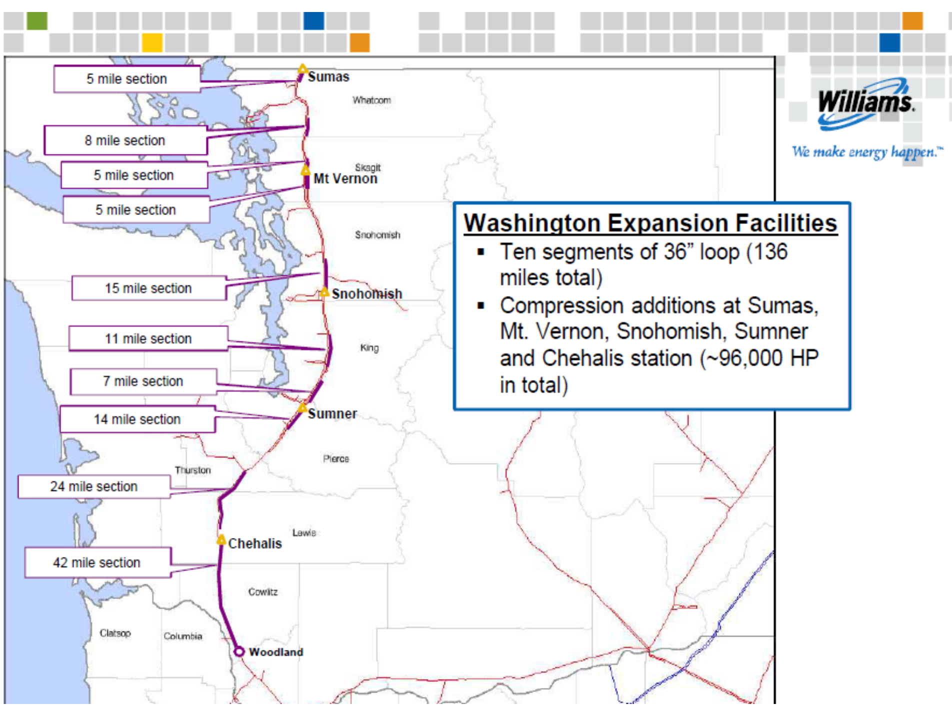
Northwest Market Area Expansion (N-MAX) and Washington Expansion
NWP has been working with the partners of Palomar Pipeline (NW Natural and TransCanada) to provide an expansion option from Stanfield, Oregon to markets along the I-5 corridor. Essentially, it would create an "Oregon Hub" via a Transportation by Other (TBO) process using vintage NWP capacity across the Columbia Gorge combined with vintage GTN capacity from Stanfield to Madras, then using Palomar capacity from Madras to Molalla tied to NWP expansion capacity up the I-5 Corridor in

Washington.

Similar to another regional solution proposed a few years ago, NWP is looking to combine available GTN capacity with Palomar (from Madras, west) along with an I-5 Expansion to near Mount Vernon. NWP is still in the development stages and has not finalized the expansion scenarios or developed the rates. NWP anticipates holding an Open Season in early 2013, with service expected in 2018. We anticipate that along the proposed path there may be an opportunity for Cascade to pick up additional capacity to address our projected shortfalls in the in the Bend, Oregon and Bellingham, Washington areas.

Washington Expansion

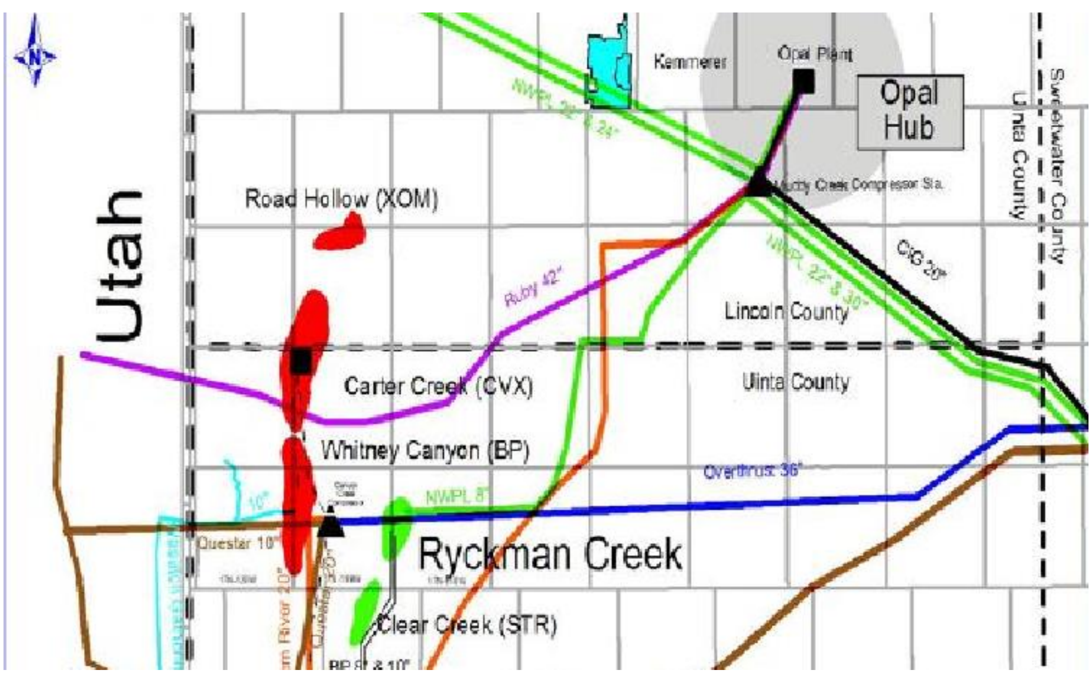
NWP is working with Oregon LNG to develop incremental capacity to serve the LNG terminal in Warrenton, Oregon. The LNG facility is proposed to be a 1.25 Bcf/d export facility. Currently, NWP is looking at a 750,000 Dths/day expansion that would require installation of 138 miles of 36-inch loop and compression at existing compressor stations. Similar to the N-MAX described above, NWP is still in the development stages and has not finalized the expansion scenarios or developed the rates. NWP anticipates holding an Open Season in early 2013, with service expected in 2016. We anticipate that along the proposed path there may be an opportunity for Cascade to pick up additional capacity to address our projected shortfalls in the Bellingham area.



Pacific Connector Gas Pipeline Project – As identified earlier, PCGP is a proposed 234-mile, 36-inch diameter pipeline designed to transport up to 1 billion cubic feet of natural gas per day from the Jordan Cove LNG terminal to markets in the region. The

Pacific Connector project includes interconnects to Williams´ Northwest Pipeline near Myrtle Creek, Oregon; Avista Corporation´s distribution system near Shady Cove, Oregon; Pacific Gas and Electric Company´s gas transmission system; Tuscarora Gas Transmission´s system; and Gas Transmission Northwest´s system, all located near Malin, Oregon. As noted earlier, this project is now viewed as an export facility; but it also has the possibility of bringing additional supply to the area to make part of our resource portfolio.

Ryckman Creek Resources, LLC, a wholly-owned subsidiary of Peregrine Midstream Partners, LLC, recently announced they are conducting a non- binding Open Season to determine the interest of prospective customers in contracting for up to 8 BCF of firm, high- deliverability, multi-cycle (HDMC) working gas storage capacity beginning April 1, 2013. Ryckman Creek is located in Uinta County, Wyoming, near the Opal Hub. Ryckman Creek 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. The initial in-service date was August 20th, 2012. Ryckman Creek Gas Storage Facility is located near the town of Evanston, Wyoming and approximately twenty-five miles southwest of the Opal Hub. Ryckman Creek currently has interconnects with Questar Gas Pipeline, Kern River Transmission, Questar Overthrust Pipeline, Ruby Pipeline and Northwest Pipeline.



Cascade’s 2011 IRP identified peak day shortfalls for Zone GTN (covering Central

Oregon demand locations) of approximately 6,900 dths/day in year 2011 and climbing to 30,600 dths by year 2031 (end of the 2011 IRP planning horizon).[1] At the time of the 2011 IRP, Cascade was working to acquire 10,000 dths/day of discounted seasonal Ruby capacity, coupled with a corresponding 10,000 dths/day of GTN capacity flowing north from the interconnection between GTN and Ruby at Turquoise Flats in order to mitigate a portion of this projected shortfall.[2] This initial Ruby acquisition in November 2012 addressed the immediate peak day shortfall through approximately the year 2015, leaving approximately a 20,600 dths/day peak day shortfall through the remainder of the planning horizon.

The 2011 IRP Action Plan also identified that Cascade had an option to acquire up to an additional 20,000 of Ruby capacity at the existing discount rate. In theory, this 20,000 dths/day of incremental Ruby capacity, coupled with corresponding GTN south-to-north capacity, would essentially resolve the peak day capacity shortfall for Central Oregon. Also in the 2011 Action Plan Cascade indicated that it would determine over the next year or so if it was prudent to acquire the incremental Ruby capacity prior to the October 2014 expiration of the option. Additionally, Cascade was also considering acquiring Ryckman Creek storage to provide Central Oregon with a more dedicated storage resource for peaking, supply diversity and price arbitrage purposes.

Other reasonable alternatives to address the 20,600 dths/day remaining shortfall also needed to be considered. As identified in the 2nd Supplemental Update to the 2011 IRP these options were:

- Incremental GTN south-to-north and/or north-to-south capacity to serve Central Oregon
- Gill Ranch storage from Malin/Turquoise Flats to serve Central Oregon. 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.
- Wild Goose storage to serve Central Oregon. 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. Customers have direct access to Pacific Gas and Electric's (PG&E) backbone system.
- Incremental Plymouth LNG storage to serve Central Oregon
- Mist Underground storage. The facility consists of seven underground natural gas storage reservoirs, a compressor station and gathering pipelines. The facility is located in Columbia County in Oregon, beginning approximately one-half mile southwest of the unincorporated community of Mist and continuing north for approximately 3.5 miles. As of the writing of this IRP through March 2017 - Mist

[1] *Cascade's 2011 Integrated Resource Plan, Appendix F, page Appendix 485*
[2] *Cascade's 2011 Integrated Resource Plan, Main Text, 2 Year Action Plan, page 108*

> Interstate Storage Service is sold out; nothing is available until April 1, 2017, the start of injections, with withdrawals available for the following winter. Beyond 2026 Cascade would need to subscribe to North Mist expansion project which would require NWP capacity to flow to Washington, or we could possibly flow gas on the Cross-Cascade project.

With assistance from the SENDOUT optimization modeling application, Cascade analyzed these various options to address the 20,600 dths/day of remaining peak day shortfall for Central Oregon. Ryckman Creek appeared to be the least expensive and most flexible storage option and was consistently selected by the model when it was available as a resource. Please note Ryckman would also require picking up some portion of the incremental 20,000 dths/day of the Ruby discount capacity to move storage inventory. However, Ryckman's on-going operational difficulties made GSOC loathe to contract for Ryckman storage, despite the model results. Since the option to acquire incremental Ruby at a discount expired at the end of October 2014, some decision about Ruby had to be made regardless of the potential storage alternatives.

During its' July 31, 2014 meeting, Cascade's Gas Supply Oversight Committee (GSOC) met to make a decision on acquiring a portion or all of the incremental 20,000 dths/day of Ruby discounted capacity. In GSOC's opinion, it seemed most prudent that Cascade acquire only a small amount of Ruby and hold off on a Ryckman decision until a better picture of the storage facility's operational viability becomes apparent. Consequently, GSOC authorized Cascade to proceed with acquiring only 5,000 dths/day of incremental Ruby discounted seasonal capacity. The November 2014 acquisition of this incremental 5,000 dths/day of Ruby discounted capacity allows Cascade to meet the projected 2011 IRP peak day shortfall through approximately year 2020.

As a result of the activities described above, as of today the remaining peak day shortfall identified in the 2011 IRP has now been reduced to approximately15,600 dths/day in year 2031.

As identified in the 2nd Supplemental Update to the 2011 IRP, GSOC ordered that Cascade should hold off on any Ryckman storage decision until a better picture of Ryckman's operational viability becomes apparent.[3] Additionally, GSOC ordered Cascade to continue to investigate the California storage alternatives and consider acquiring north to south GTN capacity to address Central Oregon shortfalls, targeting late 2016 and early 2017 as the next likely decision milestone for incremental storage and/or incremental Nova-Foothills-GTN north-to-south capacity.

Potential NOVA Expansion

2017 NGTL System Expansion Project was included in their Annual Plan, which was posted on TransCanada website December 15, 2014. NOVA anticipate certificating will be complete by 3rd QTR 2016, with construction starting in 4th QTR 2016 and a target in-service in 2nd QTR 2017. Cascade has previously participated in a non-binding agreement with NOVA for approximately 15,000. We anticipate that we will participate in a future

[3] *Page 7*

expansion.

Natural Gas Price Forecast

For IRP planning 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 has considered price forecasts from several sources, such as Wood Mackenzie, Energy Information Administration, the Financial Forecast Center's forecast, as well as our observations of the market to develop the low, base and high price forecasts. The following discussion provides an overview of the development of the baseline forecasts.

Development of Baseline Henry Hub 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. 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 current market (NYMEX) is the most current information available that provides some direction as to future market prices. On a daily basis, we can see where Henry Hub is trading and how the future basis differential in our physical supply receiving areas (Sumas, AECO, Rockies) is trading.

The fundamental forecasts of Wood Mackenzie, the Energy Information Administration (EIA), the Northwest Power and Conservation Council (NPCC), and our trading partners are resources for the development of our blended long-range price forecast. Wood MacKenzie publishes a long-term price forecast each quarter to subscribing customers. This forecast is broken down by month through the planning horizon and includes Henry Hub as well as basis differentials for our receiving areas. The company 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 develops a pattern based on the market monthly forward prices to create a long-term, monthly Henry Hub price. Since the final adoption of 7th Plan of the NPCC is not scheduled until later this year. Consequently, the NPCC Plan's fuel forecast was not given any weight in this IRP price forecast.

With a monthly Henry Hub price determined for the above sources, the company assigns a weight to each source to develop the monthly Henry Hub price forecast for the 20 year planning horizon. The forecast weighting factors are shown in Table 5-2. At the time the price forecast was developed. In recent years, the EIA forecast has often been lower than the actual monthly price; however, it is still a respected industry barometer of prices. Therefore, the EIA forecast was given a higher weight. As discussed earlier, while current market pricing may not accurately estimate the final market price, it often is a reliable indicator. Therefore, the company gave the current market pricing (NYMEX HH) some weight based on nearness to term. It should be noted that most of the forecast providers did not provide price forecasts beyond 2031. We chose to blend Wood Mackenzie and the EIA. We had the option of also extending the trend-line of the NYMEX HH beyond year 2020, but felt it important to recognize that NYMEX HH is more a factor in short rather than long-term price. Table 5-3 shows a summary level, by year of the associated weights. The detailed monthly weights can be found in Appendix E.

Development of the Basis Differential for Sumas, AECO and Rockies

Since the company's physical supply receiving areas (Sumas, AECO, and Rockies) are at a discount to Henry Hub, we utilize the basis differential from Wood Mackenzie's most recently available update and compare that to the future markets' basis trading as reported in the public market. 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. Correspondingly, we applied a weighted average to determine the individual basis differential in the price forecast. Typically, we give the most weight to the current NYMEX Henry Hub price in the early years. As our forecast moves ahead we start to reduce the impact of the NYMEX (and the impact of speculation and other market uncertainties) and give greater weight to Wood Mackenzie and EIA.

In order to determine the low case and high case, the Company utilized the EIA economic growth factors (EIA Annual Energy Outlook 2011, Table E-1). This resulted in using 2.1 for the Low Case, 2.7 for the Reference Case and 3.2 for the High Case.

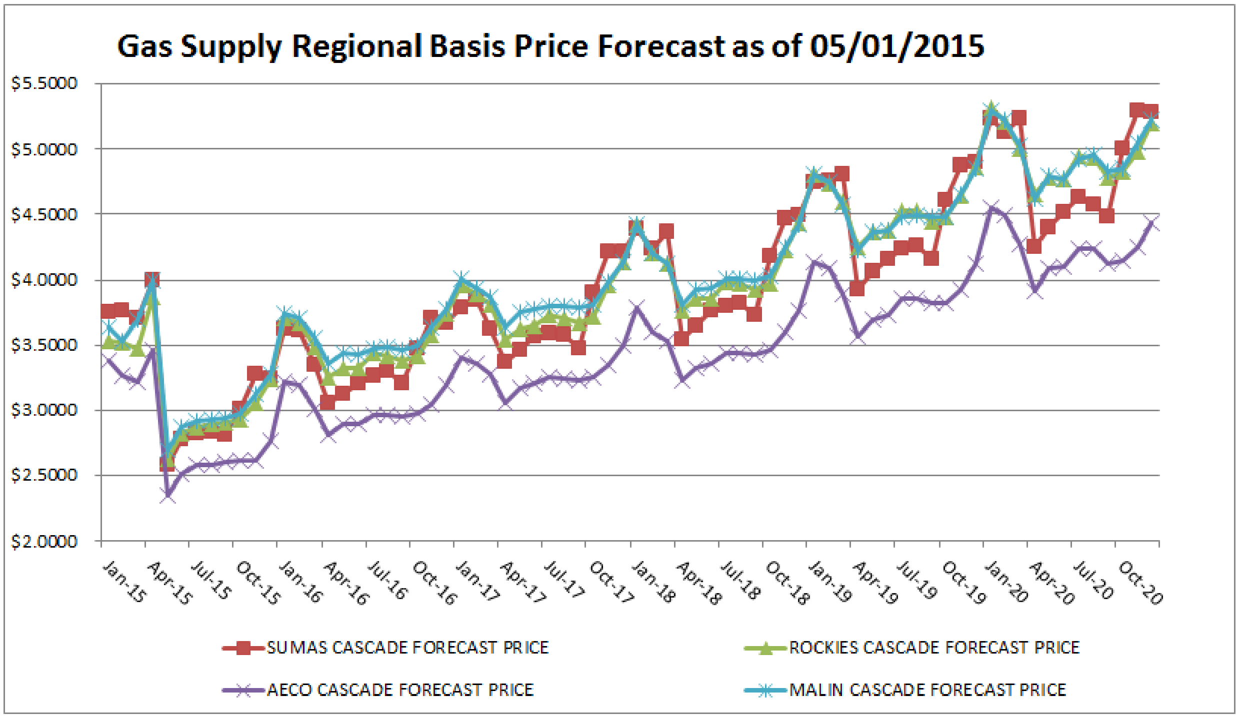
TABLE 5-3
HENRY HUB FORECAST WEIGHTING FACTORS

Year	NYMEX	Wood Mackenzie	EIA	NW Power Committee and Council
2015	60.000%	25.000%	15.000%	0.000%
2016	30.000%	36.250%	33.750%	0.000%
2017	15.000%	40.000%	45.000%	0.000%
2018	28.750%	40.000%	31.250%	0.000%
2019	20.000%	40.000%	40.000%	0.000%
2020	10.000%	40.000%	50.000%	0.000%
2021	0.000%	50.000%	50.000%	0.000%
2022	0.000%	50.000%	50.000%	0.000%
2023	0.000%	50.000%	50.000%	0.000%
2024	0.000%	50.000%	50.000%	0.000%
2025	0.000%	50.000%	50.000%	0.000%
2026	0.000%	50.000%	50.000%	0.000%
2027	0.000%	50.000%	50.000%	0.000%
2028	0.000%	50.000%	50.000%	0.000%
2029	0.000%	50.000%	50.000%	0.000%
2030	0.000%	50.000%	50.000%	0.000%
2031	0.000%	50.000%	50.000%	0.000%
2032	0.000%	0.000%	100.000%	0.000%
2033	0.000%	0.000%	100.000%	0.000%
2034	0.000%	0.000%	100.000%	0.000%
2035	0.000%	0.000%	100.000%	0.000%

Figure 5-D on the following page provides a summary of the medium price forecast (in real dollars) over the near term. Appendix E provides the detailed 20 year price

forecasts.

FIGURE 5-D



Supply Side Resource Uncertainties

Several uncertainties exist in evaluating supply-side resources. They include regulatory risks, deliverability risks, and price risks. Regulatory risks include the unknown impacts of future Federal Energy Regulatory Commission or Canada's National Energy Board 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 when the decision was made. Price risks associated with climbing prices can be minimized through the use of fixed price contracts or through the use of financial derivatives.

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. The Company will continue to monitor and be actively involved in the various pipeline forums as these initiatives develop.

As noted earlier, demand in Asia will likely make LNG exports from the Pacific Northwest a competitor for natural gas. It is also important to note an increasing trend in the use of natural gas vehicles (NGV) which utilize natural gas that has been compressed into a transportation fuel, also known simply as compressed natural gas. Taxis, transit and school buses, as well as heavy- duty trucks are among the users of natural gas powered vehicles. The Natural Gas Vehicle Institute estimates there are more than 112,000 NGVs in the United States. Plentiful reserves of natural gas exist as a domestic fuel, typically at substantial discounts compared to gasoline. From an environmental impact, exhaust emissions are generally much lower than gasoline powered vehicles. 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.

Financial Derivatives

Cascade constantly seeks methods to ensure ratepayers 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 New York Mercantile Exchange (NYMEX). The use of futures allows parties to lock-in a known price for extended periods of time (up to 6 years) in the future. Contracts are typically made in quantities of 10,000 Dths to be delivered to agreed-upon points (e.g., Sumas, Station 2, AECO, Northwest Pipeline 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 idea is to level the price over the long term. Futures and swaps are typically called “costless” because they have no up-front cost. Unlike futures and swaps, an option on futures only provides protection in one direction - either against rising or falling prices. For example, if Cascade wanted to protect itself against rising gas prices but keep the ability to take advantage of falling prices, Cascade can 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.

Portfolio Purchasing Strategy

Cascade’s Gas Supply Oversight Committee (GSOC) oversees the Company’s gas supply purchasing strategy. Beginning with the 2004/05 gas supply portfolio, Cascade has employed a more rigorous gas procurement strategy for both physical gas supplies and for hedging the price of the core portfolio. Cascade has contracted for physical supplies for up to three years (based on a warmer-than-normal weather pattern). The Company’s current gas procurement strategy is to have physical gas supplies under contract for 100% of year one's warmer than normal core needs, 66% of year two, and 33% of year three. This strategy results in the need to contract annually for approximately one-third of the core portfolio supply needs for the upcoming three-year period. Under this procurement strategy, this leaves roughly 10 to 20% of the annual portfolio to be met with spot purchases. Spot purchases consist of either "First of the Month" deals executed during bid week for the upcoming month, or day purchases which are utilized to meet incremental daily needs.

Once the portfolio procurement strategy and design has been approved by GSOC, the Company employs a variety of methods for securing the best possible deal under existing market conditions. Cascade employs a bidding process when procuring Fixed physical, Indexed Spot physical, as well as financial swaps used to hedge the price of index based physical supplies. In the bidding process, we alert a minimum of three suppliers and/or financial counterparties of the specific gas supply transactions Cascade plans to fill. We then collect bids from these parties over a period of days or weeks depending on the number or time requirements of 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 will award 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 we ensure party diversity. It should be noted that there is always the possibility the lowest market price may be during a period when we are 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 indicatives may start high and drop over time, allowing us 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.

GSOC also oversees the Company's gas supply hedging strategy. The Company's current gas hedging strategy is to hedge 40% of the contracted physical supplies of Year One, 25% of Year Two and 20% of 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 higher level. Currently, depressed market prices, as well as concerns about Dodd-Frank law, have significantly reduced the need for financial swaps; the Company's current strategy is to rely primarily on fixed-priced physical supplies for hedging purposes.

Cascade's programmed buying approach has Cascade negotiating with suppliers and/or financial institutions throughout the year, loosely grouped during three specific time periods (Spring, Summer, and Fall). Ideally, the periods are designed so that each pricing basin (Sumas, Rockies, AECO) has financial swaps or fixed-priced physical supplies in each of the three buy periods. Typically, financial swaps are contracted in amounts in standard blocks of 10,000 Dths. While it is possible to contract for other amounts, deviating from the standard blocks could potentially result in having to pay a premium as it is harder for the financial institution to hedge that odd amount with one of their counterparties. As a relatively small LDC, Cascade's ability to hedge in standard blocks is severely limited. Dividing the blocks into numerous smaller or odd sizes would incur increased transactional costs. In fact, some trading partners will not even consider executing a transaction that has varying volumes or are of a non-standard size. Consequently, Cascade's procurement and hedging periods are designed with these concerns in mind while trying to ensure that the total notional volume to be contracted is spread as equally as possible across the buy periods.

Utilizing the consistency of a programmed buying method as described above should help ensure that any locked-in prices provide stability over time, in addition to preventing Cascade from being over or under hedged. In the current contract year and beyond, Cascade plans to annually review our gas procurement physical and hedging strategy and, if unchanged, the company would continue its physical and hedging strategies as outlined above.

Cascade believes its gas procurement strategy is achieving diversity and flexibility in its gas supply portfolio through a combination of physical and financial structures. This goal encompasses not only supply basin origination and capacity limitations, but also includes a combination of pricing options that will assist Cascade in minimizing exposure to price volatility. The programmed buying approach to locking in a significant portion of gas prices maintains a market sensitive and balanced supply portfolio that continues to represent stable pricing as well as secure physical supplies for the Company's core customers.

Section 6

Demand Side Resources

Introduction and Overview

Demand Side Management (DSM) resources are generally thought of as conservation measures or actions that result in the reduction of natural gas consumption due to increases in efficiency of energy use or load management. Oregon and Washington Utility Commissions require gas utilities to consider cost-effective DSM resources in their energy portfolio on an equal and comparable basis with supply side resources. In the gas industry, DSM resources are conservation measures that include but are not limited to ceiling, wall and floor insulation, higher efficiency gas appliances, insulated windows and doors, ventilation heat recovery systems and weather stripping. By prompting customers to change their demand for gas, Cascade can displace the need to purchase additional gas supplies, displace or delay contracting for incremental pipeline capacity, and possibly displace or delay the need for reinforcements on the Company's distribution system.

There are two basic types of demand side resources. These are baseload resources and heat sensitive resources. Baseload options are those that displace the need for baseload supply-side resources. They will offset gas supply requirements day in and day out regardless of the weather. Baseload DSM resources include high efficiency water heaters, higher efficiency cooking equipment and horizontal axis washers. Heat sensitive DSM resources are measures whose therm savings increase during cold weather. For example, a high efficiency furnace will lower therm usage in the winter months when the furnace is utilized the most and will provide little if any savings in the summer months when the furnace is rarely used or is turned off. Examples of heat sensitive DSM measures include ceiling, floor, or wall insulation measures, high efficiency gas furnaces, and improvements to duct work. These types of measures offset more of the peaking or seasonal gas supply resources, which are typically more expensive than baseload supplies.

Update to 2014 Demand Side Management Section Format

As of this most recent Integrated Resources Plan, Cascade has separated out the Washington and Oregon DSM plans into two distinctly labeled sections in order to ensure greater clarity for those reading the document. In addition, we have expanded out the DSM section of the Washington IRP to include additional information and insights on program planning. Washington specific appendices have been updated to reflect the new Conservation Potential Assessment provided to the Company by Nexant. This study replaces the Stellar/Ecotope study that was utilized in prior planning periods for Washington. The development and use of an improved Conservation Potential Assessment for Demand Side Management and program planning purposes is consistent with the commitments made by the Company in its 2012 Washington IRP Action Plan and within Section 6 of that document. Details will be provided in the following sections.

Environmental Externalities (Washington and Oregon)

When evaluating DSM resources, the Company also includes an evaluation of the impacts of environmental externalities. The impact of utilizing energy on the environment continues to be a subject of societal concern and debate. If there are impacts that cannot be repaired naturally within a reasonable period of time, damage to the environment occurs for which society will have to pay in some, as yet undetermined, form. The question of who pays, how much and when payment should be made, are complicated issues.

For many years, The Northwest Power and Conservation Council (NPCC) has utilized a 10% cost advantage for electric utilities acquiring conservation resources to realize the benefits of not using supply side resources. Such electric utility benefits include reduced fish and wildlife impacts, load stability, load predictability and improved air quality. When calculating the avoided cost figures, the Company includes an incremental cost advantage for conservation resources. Historically, Cascade has included the 10% cost advantage for conservation resources, which was consistent with Oregon's requirements for gas utilities for mandated residential weatherization programs. For this plan, the company developed a graduated scale ranging from 5% for short-term measures up to a 20% factor for longer-lived measures. The use of a graduated scale is an attempt to recognize non-quantifiable benefits associated with conservation, such as price certainty and a hedge value against future carbon costs.

The approach the Company has taken in past IRPs has been based on our conjecture that in the short term minimal carbon legislation will take affect that has a direct impact to the Company and the Conservation programs, and what does pass through legislation would initially have a nominal impact. However, in the long term forecast the Company's approach is that some legislation or bill will become effective and it will have significant associated costs.

The OPUC issued Order 93-965 (UM 424) to address how utilities should consider the impact of environmental externalities in planning for future energy resources that go beyond the 10% cost advantage discussed above. In June 2008, the OPUC issued Order 08-338 (UM1302), which revised the IRP Guidelines associated with the analysis of environmental costs. The original guideline established in UM1056 required utilities to analyze the range of potential CO2 costs referenced in Order 93-965. Rather than providing a specific range of potential CO2 costs to be analyzed, the revised guideline requires the utility to construct a base case portfolio that reflects what it considers to be the most likely regulatory compliance future for the various emissions. Additionally, the guideline requires the utility to develop several compliance scenarios ranging from the present CO2 regulatory level to the upper reaches of credible proposals and each scenario should include a time profile of CO2 costs.

The political environment and pending legislation on carbon allowances must be taken into account when assessing potential program impacts to conservation programs. Under Governor Jay Inslee's Executive Order 14-04 (Carbon Pollution Accountability Act) the costs of gas would increase for customers commensurate with allowable carbon emission levels in Washington State. As a natural gas utility the Company does not have alternative renewable resources for energy production. In an effort to understand and account for the impacts of this proposed legislation the Company has become a member of the Washington Climate Coalition which was established to provide the business and industry perspective on the Act to the public. The Carbon Pollution Accountability Act could theoretically increase program participation as businesses seek to engage in energy-efficiency upgrades to offset their carbon emissions, but it's still too early to assess full impact of the proposed legislation since many of the businesses noted as high carbon emitters could be on non-qualifying rate schedules. The Company will continue to monitor the proposal as it moves through the legislative processes and its potential influences on DSM planning.

In response to Governor Inslee's Executive Order 14-04, in 2015 legislation was introduced as HB 1314 and SB 5283 as a cap-and-trade proposal to set a statewide emissions cap on carbon emissions. While estimates of potential impact to fuel providers differ at this time it is likely, should the legislation pass, natural gas prices could significantly increase resulting in increased costs to ratepayers. As noted above the Company will continue to monitor the process but as of the time of this writing the legislation appears to be stalled for the time being.

Unlike electric utilities, environmental cost issues rarely impact a gas utility's supply-side resource choices. For example, Cascade cannot choose between coal-fired generation or wind energy sources to meet its load requirements. As a natural gas distribution company, the Company's only supply-side energy resource is natural gas. However, environmental externality costs make a difference in the comparison between supply-side and demand-side resources. At the time of this writing, specific details on the level of carbon allowances and how they may be allocated to the gas utilities under a cap and trade program are still unknown. Therefore, in an effort to create a more realistic and robust assumption with regard to potential carbon legislation, Cascade utilized the most recent draft legislation, the Kerry-Lieberman proposal. Table 6-1 on the following page shows the updated analysis.

Table 6 -1 Natural Gas Environmental Externality Cost Analysis Updated with EIA's Estimated Emission Factors & Inflation				
Emission		Emission (Lbs/Therm)	Cost ($/Lb)	Externality Adder ($/Therm)
SCENARIO 1				
NO_2	$2500/Ton	0.008	$1.250	$0.010
CO_2	$15/Ton	5.2191	$0.008	$0.088
TOTAL				$0.090
SCENARIO 2				
NO_2	$2500/Ton	0.008	$1.250	$0.010
CO_2	$20/Ton	5.2191	$0.010	$0.117
TOTAL				$0.127
SCENARIO 3				
NO_2	$2500/Ton	0.008	$1.250	$0.010
CO_2	$30/Ton	5.2191	$0.015	$0.175
TOTAL				$0.185
SCENARIO 4				
NO_2	$2500/Ton	0.008	$1.250	$0.010
CO_2	$20/Ton	5.2191	$0.010	$0.117
TOTAL				$0.127
SCENARIO 5				
NO_2	$2500/Ton	0.008	$1.250	$0.010
CO_2	$25/Ton	5.2191	$0.013	$0.146
TOTAL				$0.156
SCENARIO 6				
NO_2	$2500/Ton	0.008	$1.250	$0.010
CO_2	$30/Ton	5.2191	$0.015	$0.175
TOTAL				$0.185

Source: http://www.eia.gov/survey/form/eia_1605/emission_factors.html

General Assumptions: Externality Adder reflects 1st year adder. Adder will increase annually by 3% and will be adjusted by the CPI, estimated to be 3.5%/year.

Washington Demand Side Management Planning (2014 Cycle)

As noted in the previous section, we have repositioned all Washington Demand Side Management planning into this section. We will update this section each Washington DSM planning cycle and note the year/planning cycle in which these updates were made.

Near Term Policy Outlook

Outside Determinants of Customer Usage

Cascade has remained active in monitoring external developments at the state and national level which carry potential impacts to customer usage within our service territory. Such developments include changes to Commercial and Residential building codes. There are no pending building code changes at the time of this writing that will affect the Company's prescriptive commercial program offerings. We will continue to monitor code adjustments as they arise and alter our rebates if and when appropriate. The Company's custom commercial rebate offerings require few accommodations when codes do change outside of the day-to-day processes already in place. This program uses a custom analysis allowing the use of a rolling baseline commensurate with current code requirements.

As mentioned in the Company's 2012 IRP several substantial changes to Washington code were scheduled to go into effect on July 1, 2010. However, some of the proposed code changes were delayed following concerns from the building industry regarding costs and impacts to consumers. Specifically, the Washington State Building Code Council had proposed a rule that would have made duct sealing mandatory for all residential upgrades involving a furnace repair or replacement which would have had direct impact on Conservation Incentive Program, and led to the elimination of our rebate for furnace replacement paired with PTCS Performance Tested Comfort Systems) duct sealing.

The 2012 Washington State Energy Code (WSEC) went into effect July 1, 2013. The WSEC requires duct systems be tested when an existing space-conditioning system is altered or replaced, although at the time concurrent sealing was not required In response to the potential for the rule to *require* duct-sealing in the future, as well as in consideration of cost-effectiveness thresholds, the Company removed its standalone PTCS duct sealing measure on May 10, 2013 from its portfolio and later removed the combination Furnace Replacement/PTCS duct sealing measure on September 2, 2014.

Outlined below are proposed code changes that have the potential to impact Cascade's Conservation Incentive Program moving forward:

National Appliance Energy Conservation Act – Residential Water Heaters
The energy conservation standards for residential water heaters in the April 16, 2010 Final Rule apply to products manufactured on or after April 16, 2015. The amended conservation standards consist of minimum energy factors (EF) that vary based on the rated storage volume of the water heater, the type of energy it uses, and whether it is storage or instantaneous. Water heater overall efficiency is based on the amount of hot water produced per unit of fuel consumed over a typical day (EF). Current standards for gas-fired water heaters are listed below:

Table 6 - 2
Current Water Heater per Code

Product Class	Energy Factor as of January 2014	Energy Factor as of April 16, 2015
Gas-fired Water Heater Conventional tank	0.67 (0.00190 x Rated Storage Volume in gallons)	For tanks with a Rated Storage Volume at or below 55 gallons: EF = 0.675 (0.0015 x Rated Storage Volume in gallons).
Instantaneous Gas-Fired Water Heater	0.62 (0.0019 x Rated Storage Volume in gallons).	EF = 0.82 (0.0019 x Rated Storage Volume in gallons).

For gas-fired storage water heaters with a volume greater than 55 gallons, the standard effectively requires condensing technology for water heaters manufactured after April 16, 2015. Since this rule applies to those appliance manufacturing moving forward the existing inventory at existing efficiency levels will continue to be available to installers to distribute for the near future. The estimated DOE rule effective date is January 1, 2020 at which point manufacturers will be required to market products that meet the new rule. At this time there are no imminent Washington State building code changes associated with this DOE rule. The company will continue to monitor the building code and alter its program offerings as appropriate contingent on code and product availability.

Building Air Leakage Testing – (Residential-Existing)
2012 Washington State Energy Code (WSEC) section R402.4.1.2 requires air leakage testing for all new houses and additions. The requirement is met if the structure has a Specific Leakage Area (SLA) of 0.00030 or less. SLA is an estimate of a home's leakage area, in square inches, divided by the conditioned floor area of the home. Although Building Air Leakage Testing is not required for existing homes, the Company offers an incentive as of September 2, 2014 "Whole House Residential Air Sealing", for existing homes. The Company requires the home to meet the Specific Leakage Area of 0.00030 or less. Whole House Air Sealing increases the effectiveness of insulation; it can improve indoor air quality and provides durability to the home.

Furnace Standards

The U.S. Department of Energy (DOE) proposed increasing the minimum efficiency standards for residential furnaces to 90% AFUE on May 1, 2013.

Although the proposed standard was challenged at the time, the Company anticipates the minimum furnace efficiency standards will increase in the near future. The Company removed a rebate for 90% AFUE furnaces from its portfolio on September 2, 2014 due to recommendations arising out of its Potential Assessment that customers were installing higher efficiency furnaces. The Company now offers one High Efficiency Natural Gas Furnace incentive of 95% AFUE or higher.

An updated DOE Furnace Standard is due in 2016; potential effective date 2021. The update will require manufacturers to produce minimum 92% AFUE furnaces by 2021. This change from the DOE Furnace Standard of 80% AFUE to 92% AFUE will likely have impact on our Conservation Incentive Programs. The Company has time to plan for tariff modifications to reflect updated standards as they arise

Regional Energy Planning

Based on the building forecast prepared by the Northwest Power and Conservation Council in support of the 6^{th} Northwest Power Plan – by 2030, the Washington State energy code will have influenced half of all building construction. Internally, this means a significant amount of properties will be mandated by code to meet previously voluntary efficiency standards – significantly reducing our savings potential.

Because the final design, breadth, and ultimate impacts of climate change legislation are yet unknown, the Company has considered the affect climate change legislation will have on potential bundles under different price indicators and will be able to model potential bundle scenarios when necessary in the future.

Washington Program Cost Effectiveness & Emerging Technologies

The declining costs of natural gas in the marketplace have made it increasingly difficult to maintain robust conservation programs as a utility. Despite this hurtle, the Company continues its commitment to offering meaningful conservation programs to help drive customer decisions toward higher-efficiency appliances and upgrades. In CY2013/2014 the Company had its Conservation Potential Assessment performed by Nexant which specifically included analysis on our potential from two perspectives - on the old method of establishing potential and a new version based on guidance from the UG-121207 Conservation Policy Statement from the WUTC (further described later in this chapter). The Company held multiple discussions with its Conservation Advisory Group related to the policy statement.

One of the primary actions the Company took in adherence to UG-121207 is our migration to the Utility Cost Test from utilizing the Total Resource Cost (TRC) test. This alteration has allowed us to maintain our Washington programs despite the declining cost of natural gas.

As the energy efficiency market continues to develop and cost-effective conservation technologies become increasingly available, the equipment standards and accessibility to such measures may evolve over time. In order to ensure the Company's DSM offerings stay current, Cascade engages in a regular review of the measure-mix within its conservation portfolio. Measures are added, removed, replaced, or modified when it is determined new technologies of equal or greater cost-effectiveness are available to the market. However, the emergence of a high-performance natural gas conservation technology will only have positive energy-savings impacts if customers are willing to pay the initial higher costs associated with the purchase and installation of cutting edge efficiency measures. By monitoring and updating the measures and incentive levels within Cascade's Conservation Incentive Program (CIP), the Company is able to ensure ratepayers have access to an optimal level of behavior-motivating incentives needed to encourage the purchase of cutting-edge, cost effective, gas conservation technologies. In addition to monitoring the viability of more "traditional" natural gas conservation measures, the Company also engages in concurrent efforts to research and determine the feasibility of emerging high-efficiency gas technologies such as the commercial application of high-efficiency natural gas heat pumps. We continue to monitor cutting edge measures and have made tremendous progress on this front thanks to the reassessment of our conservation potential in CY 2013/2014 by Nexant. More details regarding both sets of efforts can be found below. Further discussion about the Nexant Conservation Potential study and Cascade's approach to the UCT will be provided in detail later in this report.

Emerging Technologies

In additional to exploring more traditional avenues for natural gas savings, the Company has also begun to closely monitor emerging technologies with strong potential for deeper natural gas savings. Such high performance measures include energy-efficient Natural Gas Heat Pumps (GHP) which have been identified as a promising and high-impact conservation measure by Oakridge National Laboratories. Natural gas heat pumps have been in use throughout Asia and Europe for several decades and are being regularly tested and implemented throughout the American Southwest; real-world applications of the measure have successfully taken place in military and other mixed-used facilities. Gas Heat Pumps have demonstrated substantial carbon and water savings, and waste heat recycling for water heating purposes, as well as non-energy benefits such as reduced noise pollution from the quiet-running motor. COP (Coefficient of Performance) levels show promise when examined from a full-fuel cycle perspective that takes site-versus-source efficiency into consideration.

Cascade worked with several communities to assess the viability of 1-2 monitored GHP pilot efforts within its service territory. Such efforts would allow the Company to better understand the potential and applicability of this measure within its climate zones, and help introduce a high-effective carbon-mitigation technology into the region. Since a robust market for Natural Gas Heat Pumps is not yet in place, competition amongst vendors is limited, as are the number of GHPs being produced. Thus, up-front costs remain an obstacle to cost-effectiveness. At this time Cascade has elected to invest in Regional Market Transformation efforts through the Northwest Energy Efficiency Alliance (NEEA) and hopes to revisit service territory pilot efforts in natural gas heat pump technology in the future. If initial pilot efforts prove promising from an energy savings standpoint, Cascade would plan to work with community partners, equipment vendors, and efficiency technology organizations to introduce the measure into the mainstream markets within our region. If and when the measure proves viable, Cascade would then also be able to support GHP efforts through the custom Commercial portion of its Conservation Incentive Program.

In addition to Natural Gas Heat Pumps for use in commercial space heating applications as noted above, the Company is also in the process of gathering more information regarding Gas-fired Heat Pump Water Heaters. This technology has been identified by the Northwest Energy Efficiency Alliance as potentially viable technology with costs in a similar range to electric models currently available on the market.

> *Natural Gas-Fired Heat Pump Water Heater (Residential, New & Existing)* – The Gas Technology Institute Emerging Technology Program is working to design and demonstrate a packaged water heater driven by a gas-fired ammonia-water absorption heat pump. This gas-fired heat pump water heater (GHPWH) can achieve Energy Factors of 1.3 or higher, at an expected consumer cost of $1,800 or less. The technology is expected to become commercially available in 2016 or 2017 depending on commercialization timeline and field test results.

Market Analysis

Heat pump technology has entered the domestic hot water industry through the deployment of the electric heat pump water heaters. Because the operation of an electric heat pump is similar to gas, regions with successful electric heat pump water heaters are well positioned to adopt GHPWH. The Gas units offer lower operating costs compared to electric heat pump water heaters.

Cost and Benefits

A typical home using 76 gallons a day of water will see an average cost of $160 per year with a GHPWH. This represents a simple payback of 6.3 years over a conventional gas storage system. Most hot water systems have a life span of 13 years leaving nearly 7 years of savings to the owner after recouping the original investment.

Additional benefits include:

1. Units are designed to retrofit to common gas storage water heaters, without piping upgrades by installers
2. Potential integrated cooling applications available in the future
3. The technology may be installed as a hybrid system with high-efficiency units to meet higher design loads.

Barriers

1. Gas heat pump systems have been available in the market for many years but the technology has not yet been utilized for domestic hot water heating until now. There has been significant investment in laboratory and field testing but the product has not been certified as it remains pre-commercial.
2. The GHPWH is a sealed system, not intended for servicing (Electric Heat Pump Water Heaters are intended for servicing), so the entire heat pump needs to be replaced
3. Installers need training because the installation (similar to the electric version) crosses trades between plumbing and HVAC/refrigeration.
4. Due to lower recharge timing, heat pump systems require a larger storage tank. Therefore, the 60-80 gallon tank may require a two person install.

Utility support for technology like the one noted above is important in the industry to demonstrate to manufacturers that there is interest in supporting deployment through rate payer funded efficiency programs. The more interest displayed in emerging technologies, the more likely manufacturers are to increase production and market availability.

As mentioned previously the Company has elected to partner through NEEA with other gas utilities in the region to engage in the first Regional Gas Market Transformation Collaborative in the nation. The goal is to increase market adoption of energy-efficient natural gas products and practices in the future. As part of the project the Collaborative plans to pilot five distinct technologies by increasing their uptake and availability in our joint service territory to improve cost effectiveness of these natural gas technologies. This five year effort is just beginning as of 2015 but should result in increased savings if not immediately, then as the technology is adapted and uptake increases in future years. The Company will continue to keep apprised of this and other equally cutting-edge efficiency options with significant future savings potential for our customers.

Impacts of Washington's Climate Change Challenge

Since Governor Gregoire announced the Executive Order creating Washington's Climate Change Challenge in February 2007, Cascade has monitored the progress of the Challenge as it pertains to the Utility. On September 23, 2008, the Western Climate Initiative (WCI) released its Greenhouse Gas Cap and Trade design recommendations. WCI participants have flexibility in setting requirements for implementation, compliance, and enforcement of the program under the following recommendations from the WCI:

- Reduce GHG emissions to 15% below 2005 levels by 2020.
- GHG measurements and monitoring begin 1/1/10 for reporting in early 2011.
- First compliance period begins 1/1/12 for electric generation (including imports); industrial and commercial combustion; industrial process non-combustion emissions.
- Second compliance period begins 1/1/15 for residential, commercial, and industrial fuel combustion below 25,000 metric ton threshold; transportation fuel.
- Encourage entities to reduce GHG emissions 1/1/08-12/31/11 by issuing Early Reduction Allowances that are in addition to allocated allowances and are treated like allocated allowances.

Since the 2008 IRP, the Washington Department of Ecology has moved forward with enacting Executive Order 09-05, *Washington's Leadership on Climate Change,* which went into effect May 21, 2009 and directs state agencies to:

- Continue to work with six other Western states and four Canadian provinces in the Western Climate Initiative to develop a regional emissions reduction program design;
- Work with companies that emit 25,000 metric tons or more each year to develop emission reduction strategies; and
- Work with businesses and interested stakeholders to develop recommendations on emission benchmarks by industry to make sure 2020 reduction targets are met.

2012 Washington State Energy Strategy

In December 2011, the Washington State Department of Commerce released its most recent energy strategy – the *2012 Washington State Energy Strategy* - the previous plan of this type having last been produced in 1993, nearly 20 years ago. The plan does not make specific legislative recommendations – but rather outlines action items. The 2010 legislation requires this plan to be released on a regular basis every four years – with the next version slated for 2015. Every two years the Department of Commerce issues an overview of recent trends, expenditures and updates the state energy indicators as a Biennial Energy Report. The latest such report was produced in 2014 and notes the historically low natural gas prices and the necessity to maintain the state's commitments to efficiency and renewable energy. It also notes any support from its perspective for natural gas should be directed to displacement of coal-fired electric generation. The update also notes addition of Governor Inslee's Executive Order 14-04, Washington Carbon Pollution Reduction Clean Energy Action as being a key feature of the updated report.

The ultimate objective of the plan is to reduce Washington's energy consumption (especially through fossil fuels) and increase efficiency leading to a reduction in greenhouse gas emissions and the overall amount expended toward energy in Washington State. The goal with the most potential impact in our long range planning:

- A broader approach to energy efficiency in buildings.

As part of this goal for increased energy efficiency, the strategy seeks to:

- Make it easier for property owners to identify the most effective energy improvements.
- Enable financing of those improvements using the energy costs savings from the improvement itself.
- Build consumer confidence in the quality and value of energy efficiency projects.

The increased promotion of energy improvements and financing options would likely result in impacts to the cost and availability of natural gas conservation equipment and technologies throughout the state. Such increased availability of affordable conservation technologies, combined with possible carbon adders to fossil fuel costs, would result in an increase in the level of cost-effective natural gas conservation measures

The current recommendations set forth by the 2012 Washington State Energy Strategy includes requiring utilities, to provide residential customers with an annual statement of their costs and energy consumption and provide information touting the benefits of retrofits. One of the recommendations involves developing a statewide standard for marketing and quality assurance of residential energy efficiency retrofits.

If ratepayer funded conservation, loan, or standards enforcement programs were made mandatory by the State, this would have potential impacts on the delivery costs of the Company's Conservation Incentive Program, and would therefore have potential impacts on the viable mix of incentives within Cascade's conservation portfolio.

Docket UG-121207 Policy Statement on the Evaluation of the Cost-Effectiveness of Natural Gas Conservation Programs

The Policy statement was released in October 2013 and has provided the Company with guidance on evaluating the cost effectiveness of its natural gas conservation programs. As per the policy's guidelines the Company has elected to utilize the UCT in consultation with our Conservation Advisory Group (CAG). The use of the UCT, as opposed to the traditional TRC method, has allowed the Company to maintain a continued, robust conservation portfolio of measures that is cost-effective.

Washington Utilities and Transportation Commission Docket UG-121207 offers guidance regarding the optimal method for the valuation of natural gas conservation efforts in the State of Washington. This document thoroughly addresses best practices for measuring cost-effectiveness and has stated that: "[W]e are unwilling to allow utilities to end natural gas conservation programs as a result of an unbalanced or incomplete TRC analysis. Any TRC analysis without these values [conservation's risk reduction value, the downward price pressure from reduced demand, and non-energy benefits] is potentially biased against conservation programs. Accordingly, the UCT is an acceptable option when a properly balanced TRC is not available."

The Policy statement also addressed the use of discount rates in cost-effectiveness calculations. The Company has worked closely with our CAG to determine the appropriate rate to use when calculating the net present value of its annual costs and benefits from the conservation programs. It was determined Cascade would continue to use the long-term discount rate as had previously been used to enable the programs to remain in place at their current levels and to prevent removal of measures due to a severe discounting scenario, as would have been the case had the Company utilized the Weighted Average Cost of Capital (WACC).

Relevant Energy Legislation (Senate Bill 5854)

During the 2009 Washington Legislative Session, Legislators passed Engrossed Second Substitute Senate Bill 5854 (E2SSB 5854) that amended Chapter 19.27A RCW with the intent of assisting with the implementation of Order 09-05 by tracking energy consumption in buildings. State agencies, colleges, universities and non-residential facilities encompassing more than 10,000 square feet of conditioned space were now directed to track usage with the US Environmental Protection Agency's Portfolio Manager. To facilitate this tracking, the Legislature directed all electric and natural gas utilities with more than 25,000 WA customers to provide energy consumption information, upon request, for all non-residential and qualifying public agency buildings to which they provide service. In compliance with this mandate, Cascade began to provide this critical information as requested.

The new 2012 Washington Energy Strategy recommends modifying the existing requirements set forth in E2SSB 5854 to allow tenants to request an automated utility data transfer directly to Portfolio Manager. The report also proposes annual energy use summaries be provided to all residential utility customers and include information comparing their usage to that of other customers based on size of home or weather conditions. As suggested earlier, any such mandates could potentially have impacts on the delivery costs of utility-run conservation efforts.

At the Federal level, the traction for national legislation such as Kerry-Lieberman has decreased significantly and it is uncertain at this point the level of impact federal legislation will have as compared to the impacts of regional legislation.

Potential Future Carbon Tax Options

Following a WCI benchmarking symposium held on May 19, 2010, stakeholders to this initiative developed a final white paper which explored “Issues and Options for Benchmarking Industrial Greenhouse Gas Emissions”. According to the paper, State and federal policy makers were still considering several approaches to achieving emissions benchmarks including the use of Voluntary Performance Goals, a “Cap and Trade” system, or Regulatory GHG performance standards. The 2012 Washington Energy Strategy suggested an alternative to the carbon tax or cap-and-trade system of carbon pricing. Instead, they suggested a revenue-neutral carbon tax option.

In Washington, specific requirements resulting from the Western Climate Initiative’s (WCI) Greenhouse Gas Cap and Trade design recommendation are still unknown. The recommendations include reducing greenhouse gas emissions to 15% below 2005 levels by 2020. GHG measurements and monitoring began on January 1, 2010 for reporting in early 2011. The first phase of the cap-and-trade program is proposed to begin in 2012 and will cover emissions from electricity. The second phase would begin in 2015, when the program expands to include other fossil fuels, including natural gas.

Impacts of benchmarking and pending legislation are evident across the state. Electric utilities, such as Puget Sound Energy, have begun to actively implement “Direct Use” efforts in anticipation of impending climate change legislation. Since Direct Use is often the most prudent use of energy resources, the Company will carefully monitor how environmentally responsible load switching of this nature would be treated under a cap-and-trade scenario.

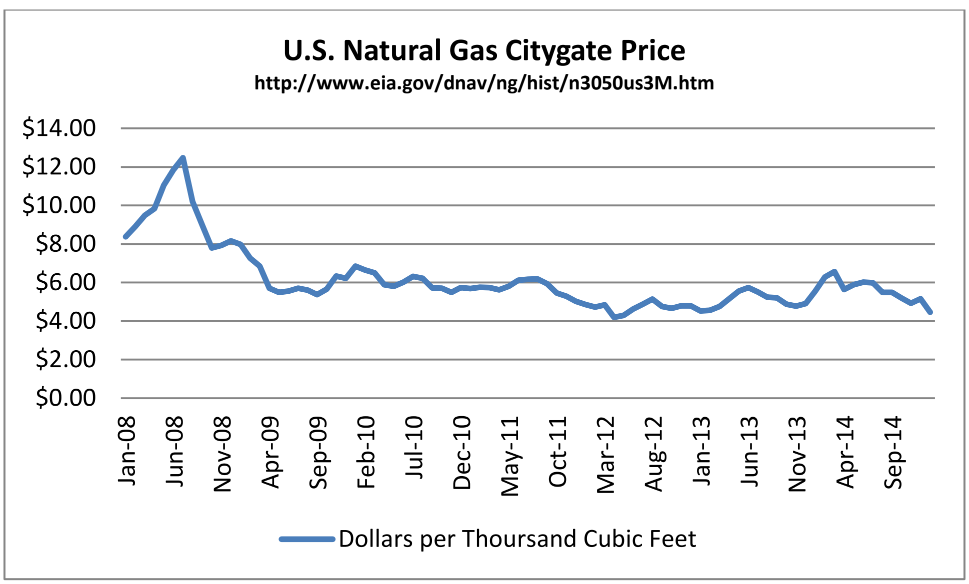
Potential DSM Measures and Their Costs

In order to understand the impact declining costs can have on the programmatic potential of natural gas conservation programs, it is important to understand how these programs work. Utility-run energy efficiency programs are designed to encourage the use of high-efficiency natural gas equipment and measures. The threshold used to verify if the amount paid by the utility is reasonable is the avoided cost of natural gas.

Quite simply, a utility should not pay more than 100% of the avoided cost of a measure. Likewise, it is considered general industry best practice that a rebate should be no lower than around 1/3 the incremental cost of the measure, nor higher than is necessary to achieve maximum anticipated participation. This helps the utility avoid both the risk of free ridership and the hazards of skewing program cost effectiveness and triggering the law of diminishing returns by paying beyond the level of an appropriate market signal.

Since 2008 there had been significant decline in the actual and forecasted cost of natural gas as seen in figure 6-1 below. As gas costs decline, so too does the threshold for cost-effective conservation measures.

Figure 6 -1



Reminiscent to the trend in gas prices as demonstrated in Figure 6 - 1, in 2008 the avoided cost for a 20 year measure was $10.71 with a levelized cost threshold of $0.8003 for a conservation portfolio. Four years later, avoided costs had plummeted with 20 year measures set at an avoided cost of $5.47, and a levelized cost threshold of $0.4598.

Between the 2012 IRP and this most recent version, the trend has relatively leveled off in relation to the Company's current avoided costs, Cascade is able to pursue a Residential and Commercial/Industrial conservation portfolio with an average levelized cost of $0.4521, with a total avoided cost of $5.38 for a 20 year measure.

Utilizing the UCT, Company program management set the rebate thresholds to achieve a delicate balance between driving program participation and ensuring a broad breadth and depth of measures. This balance was reviewed with the Conservation Advisory Group on June 6, 2014 and demonstrates our current program offerings at the time of writing of this IRP which can be reviewed later in this chapter under the DSM Portfolio Updates and Planning section.

See Appendix H for additional information on the most recent avoided cost thresholds and the maximum actual and levelized costs for conservation measures based on measure life.

Following guidance from WUTC Docket UG 121207 Cascade is heartened by the opportunity to continue forward with aggressive, robust energy conservation efforts. The use of the PACT/UCT allows the Company to continue to offer valuable, long-lived conservation opportunities to its ratepayers. The Utility Cost Test is the optimal vehicle for valuation of these measures since it is a straightforward and clean calculation of the utility's investment in Demand Side Management and does not penalize customers for making independent determinations regarding the cost-benefit of an energy efficiency upgrade. The UCT instead treats the rebate from utility run natural gas efficiency programs as a leveraged partnership that drives positive market change and the installation of measures with the potential for long-lived and deeper energy savings.

In addition to the use of the Utility Cost Test, the Company also discussed with its Conservation Advisory Group and Staff regarding the continuation of its Long-Term Discount Rate of 4.17% so that longer-lived measures continue to thrive within its portfolio and that no reductions or slowed momentum was experienced as a result of migrating the programs to the Weighted Average Cost of Capital (WACC), or other discount rate methodology that devalues savings in later years. More details regarding the Company's use of its Long Term Discount Rate can be found later in this document.

Based on the changes to avoided costs and the continued evolution of building codes and conservation technologies, and in light of the Policy Statement issued through UG 121207, the Company commissioned a study in 2013 to comprehensively reassess its conservation potential and perform evaluation, measurement and verification on previous conservation efforts performed through the Conservation Incentive Program (CIP). This study was noted as a commitment in the Company's 2012 IRP Action Plan. Cascade is extremely pleased with the outcomes of this effort. Because of the revised study performed by Nexant, the Company now has a much more nuanced understanding of its conservation potential and is able to further refine and more accurately develop conservation targets and on-the-ground portfolios to optimize energy savings in its Washington service territory.

Reassessment of Cascade Conservation Potential and EM&V Study

Early in the development of the Company's natural gas conservation efforts, Cascade partnered with the Energy Trust of Oregon to piggyback off of the Conservation Potential Assessment developed by Stellar/Ecotope. This study, commissioned within the 2006/07 timeframe, provided valuable insights into the overall conservation potential by ranking measures by levelized cost per therm saved. This calculation allowed the Company to better screen technical potential in order to include a broad range of measures with potential conservation benefits to Cascade's customers. Each measure's costs and estimated therm savings were compared to supply side costs over a 20-year planning horizon. The Stellar/Ecotope study provided an assessment of all energy savings that could be accomplished in the absence of market barriers such as cost and customer awareness (**technical potential**) by examining the baseline usage of customers by building type and sector to better understand the savings that could be achieved by measure and portfolio. The study then provided analysis to determine the feasibility for utility customers to engage in *specific* conservation activities and measures. Utility forecasted growth was applied to estimate the amount of structures with conservation potential in future years. The study aimed to quantify energy usage by customer sector (commercial, industrial, residential) and then by the customer type within each sector (single family, small office, wood products, etc.). Outcomes were translated into an assessment of **achievable potential**, or what conservation is feasible under "real world" conditions, and takes into account customer awareness, participation, and economic constraints.

The Stellar/Ecotope study did an excellent job of providing necessary insights for the Company to build the foundations of a growing energy efficiency effort in its service territory. However, based on the UG-121207 Policy Statement, technological and code changes, and the evolving sophistication of our energy efficiency efforts, the Company decided that a comprehensive reassessment of our conservation potential, as well as EM&V support was necessary for the continuation of robust and thoughtful conservation efforts. Thus Cascade contracted with Nexant to develop a fully update, Washington-focused DSM potential study for use during the 2014 IRP planning period and through the 21 year horizon (2014-2035). The study has provided new insights into the Company's overall technical, economic, and achievable potential. Program potential was excluded from this study but the vendor did provide guidance to Cascade staff as to how this can be manually developed by their program implementation team. In addition, Nexant has provided the Company with a thorough planning tool for use by Cascade in drilling down to more precise conservation targets for IRP and program planning based on the actual measures included in the conservation portfolio.

The primary goal of the Nexant assessment was to develop a comprehensive analysis of technical and achievable potential for natural gas energy efficiency within Cascade's Washington service territory for customers on Rate Schedules 503, 504, 505, 511, 570 & 577 (residential, commercial and non-transport sales industrial customers). This objective analysis illustrates the remaining savings potential by sector, segment and end use as a means to inform future program design given the declining cost of natural gas. The study also integrated a detailed evaluation and measure savings review of Cascade's conservation portfolio. Key objectives of this study include:

- Provide credible and transparent estimation of the technical and achievable energy efficiency potential by year over the next 21 (2014-2034) years within Cascade's Washington service territory;
- Assess and validate therm savings associated with key measures that qualified for, and received, a conservation incentive in the 2012 program year, and apply findings to determine realistic therm savings potential in Cascade's Washington Service area;
- Provide a user friendly, executable dynamic model that will support the potential assessment and allow for testing of sensitivity of all model inputs and assumptions;
- Develop a final report including summary data tables and graphs reporting incremental and cumulative potential by year from 2014 through 2034.

The Nexant study estimated energy efficiency savings developed into three types of potential: technical potential, economic potential, and achievable potential. Market penetration rates associated with each potential were estimated and included in this assessment. Nexant analyzed this potential via a customized modeling tool based from a Microsoft Excel-based modeling tool, TEA-POT (**T**echnical/**E**conomic/**A**chievable **Pot**ential) for the Cascade Conservation Potential Assessment. This modeling tool was built on a platform that provides the ability to run multiple scenarios and re-calculate potential savings based on variable inputs such as sales/load forecasts, natural gas prices, discount rates, and actual program savings. This model provides Cascade with the utmost transparency into the assumptions and calculations for estimating market potential.

While technical and economic potential are both theoretical limits to efficiency savings, achievable potential embodies a set of assumptions about the decisions consumers make regarding the efficiency of the equipment they purchase. Relevant factors to Cascade's conservation program were included in the Achievable Potential to simulate a realistic estimate of real-life conditions. Again, as stated earlier, program potential (i.e. the subset of achievable potential attainable given constraints on program budget and implemented measures) was not presented in Nexant's report.

Industry standard cost effectiveness tests were performed to gauge the economic merits of the portfolio. Each test compared the benefits of the energy efficiency metric to their costs defined in terms of net present value of future cash flows. The definitions for the two standard tests used in the Nexant analysis are described below.

Total Resource Cost test (TRC). The benefit to this test lies in the holistic approach to looking at the total benefits and total costs of the measure, not just energy related costs.

Utility Cost Test (UCT). The benefits in this test are the lifetime avoided energy costs and avoided capacity costs, the same as the TRC benefits. The costs in this test are the program administrator's incentive costs and administrative costs.

Detailed findings are presented in this report using the UCT as the cost-effectiveness screen for economic and achievable potential. As is shown in Section 6 and Section 7, of the Nexant Executive Summary, total natural gas savings potential is considerably higher using the UCT when compared with the TRC. This occurs because the UCT allows more measures to pass the cost-effectiveness threshold when compared to the TRC (because it considers only the incentivized portion of a measure's incremental cost). The Company continues to express its preference for the Utility Cost Test as it provides the most straightforward assessment of the value of natural gas DSM and places supply and demand side resources on equal footing.

Cost effectiveness under both scenarios was measured under a base-case scenario of Cascade's current avoided costs as of the acknowledged 2012 IRP, and an incentive rate of 30%. These inputs can be altered within the TEAPOT model and updated by the Company on an ongoing basis as appropriate. Further discussion around incentive levels can be found in Appendix D.

***Measure Savings Review*:** In addition to the Conservation Potential Assessment, Nexant also provided a measure savings review to provide a high level assessment of Cascade's process for collecting, organizing program participant data and estimating the associated savings for four key measures in the time period June 1, 2011 – May 31, 2012. This was broken up into three tasks: 1) a desk review of program applications, 2) a telephone call to program participants to verify measure installation and key savings metrics, and 3) a billing analysis of a statistical sample of installed furnace, boiler and water heater installed measures.

The telephone review verified all participation data and **no errors were found** in the reviewed measures. One of the key findings of the measure savings review is regarding Cascade's methodology for estimating natural gas savings. While utilizing a deemed savings value approach for each measure can be a cost-effective and appropriate approach to estimating savings, it can over or underestimate actual savings. The Cascade participant database documented the efficiency of the replacement measure as the incentivized amount (such as a 0.62 EF water heater), whereas often the efficiency of the installed measure as listed on the application was greater than the incentivized efficiency level. That is, while the application form always listed the actual efficiency of the installed equipment (e.g. EF=0.67), the efficiency of that particular measure would be set to a default value (e.g. EF=0.62) in the Cascade participant database. This meant that even though *higher* efficiency equipment was being installed in customer homes, Cascade was claiming savings associated with the *minimum* efficiency level for which equipment would qualify for an incentive.

Cascade is actively responding to these findings and we are now raising the energy efficiency standards of measures to ensure we continue to drive greater levels of efficiency than our customers would be likely to achieve through independent means. We also make adjustments to our conservation reports for the years (2012 – 2013) to reflect the higher standard of energy efficient conventional water heater and furnace installed by CNGC customers as a result of our programs.

Additional improvements to our data collection methodology will be made based on practicability and will be balanced to ensure reasonable administrative costs paired with all necessary data to effectively monitor and understand our conservation achievements. Data tracking is adequate at this time and further process improvements will be made as appropriate with careful attention paid to ensure that the application process is not made too complicated for our customers in a manner that inadvertently deters participation.

Note - the following tables and graphs found in the *Market Segmentation Findings* and *Energy Efficiency Portfolio Development* sections have been pulled directly from the Cascade Natural Gas Corporation Assessment of Achievable Potential & Program Evaluation. The graphs and tables will be updated in future iterations of this IRP, but have been included here as they were submitted from Nexant in 2014.

Market Segmentation Findings**:** An important first step in calculating Cascade's energy efficiency potential estimates is to establish baseline energy usage characteristics and disaggregate the market by sector, segment, and end use. In its final report to the Company provided as Appendix D Nexant offered the Company control totals to which all energy usage was calibrated in the base year of the study and then forecasted while using the same three climate zones the company has used in the past for calculating its potential. This resulted in a calculation of total natural gas consumption by eligible residential, commercial and industrial customers for 2012 in Cascade's Washington service territory in the amount of 12,256,153 dekatherms. While the industrial sales number totals 2,651,868 dekatherms, this number includes only non-transport industrial gas customers and represents only 4% of total industrial natural gas sales.

Table 6 - 3
Cascade 2012 Natural Gas Consumption & Premise Counts by Sector

Sector	2012 Sales (annual dekatherms)	Premise Count
Residential	11,203,608	171,991
Commercial	7,873,584	23,609
Industrial	2,651,868	10,639
Total	12,256,153	206,239

Washington Conservation Climate Zones by District

Zone 1

- Bellingham
- Mount Vernon

Zone 2

- Aberdeen
- Bremerton
- Longview

Zone 3

- Sunnyside
- Tri-Cities
- Walla Walla
- Wenatchee
- Yakima

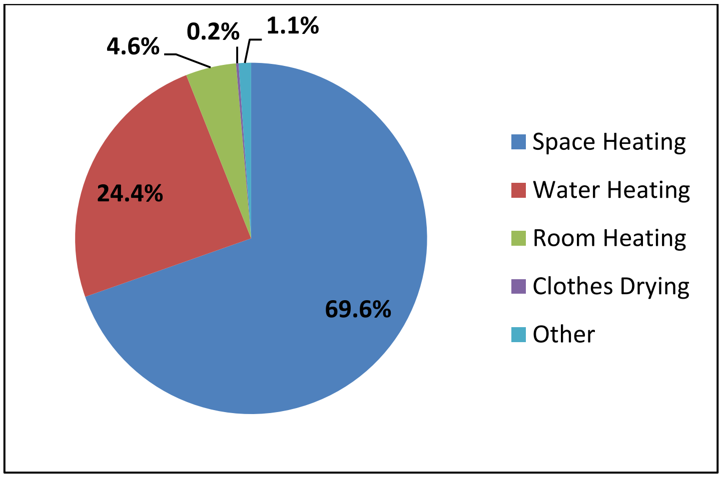
The table below shows the breakdown of energy consumption and building stock by residential segment. Single family homes dominate consumption with an 86% share, with multi-family dwellings at 14% of total residential consumption. Manufactured home (such as mobile home) dwellings comprise less than 1% of total residential consumption.

Table 6 - 4
Residential 2012 Natural Gas Consumption & Premise Counts by Segment

Sector	Energy Consumption (annual therms)	Energy Use Share	No. of Premises	Energy Use per Premise (dth)
Single Family	9,657,510	86.2%	143,058	67.5
Multifamily	1,523,691	13.6%	28,542	53.4
Manufactured	11,204	0.1%	391	28.7
Total	11,203,608	100%	171,991	65.1

The consumption was further broken down by Cascade's residential load by end use.

Figure 6 -2
2012 Residential Natural Gas Consumption by End Use*



Note* Space Heating refers to central heating equipment end uses, such as furnaces and boilers. Room heating refers to gas hearths/fireplaces

The office and retail segments represent the largest share of consumption at 29.6% and 24.2% respectively.

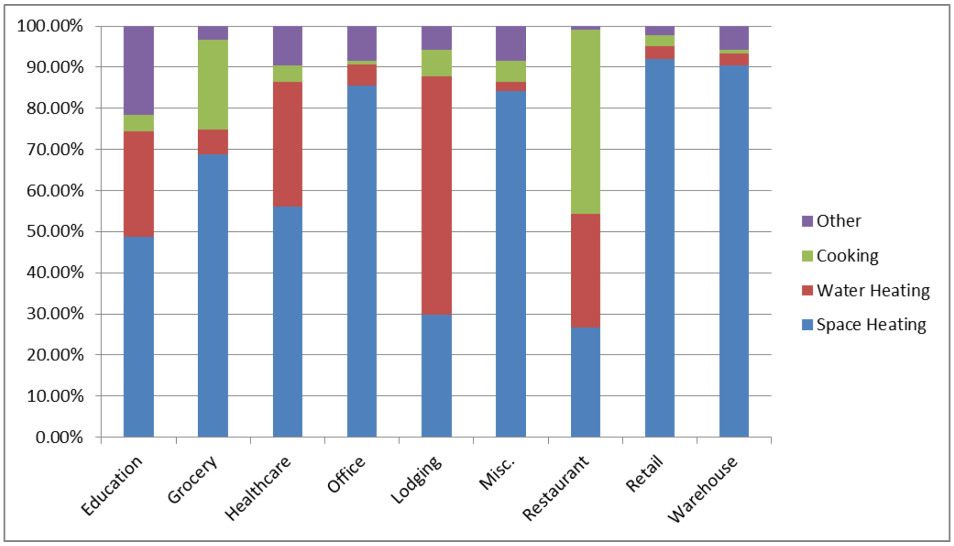
Table 6 - 5
Commercial Natural Gas Consumption & Premise Counts by Segment

Segment	Energy Consumption (annual dth)	Energy Use Share	No. of Premises	Energy Use per Premise (dth)
Education	1,191,963	15.1%	994	1,199
Grocery	590,930	7.5%	1,020	579
Healthcare	312,585	4.0%	512	611
Office	2,329,730	29.6%	8,401	277
Lodging	304,013	3.9%	266	1,143
Misc.	386,424	4.9%	2,470	156
Restaurant	650,618	8.3%	1,318	494
Retail	1,904,289	24.2%	7,152	266
Warehouse	203,032	2.6%	936	217
Total	**7,873,584**	**100.0%**	**23,069**	341

Nexant further disaggregated Cascade's commercial load by end use. Space heating represents the largest share for most segments at 71.9% on average; however certain segments such as lodging and restaurants have a higher share of water heating and cooking load respectively.

Figure 6 - 3

Commercial 2012 Natural Gas Consumption Shares by Segment, by End Use



The food manufacturing segment represents the largest share of energy use at 28.3% with paper manufacturing representing the smallest share at 2.6% of consumption.

Table 6 - 6

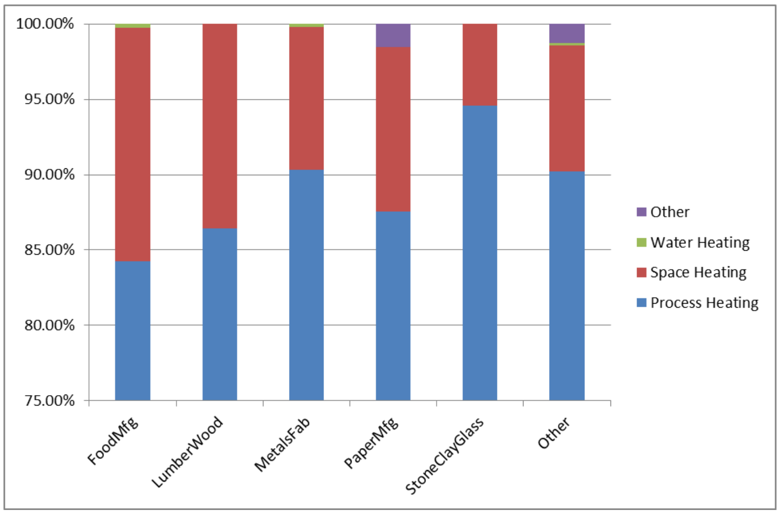
Industrial 2012 Natural Gas Consumption & Premise Counts by Segment

Segment	Energy Consumption (annual dth)	Energy Use Share	No. of Premises	Energy Use per Premise (dth)
Food Manufacturing	749,223	28.3%	465	1,611
Lumber, Wood Products	90,689	3.4%	340	267
Primary Metals Manufacturing	509,712	19.2%	1,081	472
Paper Manufacturing	69,240	2.6%	62	1,117
Stone, Clay, Glass Production	276,950	10.4%	446	621
Other	956,055	36.1%	8,245	116
Total	**2,651,868**	**100.0%**	**10,639**	**249**

Nexant further disaggregated Cascade's industrial load by end use. Process heating represents the largest share of end use consumption across all segments at 87.1% on average.

Figure 6 - 4

2012 Industrial Natural Gas Consumption by Segment, by End Use



Nexant's next step was to then develop a disaggregated forecast by sector which divided out residential, commercial and industrial baseline natural gas forecasts by end use for Cascade's Washington service territory as outlined in the tables below:

Table 6 - 7
Residential Baseline Natural Gas Consumption by End Use by Year (dth)

End Use	2014	2016	2018	2020	2022	2024	2026	2028	2030	2032
Space Heating	8,079,947	8,368,484	8,706,184	9,038,434	9,364,609	9,710,519	10,096,080	10,440,921	10,771,067	11,091,194
Water Heating	2,831,426	2,932,537	3,050,876	3,167,305	3,281,605	3,402,821	3,537,932	3,658,773	3,774,465	3,886,646
Room Heating	538,556	557,788	580,297	602,443	624,184	647,240	672,939	695,924	717,929	739,267
Clothes Dyer	26,917	27,879	29,004	30,111	31,197	32,350	33,634	34,783	35,883	36,949
Other	131,767	136,473	141,980	147,398	152,718	158,359	164,646	170,270	175,654	180,875
Total	**11,608,614**	**12,023,160**	**12,508,341**	**12,985,691**	**13,454,313**	**13,951,288**	**14,505,232**	**15,000,670**	**15,474,997**	**15,934,930**

Table 6 - 8
Commercial Natural Gas Baseline Forecast by End Use by Year (dth)

End Use	2014	2016	2018	2020	2022	2024	2026	2028	2030	2032	2034
Space Heating	5,693,885	5,878,143	6,091,708	6,296,486	6,502,141	6,708,487	6,954,140	7,167,620	7,367,969	7,523,039	7,759,600
Water Heating	990,435.79	1,022,487	1,059,636	1,095,257	1,131,030	1,166,923	1,209,654	1,246,788	1,281,638	1,308,612	1,349,761
Cooking	575,922.22	594,559	616,161	636,874	657,675	678,547	703,394	724,987	745,252	760,937	784,864
Other	658,847.40	680,168	704,880	728,575	752,372	776,249	804,673	829,375	852,558	870,501	897,874
Total	**7,919,090**	**8,175,357**	**8,472,386**	**8,757,191**	**9,043,218**	**9,330,206**	**9,671,861**	**9,968,771**	**10,247,417**	**10,463,089**	**10,792,100**

Table 6 - 9

Industrial Natural Gas Consumption Baseline Forecast by End Use by Year (dth)

End Use	2014	2016	2018	2020	2022	2024	2026	2028	2032	2034	2014
Space Heating	40,749	42,067	43,596	45,061	46,533	48,010	49,768	51,296	52,729	53,839	55,532
Water Heating	9,322	9,623	9,973	10,308	10,645	10,983	11,385	11,734	12,062	12,316	12,703
Process Heating	2,319,212	2,394,264	2,481,252	2,564,661	2,648,428	2,732,476	2,832,535	2,919,489	3,001,094	3,064,257	3,160,612
Other	294,030	303,545	314,573	325,148	335,768	346,423	359,109	370,133	380,479	388,486	400,702
Total	**2,663,312**	**2,749,499**	**2,849,394**	**2,945,178**	**3,041,373**	**3,137,892**	**3,252,796**	**3,352,651**	**3,446,364**	**3,518,898**	**3,629,549**

***Energy Efficiency Portfolio Development*:** A high-level energy efficiency potential was developed by Nexant based on measures as screened through the TEAPOT model under the following main assumptions:

- Measure cost effectiveness screen: Utility Cost Test (UCT)
- Incentive percentage of incremental cost (for achievable scenarios): 30%, 50% or 75%
- Avoided Costs: Current avoided costs as provided in Appendix H of Cascade's 2012 IRP
- Discount Rate: 8.55% (the WACC per the WUTC Policy Statement UG-121207). Additional scenarios have been run under the 4.17% discount rate and reflect more favorable results to continued, comprehensive conservation efforts as described later in this document).

High level screens performed under Nexant's baseline conditions have yielded the following total Achievable Potential for the Residential, Commercial and Industrial sectors.

Table 6 - 10

Residential Achievable Potential (dth) Screened by Levelized Cost ($/therm) under UCT

	Screened at Levelized Cost of:						
	$0.12	$0.22	$0.32	$0.42	$0.53	$0.64	$0.75
Space Heating	17,041	25,794	31,093	44,256	55,419	71,748	72,808
Room Heating	2	2	2	2	2	2	2
Water Heating	29,419	29,419	29,419	29,419	29,419	29,419	29,419
Clothes Drying	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-
TOTAL	**46,462**	**55,215**	**60,514**	**73,677**	**84,840**	**101,169**	**102,229**

Figure 6 – 5
Residential 2014 Achievable Base Potential Savings by Segment (UCT)

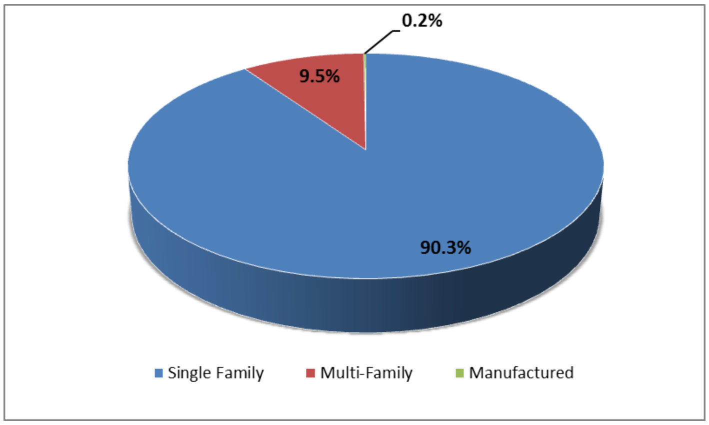


Table 6 - 11
Residential 2014 Cumulative Achievable Base Savings by Segment, by End Use (UCT)

	Single Family		Multi-Family		Manufactured		TOTAL
End Use	Dekatherms	% of Total	Dekatherms	% of Total	Dekatherms	% of Total	
Space Heating	228,139	62.8%	26,924	61.9%	409	61.1%	**255,472**
Room Heating	50	0.01%	14	0.03%	0	0.01%	**64**
Water Heating	133,727	36.8%	16,398	37.7%	259	38.6%	**150,384**
Clothes Drying	1,266	0.35%	178	0.41%	1	0.22%	**1,445**
% of Sales		**3.7%**		**2.5%**		**3.2%**	**3.5%**

Table 6 -12

Commercial 2014 Achievable Potential (dth) Screened
by Levelized Cost ($/therm) under UCT

	Screened at Levelized Cost of:						
	$0.15	$0.25	$0.35	$0.42	$0.55	$0.65	$0.85
Space Heating	1,534	6,998	8,520	10,758	11,955	12,807	14,133
Water Heating	12,101	13,512	13,736	14,678	14,924	15,339	16,058
Cooking	234	250	254	254	274	274	274
Other	-	515	515	711	711	711	763
TOTAL	**13,870**	**21,274**	**23,024**	**27,201**	**27,864**	**29,131**	**31,228**

Figure 6 - 6
Achievable Base Savings Potential by Commercial Segment (UCT)

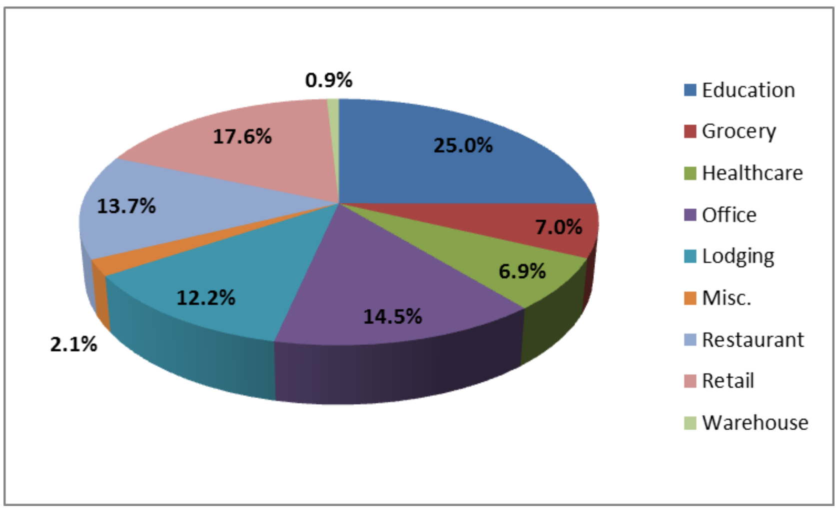


Table 6 -13
Commercial 2014 Achievable Base Savings by Commercial Segment,
by End Use (dekatherms and % of total)

End Use	Education		Grocery		Healthcare		Office		Lodging		Misc.		Restaurant		Retail		Warehouse		TOTAL
	dth	% of Total	dth	% of Total	dth	% of Total	dth	% of Total	dth	% of Total	dth	% of Total	dth	% of Total	dth	% of Total	dth	% of Total	
Space Heating	1,333	17.0%	1,660	76.1%	335	15.5%	3,705	82.0%	191	5.0%	606	90.5%	957	22.4%	5,116	92.9%	231	85.5%	**14,133**
Water Heating	5,760	73.6%	455	20.9%	1,829	84.3%	813	18.0%	3,567	93.6%	64	9.5%	3,139	73.3%	393	7.1%	39	14.5%	**16,058**
Cooking	19	0.2%	67	3.1%	4	0.2%	-	0.0%	-	0.0%	-	0.0%	184	4.3%	-	0.0%	-	0.0%	**274**
Other	711	9.1%	-	0.0%	-	0.0%	-	0.0%	52	1.4%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	**763**
% of Sales	0.6%		0.4%		0.7%		0.2%		1.2%		0.2%		0.6%		0.3%		0.1%		**0.4%**

It is important to recognize that the screens only represent the Technical, Economic, and Achievable potential within Cascade's Washington service territory but do not represent Programmatic, or on-the-ground conservation potential. Furthermore, the high-level screens provided in the Nexant report represent the savings potential available if every measure identified under the Achievable screen could be cost-effectively integrated into the Company's conservation program portfolio. In other words, the summary pages of the study provide a high-level view into what would be *theoretically* possible without concerns from program budgets or regulatory parameters. But in reality, not all measures identified by Nexant remain cost effective under real-world conditions and within the cost-screen thresholds identified in Appendix H of the Company's IRP.

It is not uncommon for a utility to set programmatic goals below achievable potential findings. Many utilities utilize potential studies to inform the direction of goals and help design programs to capture untapped end use/technology potential. We set a programmatic level for a variety of reasons as noted above, but also because administrative costs are not calculated into the program at the Achievable level, but rather at the Programmatic level. The Achievable potential also assumes savings are captured in all end uses in all market segments. It is rare for utilities to develop DSM programs that address all segments simultaneously, and instead tend to be more strategic in where they focus their resources.

As recognized by Nexant, a more nuanced approach is required in order for the Company to create a realistic portfolio of conservation measures that pass programmatic cost effectiveness screens and offer realistic and pertinent conservation benefits to our customers.

Therefore, as recommended by Nexant, the Company is treating the Base Case Portfolio Findings as a high-level assessment of potential, but is utilizing the TEAPOT model directly to create dynamic, focused portfolios and subsequent targets for use in both the IRP and for program planning. A summary of the program planning and TEAPOT modeling scenarios used by the Company for its Conservation Incentive Program portfolio revisions can be found in the section below.

Figure 6 - 7

Programmatic Potential Processes

Technical Potential	
This is calculated through TEAPOT and is reported as a combination of all Technical Potential for Residential & Prescriptive Commercial and Industrial	Technical Potential represents a substitution by the end user of all *technically* feasible measures at the end use level

↓

Economic Potential	
Calculated through the TEAPOT model and reported as a combination of all Economic Potential for Residential & Prescriptive Commercial & Industrial	Economic considers the most efficient measures that pass *economic* screening tests and is a subset of Technical Potential

↓

Achievable Potential	
At this stage the Company elects whether to use a Base, Moderate, or High adoption curve - we have used a Base adoption curve for this IRP.	
Calculated through the TEAPOT model and reported as a combination of all Achievable Potential for Residential/Commercial/Industrial	Achievable embodies a set of assumptions about the decisions consumers make regarding the efficiency of the equipment they purchase to simulate a realistic estimate of real-life conditions

↓

Programmatic Potential	
Calculated by the Company as shown below:	Programmatic Potential is the subset of achievable potential attainable given the Company's strategic planning on segment implementation, current Portfolio offerings, and administrative cost thresholds
25 % of Residential Achievable Potential	**75 % of Commercial Achievable Potential**
	Plus additional 65 % to accommodate custom commercial potential

Final Programmatic Potential is calculated based on the above inputs and cross-referenced with the Company's internal program planning tool. Additional information on the processes is available in this IRP.

DSM Portfolio Updates and Planning

Now that the Company has the TEAPOT tool and can input the measures identified by Nexant into our internal valuation mechanism we have a much more nuanced and supple method to develop our portfolio than has been used in the past. In the following section we identify the forecast models for the next 20 years utilizing all the measures identified by Nexant as potentially cost-effective and then include a snapshot of the expected forecast of conservation potential for the next two years taking into account our on-the-ground realistic savings goals. We'll also include an explanation of how we've come to our current rebate offerings through Tariffs 300 (Residential Conservation Incentive Program), and 302 (Commercial Industrial Conservation Program).

The next section is provided in an effort to provide transparency into the development of the Company's revised Conservation Incentive Program for both its Residential and Commercial/Industrial sectors in place at the time of this writing and was run under the WACC discount rate of 8.33% and 2.6% inflation rate used by the company at the time. All scenarios have been screened and developed from the Nexant Technical, Economic, and Achievable Potential (TEAPOT) Model. This tool has allowed the Company to build out Achievable Potential estimates based upon discrete bundles of cost-effective measures.

All measure assumptions were adjusted as appropriate based on Nexant's findings. All measures were run under the Company's 4.17% long term discount rate as per discussion with its Conservation Advisory Group. Additional scenarios have been screened under the UCT and utilized the 8.33% WACC discount rate recommended for residential measures weighed under the UCT per policy statement UG-121207 with bond rate used for the TRC under the residential scenarios and can be referenced in Appendix __. This was performed in the Company's standard program planning and cost-effectiveness assessment tool and became the final version approved by the CAG and forwarded to the WUTC for implementation in September.

At the time each option presents the best possible outcomes under the Long Term discount rate scenario. In this instance "Best Possible Outcome" resulted in a portfolio that:

1. Maximized the inclusiveness of viable, industry-acknowledged conservation measures
2. Did so while maintaining incentive levels that send a meaningful market signal to consumers to upgrade to high-efficiency equipment and measures
3. Remained cost effective at the Company's most recently acknowledged avoided costs, even if participation levels remained on par with prior year's achievements (for residential)

Residential Scenarios

As suggested above, residential offerings have been screened for cost-effectiveness and synchronized with the corresponding scenarios in TEAPOT. The TEAPOT model was built to include the Company's current portfolio measures so coordination between the Nexant model and the internal program planning tool was a straightforward process.

Scenarios were built from measures identified by Nexant and our program delivery team. The portfolios were then run through TEAPOT once more so generalized Achievable Potential targets could be set. This is described in more details in the sections below.

Portfolios were developed to maximize the number of rebates available to our customers — with rebates set at incentive levels attractive enough to encourage the desired conservation behavior. Administrative costs were set to levels commensurate with our 2014 budget.

We set an administrative budget in order to plan and operate programs. This budget must ensure an acceptable ratio of costs balanced with therm savings achievements. Since therm savings offset the costs of administrative investment, the greater the achievement, the more cost-effective our programs. If the budget or therm savings upon which the portfolio is built are unrealistic, we risk developing a scale-dependent portfolio doomed to failure.

For program planning Achievable Potential means the likelihood of measure adoption under realistic market and societal conditions in the CNGC service territory. However, Achievable Potential should not be confused with Program Potential, which is influenced by Regulatory Policy and company budgets/tariffs. Cascade will aggressively strive towards Achievable Potential, but will build programs against the threshold of lower more Program-realistic targets in order to ensure maintained cost effectiveness.

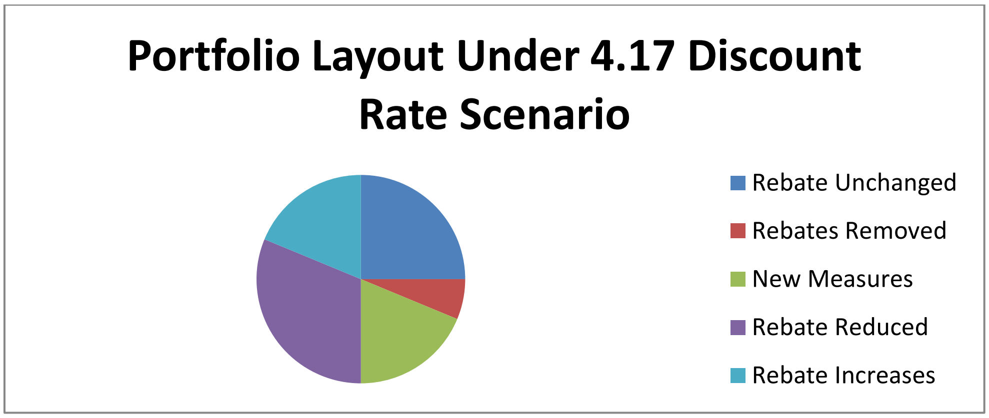
Under the 4.17% Long Term Discount Rate, Cascade was able to grow and maintain a portfolio of measures with a total Achievable Potential of 632,913 utilizing the UCT. As a final note, therm savings targets were based from the TEAPOT tool and will be used for the purposes of IRP and Conservation Plan development. However for the purposes of program development, we have narrowed the target to 138k therms (closer to 25% of Achievable base), reflecting a number within approximate range of our 2013 achievement. This was built this way in order to ensure any program portfolio built is not set up for failure if it cannot attain an unrealistic model-created target. Additional savings achieved beyond this figure make the conservation programs even more cost effective, maximizing the value of participation for the Company and Ratepayers.

TEAPOT- generated targets will be acknowledged in the IRP and conservation plan as *aspirational* targets and those we will aggressively strive towards throughout the year.

However, the programs will be built in a way that ensures cost-effectiveness can be maintained even if we fall short of that target.

Now that we have reviewed Residential program budgets and targets, here are the results of the Best Possible Outcomes under the 4.17% discount rate scenarios for the Residential Program.

Figure 6 - 8



The above chart provides a high-level overview of the portfolio spread available to our customers under an optimized program planning scenario where we set rebate levels at as close to 30% of cost as possible in order to maintain attractive incentives.

Measures remained in the portfolio if they were able to maintain a benefit cost ratio of over 1 at a measure level, and a loaded levelized cost of under $0.41 per therm at the portfolio level under the following conditions:

(a) under the full spread of anticipated residential program expenses;
(b) under a target based from prior year achievements;
(c) Under an incentive level within reach of 30% of incremental costs, per Nexant guidance as reasonable threshold for encouraging update of conservation measure.

For the most part, outcomes were positive with only one measure removed from the portfolio due to strains to cost-effective under the current lowered cost of natural gas. The efficiency levels for two measures — .64 water heaters and 90% efficient furnaces were adjusted upwardly to .67 and 95% respectively, in order to reflect the market, and set the conservation bar higher for our customers to encourage deeper energy savings. Four measures remained unchanged from the current tariff. Three new measures were added, and three rebates were upwardly adjusted due to their extreme cost-effectiveness and in order to help them reach a threshold closer to .30 of measure cost. Five measures experienced downward adjustments in order to balance the portfolio and maintain cost effectiveness overall, but careful attention was paid to ensure the rebates were not reduced to levels that would make them unattractive to customers and thus become purposeless as incentives towards positive conservation behavior.

Commercial/Industrial Scenarios

The Nexant potential assessment and TEAPOT modeling tool have allowed the Company to identify viable measures for inclusion in a modified Commercial/Industrial Conservation Program portfolio. The purpose of this exercise was to design a program able to withstand fluctuations in avoided gas costs and maximize the spread of cost-effective and worthy measures for inclusion in the CNGC Conservation Incentive Program.

Savings levels were based from the TEAPOT model. The outcomes were developed by running multiple portfolio scenarios carved out from the master list of measures. Carve-out was based from Nexant's screened achievable cost-effectiveness, with a secondary review of this measure sub-set by the C&I program delivery team. The portfolio was screened in both TEAPOT and in the Company's internal valuation tool. For the purposes of program planning, a viable measure set was defined as one composed of measures identified by Nexant and the Company as viable through its initial measure screen *and* remained viable under the company's best estimates of program expenses and predicted energy savings.

It is important to note the screen conducted with the TEAPOT tool and internal valuation mechanism for the Commercial/Industrial sector was performed **strictly to assess viable prescriptive measures and potential**. TEAPOT can only provide estimated achievable potential based on known measures. However, program experience has clearly demonstrated the prescriptive portion of savings from the CNGC Conservation Program is fairly consistent, with an average of 65% of therm savings coming from custom projects. Therefore the prescriptive portfolio is assumed to represent 35% of total program savings.

All measures identified as viable under Nexant from an Achievable Potential Standpoint were screened under the TRC and UCT utilizing Company's 4.17% long term discount rate. This was performed in the Company's standard program planning and cost-effectiveness assessment tool.

Incentive levels had been set to one third of incremental costs as determined by Nexant or ground-level programmatic data. Keeping all incentives in the 30-33% range allowed us to clearly synchronize program offerings with the TEAPOT model which begins a base scenario of Achievable 1 at an assumption of a minimal viable rebate level of 33% of incremental costs, in order to avoid free ridership, or vestigial offerings.

Measures remained in the portfolio if they were able to maintain a benefit cost ratio of over 1 at a measure level, and a loaded levelized cost of less than $0.41 per therm at the portfolio level under the following conditions:

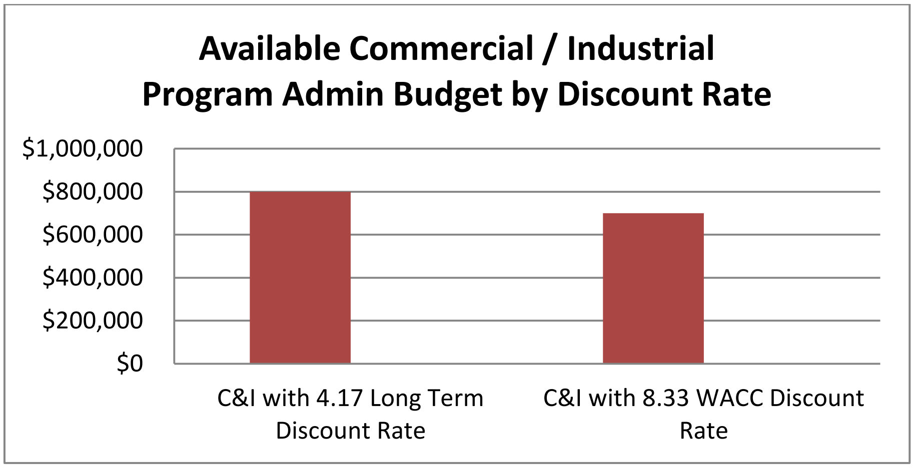
(a) under the full spread of anticipated C&I program expenses;
(b) under a combined prescriptive + customer C&I target developed via TEAPOT (35% of total program savings) + additional proportion of custom savings (assumed at 65% of total C&I program savings).
(c) Under an incentive level at least 30% of incremental costs, per Nexant guidance as minimal threshold for encouraging update of conservation measure.

Cascade strives towards aggressive conservation achievements, but at the program development phase it is essential we balance optimism and realism. Program developers must set an administrative budget in order to plan and operate programs. This budget must ensure an acceptable ratio of costs balanced with therm savings achievements. Since therm savings offset the costs of administrative investment, the greater the achievement, the more cost-effective our programs. If the budget or therm savings upon which the portfolio is built are unrealistic, we risk developing a scale-dependent portfolio doomed to failure because we designed a program dependent on the savings levels we *hoped* we would achieve, based on abstract modeling, and not based on prior year accomplishments and ground level understanding.

As with the Residential program, the Company analyzed the Best Possible Outcomes for a portfolio designed under the parameters of the WUTC policy statement. The portfolios were optimized for rebate level, budget and measure mix. The following table demonstrates the maximum viable budget under both a 4.17% Long Term and 8.33% WACC discount rate scenario. For the development of the CIP C&I portfolio, program costs were assumed at the fully budgeted amount for program development contractor, plus an additional buffer for internal administrative expenses and staff time. If at all possible, costs are managed at a level lower than this estimate, but significant cut-backs would require further aggressive administrative restructuring, and therefore would be imprudent to base from a more aspirational budget for the purposes of program planning.

Estimated administrative costs were assumed to be approximately $800k, reflecting the estimated expense of the Lockheed Martin program delivery contract plus a buffer for CNGC staff time and expenses

Figure 6 - 9

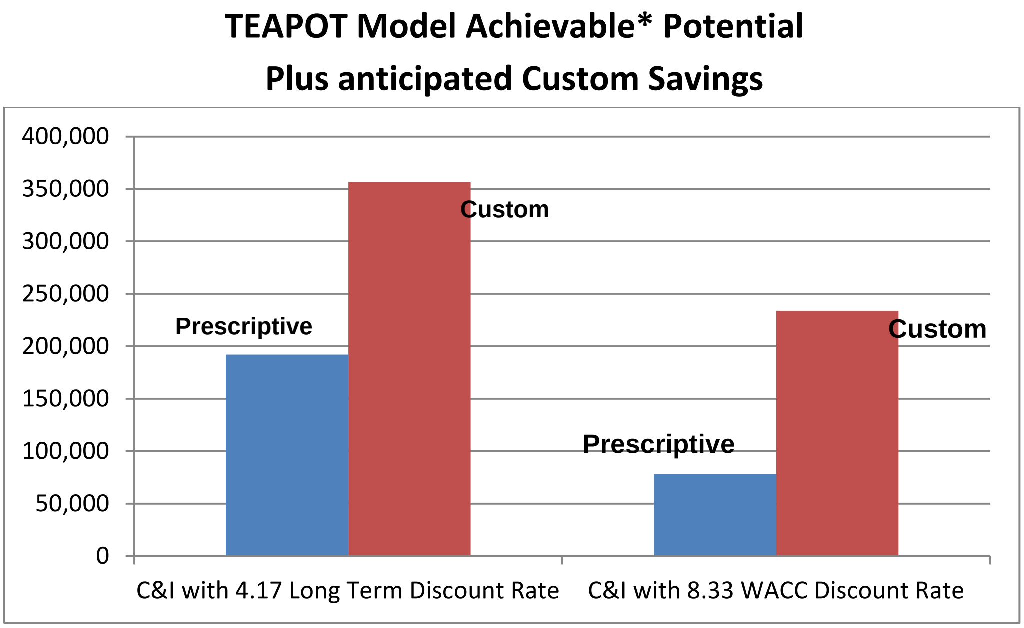


The appropriate budget levels described previously were entered into the cost-effectiveness calculation tool. These costs were balanced against the targets and portfolio offerings available under the respective discount rate scenarios.

Budgets must balance out with a realistic, proportionate level of therm savings. The table below shows the anticipated level of Achievable Potential modeled from TEAPOT. Total achievable therm savings for the Company's modified C&I programs were based from the TEAPOT tool in combination with a best estimate based on previous accomplishments and real experience with program implementation.

All targets and costs utilized in the internal valuation tool reflect the total assumed achievement and expenditure associated with the full program *including* the custom component, which was assumed at 65% of the total achieved savings for the year.

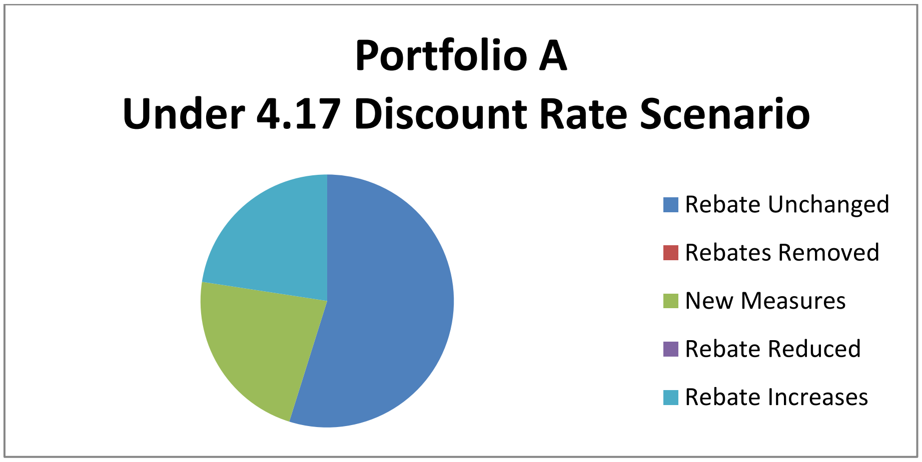
Figure 6 - 10



Under the Long Term discount rate scenario, total Achievable Potential was approximately 192,091 therms saved from prescriptive measures in an inclusive portfolio, with an additional 356,740 therms achieved through custom incentives. That said, Achievable Potential identified through TEAPOT may still be overly inclusive as it does not reflect factors such as internal budgeting to meet cost-effectiveness thresholds and external policy impacts.

Thus, while the therm savings identified through TEAPOT (and through traditional custom-to-prescriptive ratios) will be used in the IRP as our aggressive aspirational targets that we strive towards, for the sake of portfolio development, we have adjusted targets to 75% in the 4.17% long term discount rate scenario to set a more realistic minimal threshold that must be met in order for the programs to remain cost-effective. To do otherwise would risk designing a program that buckles under the weight of its own administrative and rebate costs unless an overly optimistic level of savings were achieved.

Figure 6 -11



The chart above provides a visualization of the optimized portfolio of measures developed from the TEAPOT model and screened against the avoided gas costs outlined in our most recently acknowledged Integrated Resources Plan.
Under a Long Term discount rate scenario, the Company was able to maintain a robust portfolio of prescriptive conservation incentives, retaining 17 measures at their current levels, and increasing the rebate level for 7 measures without negatively impacting program cost-effectiveness. In addition, 7 new measures were added to the list of prescriptive rebates, opening up expanded conservation opportunities. These measures were identified in the Nexant study and by our program delivery team as having a high-likelihood of adaptation if incentives were provided to drive purchase behavior.

Figure 6 -12

Program Updates from Tariff Filing in September, 2014

Following the above program planning process in summer of 2014, the Company submitted several proposed program updates after consultation with its CAG to the WUTC which were approved with an effective date of September 2, 2014. Some of the updates involved removal of measures we found to no longer be indicative of the efficiency of the measures actually being installed (like the 90% furnace removal) while others were in response to cost-effectiveness thresholds to maintain a cost-effective portfolio of measures run under the UCT. Updates included the replacement of .64 EF (Energy Factor) water heaters with models meeting the .67 EF standard; the inclusion of rebates for whole house air sealing and high-efficiency exterior doors as well as additions to the Commercial sector of the CIP. A full listing of program changes can be found below:

Additions

- Residential Built Green Certified Home - Added at $600 incentive level
- Residential High Efficiency Exterior Door - Added at $50 incentive level
- Residential Whole House Air Sealing - Added at $100 incentive level
- Commercial Motion Faucet Controls - Added at $105 incentive level
- Commercial Recirculation Controls - Added at $100 incentive level
- Commercial Ozone Injection Laundry System - Added at $2,500 incentive level
- Commercial Gas Conveyor Oven - Added at $600 incentive level
- Commercial Energy Savings Kit - Added as a free kit (Value of $25 or $55)
- Commercial Door Type Dishwasher Low Temp Gas DHW, ENERGY STAR < = 2.0 Kw Idle Rate <=0.50 gal/rack - Added at $650 incentive level

Replacements

- Residential 0.64 EF Water Heater Specification with 0.67 EF Specification- Increased from $40 to $45

Modifications

- Residential High Efficiency Natural Gas Furnace 95%+ AFUE (90% removed due to market transformation) - Increased new construction upgrade from $200 to $250
- Residential High Efficiency 80% AFUE Hearth / Fireplace - Reduced from $300 to $250
- Residential High Efficiency 70% FE Hearth / Fireplace - Reduced from $200 to $250

- Residential Combination DHW and Space Heat using Tankless Water Heater - Reduced from $1,000 to $825
- Residential Floor Insulation - Reduced from $0.45 sq. ft. to $0.30 sq. ft.
- Residential Wall Insulation - Reduced from $0.40 sq. ft. to $0.35 sq. ft.
- ENERGY STAR Plus Certified Home - $750 rebate removed
- Residential Furnace and PTCS Duct Sealing - $400 rebate removed
- Northwest ENERGY STAR Certified Home - Increased incentive from $550 to $600
- Commercial Direct Fired Radiant Heating - Increased incentive from $6.50 kBtu/hr. to $6.95 kBtu/hr.
- Commercial Wall Insulation R-11 and R-19 - Increased Tier I from $0.30/sq. ft. to $0.50/sq. ft. / Increased Tier 2 from $0.40/sq. ft. to $0.56/sq. ft.
- Commercial Steam Traps, Minimum 300 kBtu system size, steam pressure operating at 7 psig or greater, steam trap line size < 2”, Min 25 psig Trap Design Pressure - Increased from $80 to $125
- Commercial Gas Convection Oven - Increased from $400 to $450
- Commercial Gas Griddle - Increased from $200 to $350
- Commercial 3 Pan Gas Steamer >= 38% Cooking Efficiency, <= 2,083 Btu/hr./pan Idle Rate - Increased from $650 to $850

The Company will continue to monitor the state of natural gas conservation technologies within its service territory and make adjustments commensurate with evolving Energy Star standards and code requirements as well as monitor new and promising technologies available to optimize the use of natural gas in our customers’ homes. Such measures may include a natural gas heat pump as they become more widespread throughout the market place, or potentially Boiler Pipe Insulation and Demand Control Ventilation.

Current Program Offerings 2015

As suggested above, all items offered at the time of the 2015 Integrated Resources Plan were developed based on the Company’s best understanding of avoided costs as outlined in Appendix H of the previous Integrated Resources Plan acknowledged by the WUTC and savings assumptions and targets were built from the Nexant Study, TEAPOT modeling tool, and on-the-ground knowledge of Cascade’s Washington service area. The Company’s conservation portfolios and programs are subject to modification following the acknowledgement of this more recent IRP, and/or following any and all changes to the underlying data or circumstances surrounding the assessment and measurement of program cost-effectiveness. Customer participation levels will be commensurate with a cost-effective natural gas conservation measure mix that Cascade will be able to maintain in its portfolio. This shall be assessed by taking into account the cost-effectiveness parameters recommended by the WUTC following the outcome of UG-121207, “Rulemaking on Natural Gas Conservation Programs,” with modifications to discount rate *use of the 4.17% long term discount rate) as supported by the Company's Conservation Advisory Group.

For the following tables please note– levelized costs displayed do not include administrative costs. The Company includes the administrative costs at the portfolio level, and they are factored in during the programmatic planning stage in our annual report. Also, levelized costs are shown as a range since Cascade tracks therm savings dependent upon which of Washington's three climate zones the measure is installed in. The range below also indicates the varied vintage of the measure (whether it is a replacement for a broken item, an early replacement or a new install) and finally the market segment (type of building in which the install occurs).

Table 6 -14
Current Residential Program Offerings from Tariff 300

Measure	Incentive	Therm Savings Range per premise values*	Levelized Cost / Therm per premise values ($)
High Efficiency Natural Gas Furnace 95%+ AFUE	$250	100 - 134	0.25 – 0.43
High Efficiency Natural Gas Hearth /Fireplace 70% + FE	$150	74 - 76	0.21
High Efficiency Natural Gas Hearth / Fireplace 80% + AFUE	$250	74 - 76	0.21
High Efficiency Combination Hot Water and Space Heat 90% + AFUE	$825	384 - 539	0.09 – 1.40
Condensing High Efficiency Natural Gas Tankless Water Heater 0.91 + EF	$150	54 - 82	0.58 – 0.79
Conventional High Efficiency Natural Gas Water Heater 0.67 + EF	$45	14 - 43	0.28 – 0.69
High Efficiency Exterior Door ≤ U 0.21	$50	13	0.37

Floor Insulation ≥ R-30 prior NTE R-11	$0.30 / sq. ft.	108 - 132	0.37 to 0.42
Wall Insulation ≥ R-11 prior NTE R-4	$0.35 / sq. ft.	118 - 233	0.02 to 0.08
Ceiling or Attic Insulation ≥ R-38 prior NTE R-18	$0.30 / sq. ft.	24 – 194	0.21 to 0.27
Whole House Residential Air Sealing ≤ 0.0003 SLA	$100	71 - 84	0.30
Northwest ENERGY STAR Certified Home + U.30 Glazing	$600	200 - 206	0.27
Upgrade to ENERGY STAR Premium High Efficiency Natural Gas Furnace	$250	100 - 134	0.25 – 0.43
Built Green Certified Home	$600	203 - 210	0.27
Energy Savings Kit 1 or 2	Free (Value $10 or $16)	17 – 31	0.37

Table 6 -15
Current Commercial Program Offerings from Tariff 302

Measure	Incentive	Therm Savings Range per premise values	Levelized Cost / Therm per premise values ($)
Warm Air Furnace **Condensing** Min 91% AFUE	$3.00/kBtu/hr.	126-304	0.18 – 0.70
HVAC Unit Heater	$1.50/kBtu/hr.	92 – 611	0.52 – 1.50

Non-Condensing Min 86% AFUE			
HVAC Unit Heater **Condensing** Min 92% AFUE	$3.00/kBtu/hr.	247 – 1361	0.30 – 0.66
Radiant Heating Direct fired radiant heating	$6.95/kBtu/hr.	311 – 1382	0.02 – 0.13
Boiler Condensing Min 90% Therm Efficiency & 300 kBtu input	$4.00/kBtu/hr.	151 – 667	1.34 – 5.07
Boiler Vent Damper Min 1,000 kBtu input	$1,000	24 – 73	0.71 – 2.47
Boiler Steam Trap Min 300 kBtu input Steam pressure @ 7 psig or >	$125	73 – 261	0.08 – 0.32
Domestic Hot Water Tanks Condensing Min 91% Thermal Efficiency	$2.50/kBtu/hr.	11 – 1521	0.13 – 1.63
Domestic Hot Water Tankless Water Heater ENERGY STAR 0.82 EF	$60/gpm	6 – 1137	0.15 – 1.68
Attic Insulation Tier 1 Min R-30	$0.50 /sq. ft.	46 – 204	0.151
Attic Insulation Tier 2 Min R-45	$0.65 /sq. ft.	46 – 204	0.192
Roof Insulation Tier 1	$0.60 /sq. ft.	288 – 744	0.14 – 0.63

Min R-21			
Roof Insulation Tier 2 Min R-30	$0.80 /sq. ft.	288 – 744	0.14 – 0.63
Wall Insulation Tier 1 Min R-11	$0.50 /sq. ft.	211 – 935	0.17 – 0.38
Wall Insulation Tier 2 Min R-19	$0.56 /sq. ft.	211 – 935	0.16 – 0.39
Ozone Injection Laundry Venturi injection or bubble diffusion – Min 125 lb. total washer/extractor capacity	$2,500	294 – 1049	0.82 – 1.78
Motion Control Faucet Max flow rate of 1.8 gpm	$105	72 – 1330	0.16 – 0.57
Clothes Washer 1.8 MEF	$180	379 – 1850	0.01 – 0.20
Gas Convection Oven ENERGY STAR ≥ 42% Cooking Eff / ≤ 13,000 Btu/ hr. Idle Rate	$450	368 – 736	0.23 – 0.41
Gas Griddle ENERGY STAR ≥ 38% Cooking Eff / ≤ 2,650 Btu/ hr. Idle Rate	$350	155 – 274	0.08 – 0.15
Gas Conveyor Oven > 42% tested Baking Eff	$600	137 – 589	0.69 – 2.34
Connectionless 3 Pan Gas	$850	1174 – 1283	0.05 – 2.23

Steamer ENERGY STAR or CEE/FSTC qual. ≥ 38% Cooking Eff / ≤ 2,083 Btu/ hr./pan Idle Rate			
Connectionless 6 Pan Gas Steamer ENERGY STAR or CEE/FSTC qual. ≥ 38% Cooking Eff / ≤ 2,083 Btu/ hr./pan Idle Rate	$1,200	1174 – 1283	0.05 – 2.23
Double Rack Oven FSTC Qualified ≥ 50% Cooking Eff / ≤ 3,500 Btu/ hr./pan Idle Rate D Rack	$2,000	65 – 587	0.151
ENERGY STAR Gas Fryer	$600	388 – 685	0.08 – 0.14
Door Type Dishwasher Low Temp ENERGY STAR ≤ 0.6 kw Idle Rate/≤1.18 gal/rack	$650	16 – 1290	0.13 – 0.65
Multi-Tank Conveyor Low Temp Dishwasher Gas Main w/Electric Booster ENERGY STAR ≤2.0 kw Idle Rate;≤0.50 gal/rack	$1,000	16 – 1290	0.08 – 1.29
Recirculation Controls Continuous Operation DWH Pump	$100	112 – 399	0.02 – 0.15
Energy Savings Kit A or B	Free	34-45	0.37 – 0.49

	(Value $55 or $25)		

Washington Low Income Program

This program is available to income-eligible residential dwellings served by Cascade Natural Gas where the primary heating equipment in the residential dwelling is fueled by natural gas. The program is designed to increase energy efficiency in low-income households within Cascade service territory by providing rebates for the installation of certain energy efficiency measures in qualifying residential dwellings following the completion of a home energy evaluation performed by a qualifying Agency. The customer must be a residential customer of the Company and must be certified as low-income by a Communication Action Agency or Low Income Agency. The customer must also reside in a dwelling built prior to 1991 with natural gas as the primary heating source.

The following measures qualify for a rebate through the current Cascade Low-Income Washington Weatherization program. Calculations for rebates are based on projected annual therm savings of the measure(s) x 100% of the Avoided Cost per therm.

Table 6 -16

Current Low Income Weatherization rebate offerings from Tariff 301

Measure	Avoided Cost per Therm
Ceiling Insulation	$8.09
Wall Insulation	$8.09
Floor Insulation	$8.09
Duct Sealing and Insulation	$6.15
Infiltration Reduction	$6.15

Table 6-18 offers adjustments to reflect more realistic annual achievements for the Company's Low Income Weatherization program. Note the decrease in expected savings from previous years' projections under the Low Income Weatherization program. This decrease is a reflection of program achievements for 2014 and a more realistic goal based on new evidence related to current client prioritization performed by the Community Action Agencies for natural gas heated homes. The U.S. Department of Energy Weatherization Assistance Program (DOE-WAP) requires if the Community Action Agencies use DOE-WAP funds, all rules and guidelines for utilization of their funds be met – including their prioritization guidelines.

These guidelines instruct agencies to develop an "actual waiting list" to determine which households are served next for weatherization services. Priority is given by age, disabilities and homes with children age six or younger. Priority can also be given to high residential energy users and households with a high energy burden. Currently, agencies are serving those homes with the largest Heat Cost Burden (percentage of clients' income dedicated to paying for heat) and by their large Energy Cost (total dollars being spent annually on baseload and space heat). Due to the low cost of natural gas and the commensurate higher electric heating bills, client homes heated with electricity are being served first. In the current energy-price environment, natural gas customers are at a distinct disadvantage for getting assistance with weatherization services regardless of their need. In fact, some agencies are planning on less than 10% of the homes they weatherize for 2015 to be customers with natural gas heated homes. This is why our 2015 therm savings projection is similar to our 2014 therm savings achieved and why the Company has elected to decrease expected savings for the 20 year forecast over the 2012 IRP estimates. It is probable that the agencies will find a way to utilize utility funding for gas heating homes more regularly if gas prices increase causing a higher energy burden for natural gas homes.

The Company has identified the causes of the reductions in 2014 and is currently working with the Community Action Program Agencies to help move the Low-Income Weatherization therm savings back toward historic program performance levels. If additional funding becomes available, and modifications in administrative rules are made from the Department of Commerce, the Low-Income program will provide additional savings potential. The Company represents the lowered savings potential in the near future through 2016 and has ratcheted up the savings in the following years to a level more commensurate with past achievements in years that were not dependent on American Recovery and Reinvestment Act funding.

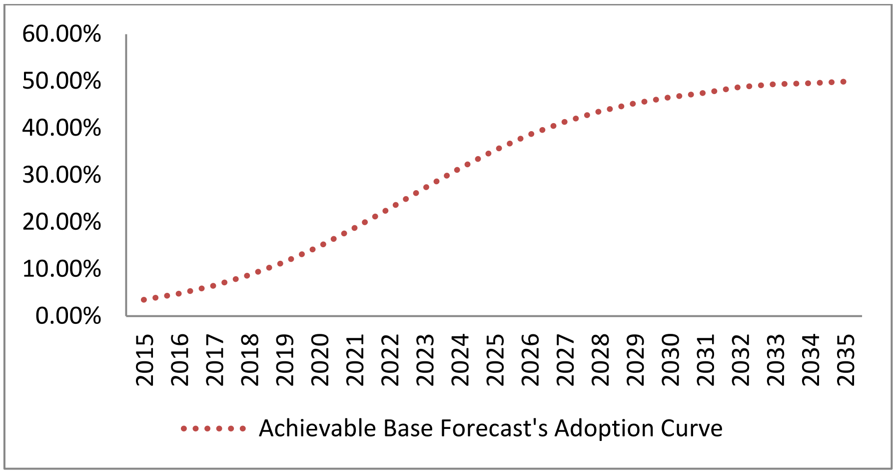
Forward Looking Targets/ TEAPOT Forecasts

The TEAPOT model was used in the following section to provide an illustration of the Company's Conservation Potential for Residential and Commercial/Industrial Prescriptive program participation for a 20 year forecast (see table 6-18 and Figure 6-21). It was also used to provide a foreshadow of the more immediate 2-year potential incorporating expected programmatic levels of participation alongside the TEAPOT modeled base Achievable levels.

Residential Potential

The TEAPOT model for the Residential program was run for the 20 year forecast with an all-inclusive measure set meaning all measures indicated by Nexant to potentially be cost-effective under the UCT were included in the forecast from 2015-2035. We then ran a subset of measures based on the current program portfolio for the 2015-2016 timeframe to give a potential savings in-line with our programmatic on-the-ground expectations. The Company used the Achievable base as noted previously in this IRP.

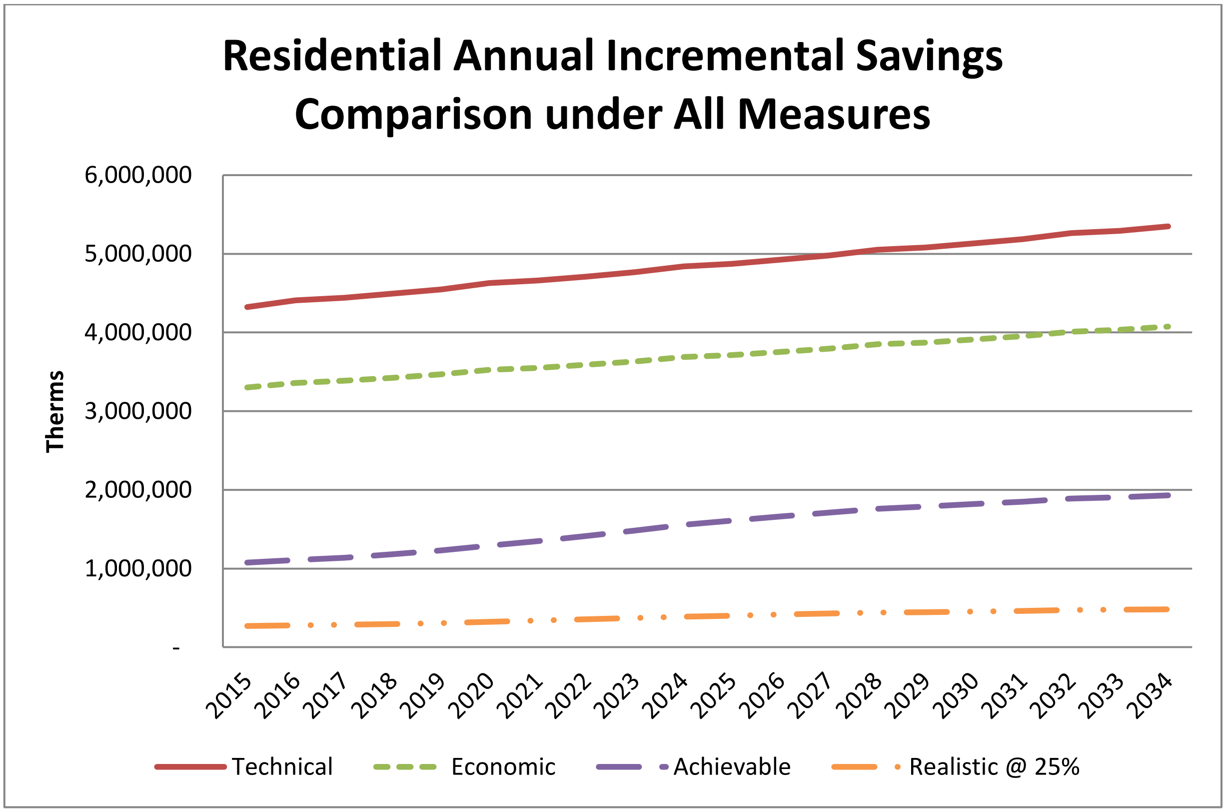
Figure 6 -13
Achievable Forecast Adoption Curve



TEAPOT has the ability to model additional adoption curves at a moderate or higher level for the Achievable potential. The Company, however, elected to use the base adoption curve at 50% as opposed to the moderate and high option which correlate with higher incentive level caps. As a policy decision we use the base at this time because the savings potential can be slightly greater than the achievable moderate savings potential, even though the moderate had a more aggressive adoption curve as was the case in 2014. Nexant address this in Volume II page 48 (available in appendix D, page 99) the Cascade Assessment of Achievable Potential & Program Evaluation. This occurs because the measure cost used in the cost-effectiveness test under the achievable moderate scenario (50% of incremental cost) compared to the achievable base scenario (30% of incremental cost) causes more measures to fail cost effectiveness. The fewer measures passing cost effectiveness can have a greater impact on potential than the increased adoption of the measures in the moderate scenario. By running the program at the base adoption curve we are able to maintain a more robust portfolio.

Based on the all-inclusive scenario of the residential program savings in an ideal setting, the following figure demonstrates what potential could look like if the Company included all residential measures represented by Nexant as cost-effective:

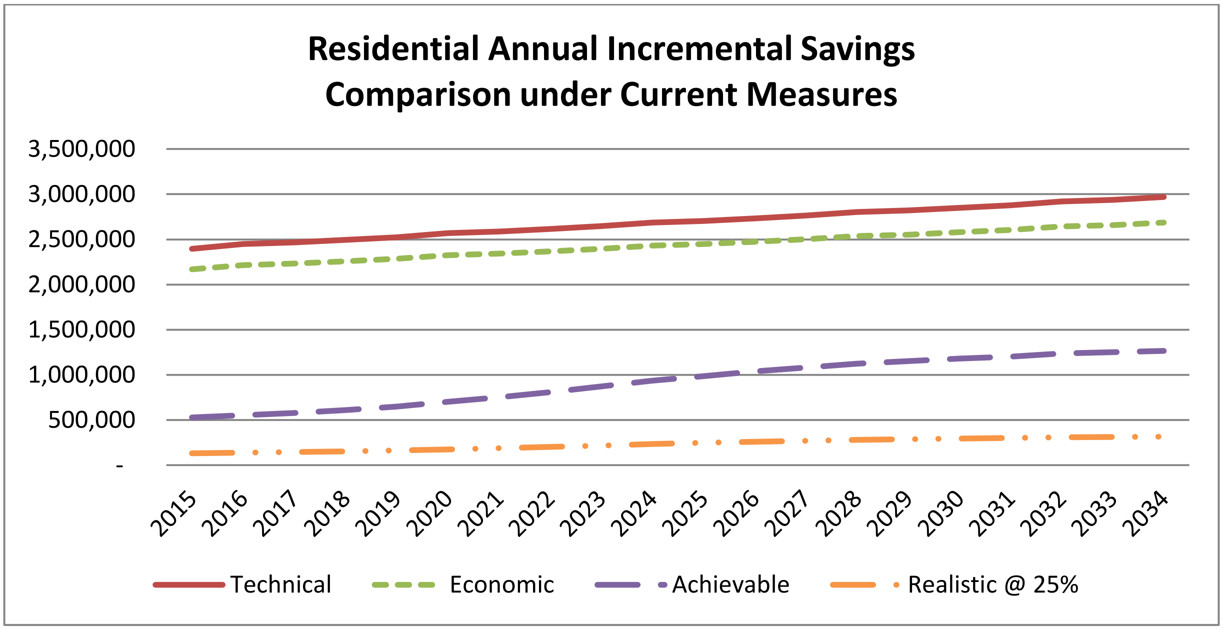
Figure 6 -14



At this point it's important to note this is not a viable portfolio for actual program planning, but it does provide a demonstration of the inclusivity of the Nexant TEAPOT tool. The line graph above provides five separate lines denoting the various savings potentials for Technical, Economic, Base Achievable, a reduction to 75% of Achievable to accommodate aspirational programmatic targets and an on-the ground savings potential in line with past program participation levels. This last line corresponds with the method used when developing our current rebate offerings. For the purposes of program development, we narrowed the target closer to 25% of Achievable base to reflect a number within approximate range of our previous year's achievements. The Company will continue to seek higher savings goals, but this allows us to maintain cost-effective programs without setting the program up for failure.

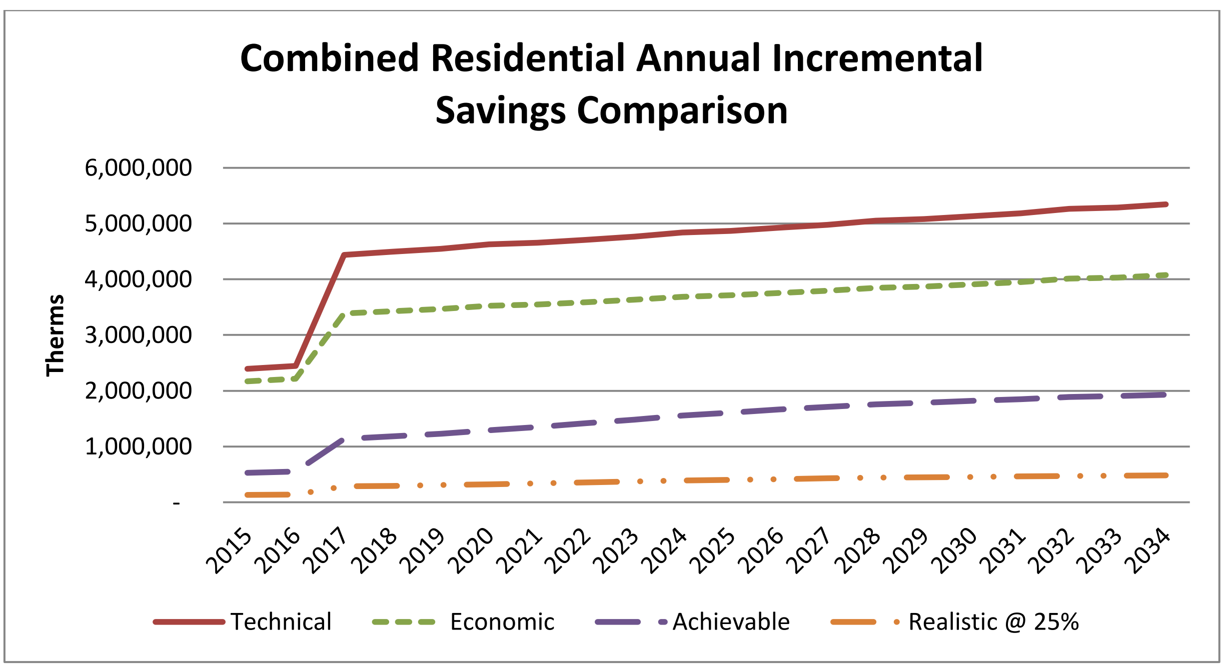
The following graph shows the Residential program potential under the current program portfolio.

Figure 6 -15
Program Potential under current Portfolio



Below is the Residential combined annual incremental energy savings by scenario. Note the sharp increase from year 2016 to 2017 when the company tracks the potential from the all-inclusive scenario as opposed to the portfolio specific scenario utilized in 2015 and 2016.

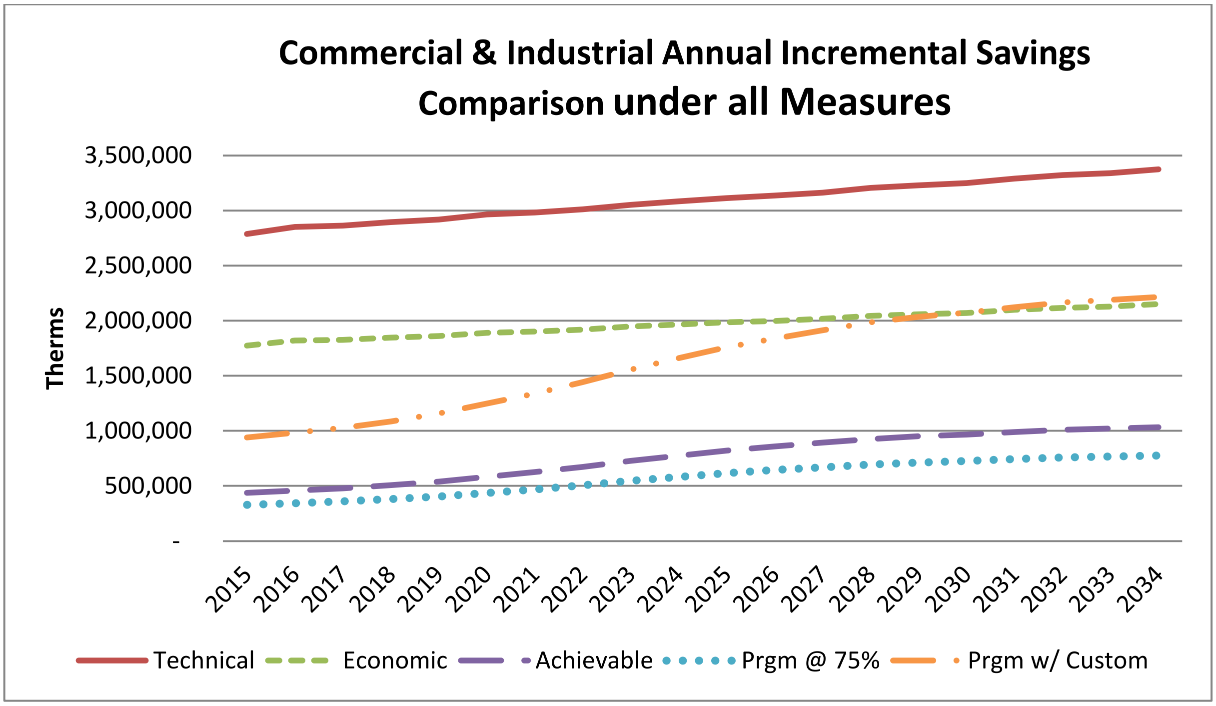
Figure 6 -16



Commercial/Industrial Potential

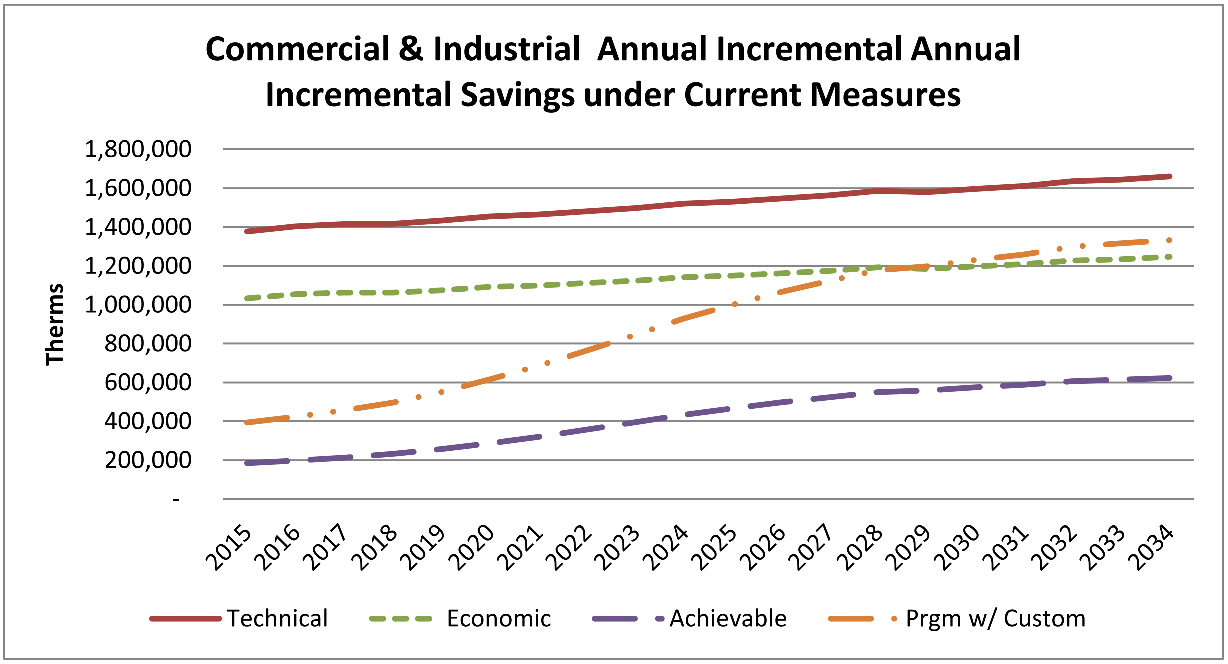
Below is the all-inclusive Commercial/Industrial forecast for the prescriptive portion of the Company's CIP.

Figure 6-17



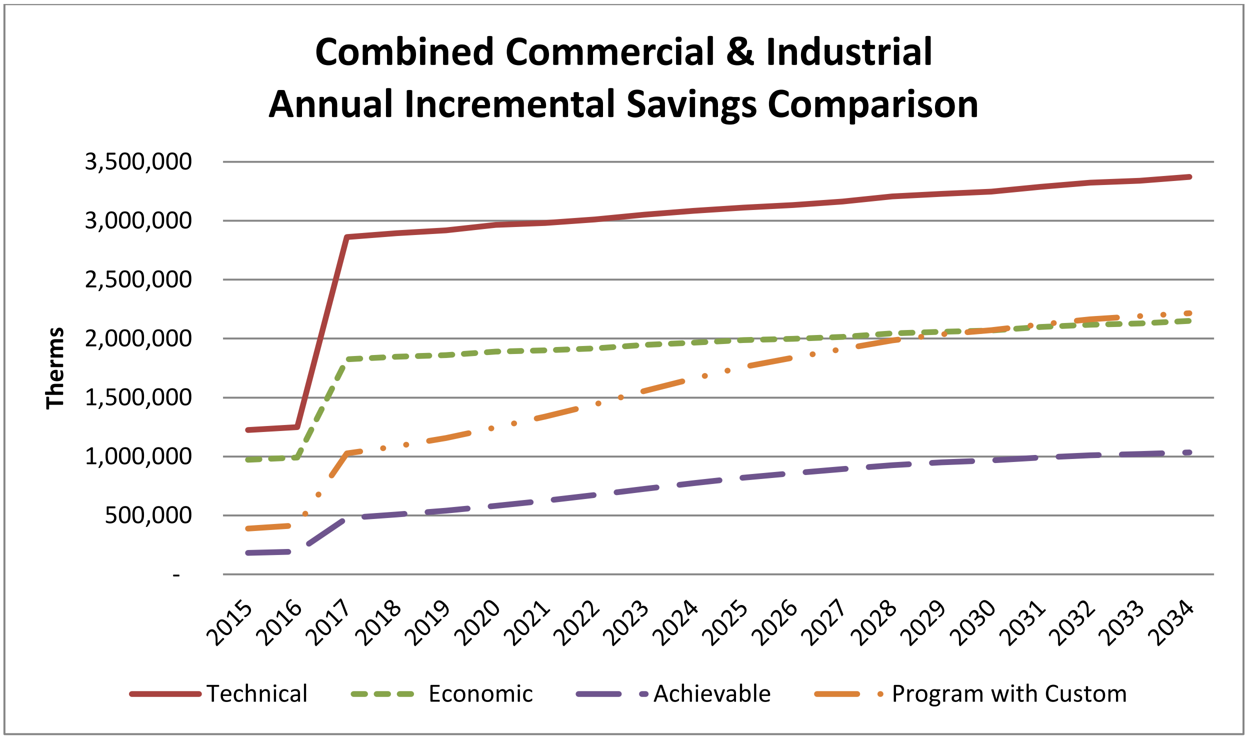
As noted previously the model does not allocate savings associated with the Company's Custom Commercial/Industrial program offerings which characteristically account for 65% of the conservation savings for the Commercial/Industrial CIP. To display overall expected participation numbers we have added in the historic participation levels for custom projects which makes the Program with custom line exceed the savings potential alone for the Economic prescriptive measures in the latter portion of the graph above. We have also provided a graph of the conservation potential for the Commercial/Industrial CIP where only those measures currently available in our portfolio are calculated along with the expected 65% addition from custom.

Figure 6 -18
CIP Portfolio under current Portfolio



Once the Company had the combined Commercial/Industrial measures and was able to add in the custom component the following demonstrates the Commercial/Industrial Annual Incremental Energy Savings by Scenario. Note the uptake between years 2016 and 2017 indicating the transition from tracking savings potential by the current portfolio in effect to the all-inclusive portfolio for years 2017-2034.

Figure 6 - 19



Cascade will continue to carefully monitor the cost-effectiveness and participation levels associated with all of its natural gas conservation efforts through the detailed annual report it files each year as part of Docket UG-060256. As described in the Company's 2012 Annual Report, the Annual Conservation Achievement Report below shall – and does continue to- be filed with the WUTC in a format similar to its previous Conservation Reports, as an informational filing. This, and all future reports will be shared with the WUTC by July 1st of the following program year (for instance, 2013 achievements were reported no later than July1, 2014). In the event that the reporting format or timing needs to be adjusted, the Company will notify Commission Staff prior to filing.

CY 2015 & 2016 Targets

At this point, after doing a thorough review of our program offerings and updating our tariffs in September, 2014, we do not anticipate any specific changes to the program in the next 2 years unless legislation or building code changes require it, or if any of the inputs used in our TEAPOT modeling tool change significantly.

The Company plans on keeping abreast of the savings potential in three of our service territories (Bellingham, Walla Walla and Anacortes) within Washington that may experience an uptake in program participation over the next two years as they engage in the Georgetown University Energy Prize Competition. The prize competition goal is to raise awareness of energy-efficiency in communities by local governments, communities and utilities working together to develop and implement plans for innovative, replicable, scalable and continual reductions in the per capita energy consumption from both natural gas and electric providers. Based on these participating communities the Company would expect the savings goals for 2015 and 2016 to be slightly higher (3%) than the estimated "Realistic" potential demonstrated in Figure 6-18. See below for the company's realistic goals based on the TEAPOT model in conjunction with our conservative target for a cost-effective programmatic level savings target.

2015
Residential target of **132,085** therms
Commercial target of **388,969** therms
Low Income target of **7,000** therms

2016
Residential target of **138,074** therms
Commercial target of **415,845** therms
Low Income target of **7,000** therms

These projected achievements are based on the Company's current best estimates of its achievable potential, which are based on projected gas costs and the Nexant Potential study of viable natural gas measures and are subject to modification dependent upon updated forecasts, knowledge of evolving efficiency technologies, customer interest and program participation levels and updates based on external influences. Budgets for FY 2015 and 2016 will be based commensurately with these targets and adjusted to ensure maintenance of cost-effectiveness and appropriate levelized costs. The Company anticipates the budgets for both these years to be in the range of **$800,000- $1.2M** in administrative costs. It's possible the administrative costs for FY2016 may be slightly higher than those in FY 2015 due to the expiration of our Residential program delivery vendor's current contract occurring at the end of 2015. The Company also includes note below of expected participation level costs for the 5 year NEEA pilot (total **$1,704,849**) as agreed upon in January, 2015. The Company will list these costs in the Annual Conservation Report in July and will display the program's cost-effectiveness primarily without the costs but will also include the NEEA pilot efforts to demonstrate its effect on cost-effectiveness.

Cascade Natural Gas NEEA Gas Market Transformation Pilot Participation

Table 6 -17

Year	Cascade's Washington Commitment at 9.3% of total budget for 5 year pilot
2015	$145,848
2016	$244,956
2017	$313,122
2018	$452,211
2019	$548,712
Total	$1,704,849

20 Year Conservation Potential

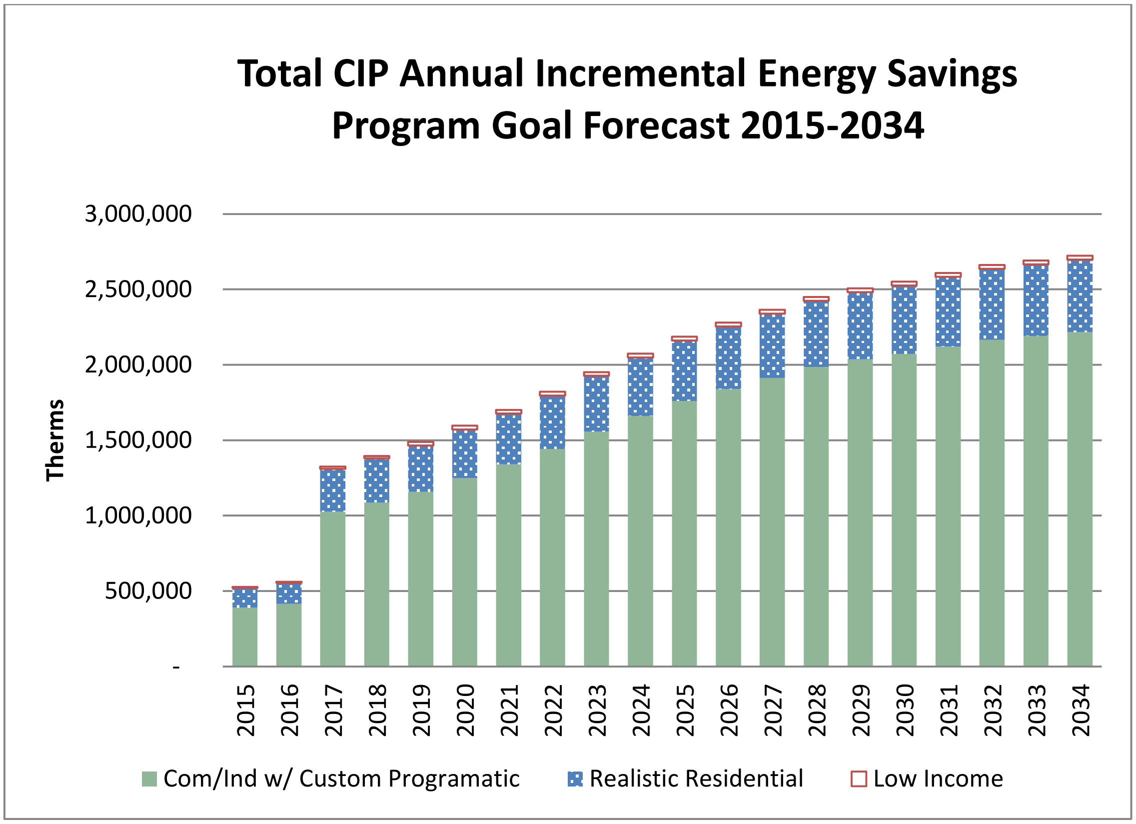
The Company provides the following table as our total CIP Forecast for Residential, Commercial and Industrial efficiency gains from 2015-2034. We have added some incremental savings from the Low-Income program, as mentioned previously but based on current trends in the Low Income sector the additional numbers for the next 20 years are lower than previous estimates.

Table 6 -18

Total CIP Forecast 2015-2034 Incremental Annual Energy Savings							
Year	**Technical**	**Economic**	**Achievable**	**Realistic Residential**	**Com&Ind w/ Custom**	**Low Income**	***Program Goal***
2015	3,622,493	3,142,742	**709,858**	132,085	388,969	7000	**528,054**
2016	3,697,729	3,206,806	**746,356**	138,074	415,845	7000	**560,919**
2017	7,303,630	5,210,011	**1,616,912**	284,585	1,025,511	15000	**1,325,096**
2018	7,389,202	5,271,958	**1,687,252**	295,124	1,085,908	15000	**1,396,032**
2019	7,466,694	5,326,351	**1,770,096**	307,571	1,156,744	25000	**1,489,315**
2020	7,589,731	5,414,515	**1,875,323**	323,250	1,247,833	25000	**1,596,083**
2021	7,640,102	5,450,712	**1,974,528**	337,396	1,339,164	25000	**1,701,560**
2022	7,719,181	5,507,406	**2,088,447**	353,823	1,442,479	25000	**1,821,302**
2023	7,817,800	5,579,650	**2,209,512**	370,798	1,556,402	25000	**1,952,200**
2024	7,924,271	5,654,499	**2,329,649**	388,646	1,660,858	25000	**2,074,503**
2025	7,983,419	5,698,581	**2,428,799**	401,940	1,759,367	25000	**2,186,307**
2026	8,058,848	5,751,321	**2,520,295**	415,557	1,838,719	25000	**2,279,276**
2027	8,140,431	5,809,739	**2,602,617**	427,574	1,912,116	25000	**2,364,690**
2028	8,257,493	5,893,655	**2,685,243**	439,742	1,984,873	25000	**2,449,615**
2029	8,308,356	5,931,130	**2,737,445**	446,847	2,035,841	25000	**2,507,687**
2030	8,381,346	5,981,960	**2,786,260**	454,905	2,071,374	25000	**2,551,278**
2031	8,474,301	6,050,244	**2,838,512**	462,117	2,121,521	25000	**2,608,638**
2032	8,585,621	6,128,445	**2,898,961**	472,184	2,164,766	25000	**2,661,950**
2033	8,631,210	6,161,299	**2,927,512**	476,373	2,190,041	25000	**2,691,414**
2034	8,720,529	6,225,463	**2,962,415**	482,057	2,216,113	25000	**2,723,170**

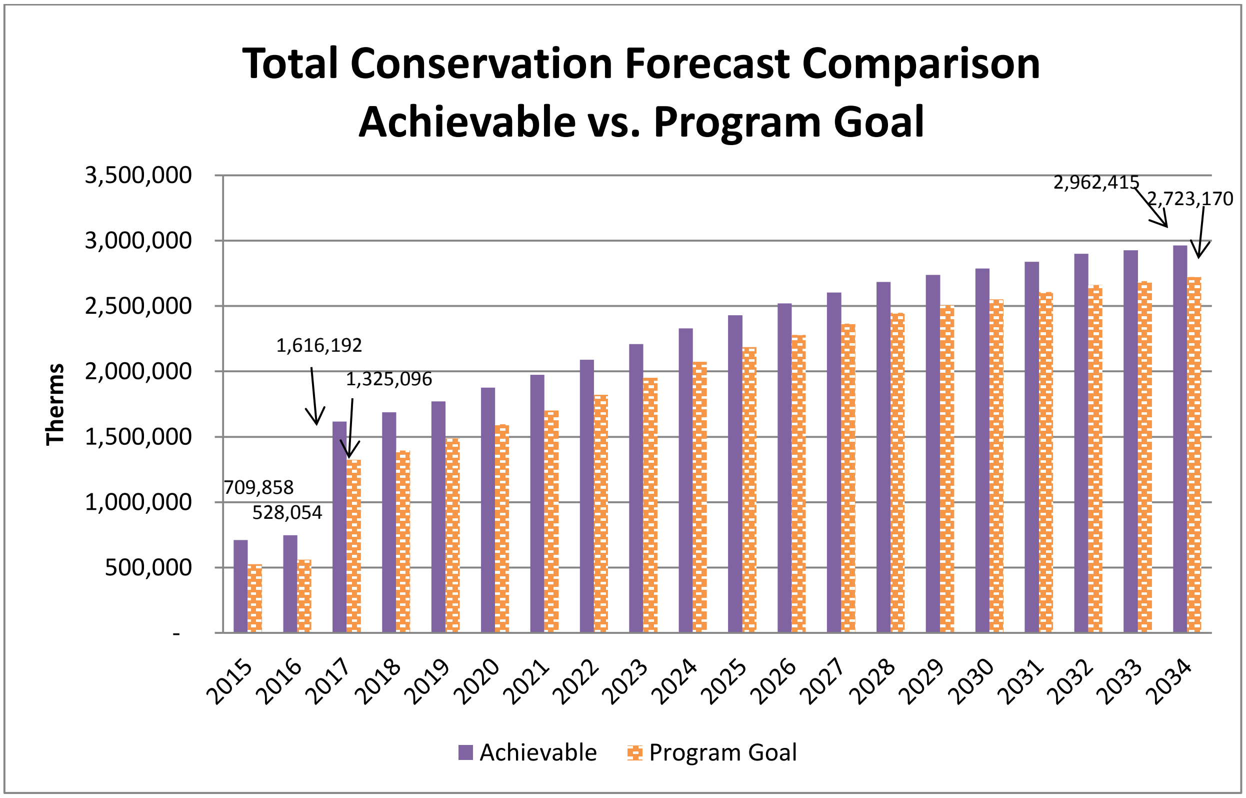
This forecast displays the first 2 years under the program Goal category and years three through twenty including all possible measures from Nexant's study. Programmatic goals are more realistic when viewed in 2-year increments since they allow flexibility in addressing current legislative, building code and budgeting criteria. Due to these external factors the Company has elected to display the savings forecast in this manner.

Figure 6 -20



For reference the Company is also providing a comparison of the Total Conservation Forecast from 2015 – 2034 between the forecasted achievable potential and the forecasted programmatic potential below.

Figure 6 -21



Many specific details are required to implement successful programs. As discussed above, the Program Potential – that which is based from actual implementation design, delivery, and market conditions will reflect some variance in savings, costs, and overall achievements. Customer participation in a program is heavily influenced by the level of incentive paid by the utility versus the cost to the customer.

External infrastructure considerations must also be addressed, such as product availability to utility customers and an adequate network of contractors, retailers, and other trade allies to support a program. As new measures or expanded programs are developed and added to the current program mix, internal and external resources and capabilities need to grow accordingly and progress through a “learning curve.” Additionally, revised projections regarding the cost of natural gas and other external factors will likely lead to needed revisions to the company’s existing programs, and will result in additional impacts on the company’s projected participation levels.

At the time of this IRP planning period, the Company has three conservation programs operating under Tariffs 300(Residential Conservation Incentive Program), 301 (Low Income Weatherization Incentive Program), and 302 (Commercial Industrial Conservation Program). The Company is pleased with the results of the TEAPOT modeling and Nexant

Study which have allowed us to provide even greater clarity, comprehensiveness and transparency in the development of our conservation planning efforts. The Company therefore, is confident in its ability to provide this information via its Integrated Resources Plan for 2015. Moving forward, as per discussion with its Conservation Advisory Group, the Company will continue to provide an abridged version of our Conservation planning processes in future IRPs, but will transition to an Annual Conservation Plan to be filed with the Commission in December of each calendar year. For the past two years the Company has provided a Memo to WUTC staff in December as a high-level informational insight into CIP standing year-to-date compared to previous year's therm accomplishments and expenditures. This document has not been intended to provide a full sense of total year achievements since it hits mid-cycle, but it has provided an opportunity for comparisons as per Staff's request.

The Company will continue to provide its comprehensive Conservation Achievements Report as an information filing as stated in its commitment in UG-060256. Future documentation outlining the Company's annual Conservation Achievements will be filed with the WUTC in a format similar to its previous Conservation Reports, as an informational filing by July 1st of the following program year (for instance, 2011 achievements (were) reported no later than Jul 1, 2012). In the event that the reporting format or timing needs to be adjusted, the Company will notify Commission Staff prior to filing.

Oregon Demand Side Management Section

Oregon Introduction

As noted in the previous section we have relocated all Oregon related Demand Side Management information beneath the "Oregon Demand Side Management Planning" header. The Company has made this change in order to streamline this document and minimize confusion between our DSM planning and efforts in both Oregon and Washington.

In Oregon, all of the Company's demand side management efforts, with the exception of the low-income energy efficiency program described later, are administered and delivered by the Energy Trust of Oregon. This arrangement was begun with the approval of Cascade's Conservation Alliance Plan in Oregon Public Utility Commission docket UG 167 which was approved on April 19, 2006 and became effective on May 1, 2006. This arrangement has been carried forward following the curtailment of the original Conservation Alliance Plan.

Energy Trust produces an annual budget and program delivery schedule for the achievement of therm savings in the residential, commercial, and (core, non-transport) industrial sectors. This annual budget is funded through a public purpose charge that is assessed on Cascade's Oregon customers and paid through their monthly bills. The public purpose charge is modified from time to time to reflect changing Energy Trust program efforts in Cascade's service area, changes in natural gas prices, and the amount of any carryover Cascade public purpose funds Energy Trust may be rolling over from the previous calendar year.

The following sections describe:

- Energy Trust of Oregon
- Public Purpose Funding
- Oregon Demand Side Management Methodology
- Oregon Demand Side Management Projections, 2015 – 2034
- Oregon Low-Income Energy Conservation Program
- Future Issues and Legislation Potentially Impacting Demand Side Management Savings

Energy Trust of Oregon

Energy Trust of Oregon is an independent nonprofit organization dedicated to helping utility customers benefit from saving energy and generating renewable power. Currently, Energy Trust provides energy efficiency and renewable energy services to customers of Portland General Electric, Pacific Power, NW Natural and Cascade Natural Gas.

Energy Trust assesses energy conservation resource potential and develops deployment scenarios designed to acquire all cost-effective energy efficiency over 20 years. The assessments and deployment scenarios help shape Energy Trust's five-year strategic plans, two-year action plans and annual budgets. The deployment scenarios are projections, while actual savings depend on customer decisions rather than Energy Trust decisions.

Energy Trust resource assessments and deployment scenarios inform utility Integrated Resource Plans. The plans are developed in a process guided by the OPUC. Energy Trust provides 20-year deployment scenarios to IRP planners at each utility, and helps update utility IRPs approximately every two years.

IRPs in turn provide a foundation for supplemental funding agreements between the utilities and Energy Trust. The utilities and Energy Trust determine this supplemental funding annually, under oversight from the OPUC, and it has significantly increased funding for efficiency programs. Energy Trust's strategic plans reflect these interactions between Energy Trust planning, utility planning and utility-Energy Trust funding agreements.

Public Purpose Funding

Since the issuing of OPUC Order No. 06-191, Cascade has collected a public purpose charge (PPC) applied to Oregon customers' bills This arrangement was begun with the approval of Cascade's Conservation Alliance Plan in Oregon Public Utility Commission docket UG 167 which was approved on April 19, 2006 and became effective on May 1, 2006. As noted earlier, monies generated through the PPC are used to fund Energy Trust's efforts on behalf of Cascade in Oregon, and on behalf of the two low-income programs – weatherization and bill payment assistance. The PPC is governed through OPUC Schedule No. 31, Public Purpose Funding.

The total amount of money generated by the PPC varies depending upon gas usage (which is weather-sensitive) and gas price (which has changed dramatically over the past few years). Consequently, Schedule 31 has been revised from time to time over the years to align customer charges with the funding requirements of the three efforts.

The following is a summary of the Oregon Public Purpose fund collected for the purposes of conservation and low-income bill assistance within CNGC's service:

- The PPC was initially made effective on June 15, 2007. The charge was set at 1.5 percent of current revenues and customer charges. The funds were then divided with 80 percent going to Energy Trust and the remaining 20 percent funding the low-income programs.

- Effective November 1, 2011 the PPC was increased to a total of 2.44 percent. Energy Trust was allocated 88 percent of the total funds collected with the remaining 12 percent funding the low-income programs. These changes were driven by Energy Trust's increasing ability to drive energy efficiency savings in Cascade's Oregon service area.

- Effective November 1, 2012 the PPC was increased to a total of 3.91 percent. Energy Trust was allocated 93 percent of the total funds collected with the remaining 7 percent funding the low-income programs.

- Effective July 1, 2013 the PPC was increased to a total of 5.46 percent. Energy Trust was allocated 95 percent of the total funds collected with the remaining 5 percent funding the low-income programs. These changes were driven by the elimination of the deferred accounting treatment of a portion of Cascade's Energy Trust funding (described below) and a timing difference between the conclusion of another OPUC effort in UG 167and the funds required by Energy Trust to capture energy efficiency savings. This amount of collection enabled the Company to not only begin charging customers for the full amount of the public purpose charge without the deferral mechanism, but also to 'realign' with our Energy Trust funding requirement.

Effective April 1, 2014 the PPC was lowered to a total of 2.60 percent. Energy Trust is allocated 87 percent of the total funds collected with the remaining 13 percent funding the low-income programs. These changes were driven by the need to align (lower) funding going to Energy Trust from the previously 'catch-up' level while approximately maintaining the dollar value of funding for the low income programs. This level was established taking into consideration Energy Trusts' projected budget needs for both 2014 and 2015.
The following is a chronicle of the operation of the deferral mechanism as it related to Energy Trust's budget requirements.

- On August 11, 2010, the Commission approved Order No. 10-309, Cascade's request for authorization to defer incremental funding of Public Purpose Funding payable to Energy Trust to support conservation. This order granted Cascade authorization to defer an amount of funding not to exceed $950,000 for a period of 12 months. Because actual achievements and expenditures did not meet the estimates, the Energy Trust entered 2011 with $526,412 of carryover funds available to meet its 2011 budget.

- Energy Trust's 2011 budget for Cascade was $2,497,836 to deliver its projected annual savings of 391,754 therms. Energy Trust entered 2011 with $526,412 in carryover funds from the 2010 program year. Public purpose funding from Cascade was estimated to be around $886,000. On paper, this would leave Energy Trust short of funding for program year 2011 by around $1,085,000 –leaving nothing toward the 5 percent reserve Energy Trust prefers to enter into each new program year with. In this case, the 2011 planning reserve was an additional $124,892, or 5 percent of the $2,497,836 budget. Cascade continued to work closely with Energy Trust staff toward the end of 2011 in order to most effectively calibrate the final provision of deferred funding so as not to provide an excess of funding should the expenditures finish below budget for 2011.

- On August 3, 2011, the Commission approved in Order No. 11-285, Cascade's request for authorization to defer incremental funding of Public Purpose Funding payable to Energy Trust to support conservation. This order granted Cascade authorization to defer an amount of funding up to $1,300,000. This additional deferred funding enabled Cascade to adequately fund Energy Trust's planned budget needs for 2011 and provide a sufficient cash reserve.

- In 2012, the OPUC informed Cascade the deferral mechanism would not be reauthorized. Cascade then filed for the change in Oregon Schedule 31 which took effect November 1, 2012 increasing the PPC to a total of 3.91 percent. Energy Trust was allocated 93 percent of the total funds collected with the remaining 7 percent funding the low-income programs. The PPC was set at this level to provide funding based upon Energy Trust's then known budget projections.

Cascade and Energy Trust work closely together to help ensure the PPC is established to fund Energy Trust budgeted energy efficiency efforts reflecting the existence of any carryover funding Energy Trust has available from the previous year. At the time of the preparation of this report (April, 2015) Energy Trust's amount of Cascade carryover funds totaled $1,156,900. Cascade and Energy Trust will be looking at adjusting the PPC once we have some additional information regarding Energy Trust's utilization of available funds and incorporating any related decisions and directions coming from Cascade's upcoming Oregon general rate case.

Oregon Demand Side Management Methodology

Energy Trust engaged Navigant Consulting, Inc. (Navigant) to prepare an energy efficiency resource assessment of its service territory in August 2013. The primary purpose of this energy efficiency resource assessment is to enable Energy Trust to support the Integrated Resource Planning (IRP) process of its four funding utilities. Energy Trust provides a 20-year forecast of efficiency resource potential for each utility, which informs Energy Trust's strategic program planning, and development. This new resource assessment replaces the Stellar-Ecotope studies that had formed the basis of Cascade Natural Gas' Oregon demand side management assessment for the past several years and IRP cycles.

The final report on this effort by Navigant, dated June 4, 2014, can be found on-line at: http://energytrust.org/library/reports/Energy_Efficiency__Resource_Assessment_Report.pdf and referenced in appendix ___of this report.

A primary product of this resource assessment is the *Energy Trust Resource Assessment Model*, which provides a flexible yet robust platform in which to estimate the technical and cost-effective achievable potential for demand-side resources in Energy Trust's service territory across the residential, commercial, and industrial sectors.

Energy Trust's resource assessment model calculates the technical energy efficiency potential, the energy savings that are technically possible, for Energy Trust's utility territories, by taking stock input data (number of homes, square feet of commercial floor area, and industrial load) for each utility and applying applicable measure assumptions. These assumptions include assumptions like how many therms each measure saves, how much they cost, the measure life, when measures are technically possible, and what portion of the stock remains available to improve, etc.

For similar measures that would not be simultaneously installed in the same location, e.g. a tankless and efficient tank hot water heater, a competition group is created where the most cost-effective measure is considered the base measure, and any other measures are ranked and evaluated for the incremental cost and savings relative to the previous measure. This approach avoids the necessity to assign market share assumptions to similar end use technologies.

Once the technical potential is calculated, the model uses the Northwest Power Council's assumption that 85% of technical potential is achievable to calculate the achievable potential. The achievable potential represents the energy efficiency potential that is possible after considering market barriers and other factors that may limit what can actually be accomplished. The model then compares the avoided cost value of the savings to the total resource cost of the measure to determine which measures are cost effective. The savings from these measures represents the cost-effective potential for Cascade's Oregon territory.

Energy Trust's model is also capable of considering emerging technologies, technologies which are not yet widely available in the market and/or may have energy performance or costs expected to significantly improve in the future. For these technologies, the model applies a risk factor to the savings from each technology to account for the fact that some technologies may not come into fruition. By considering a range of emerging technologies and applying conservative risk factors, the cumulative end result is a reasonable estimate of energy efficiency potential that could reasonably be expected from emerging technologies.

Energy Trust takes the cost-effective potential predicted by its resource assessment model over a twenty year period and uses recent program performance to plan a deployment curve of annual acquisitions of this potential over the twenty years. This deployment is given to Cascade for their resource planning.

The following is a summary of the methodology utilized by Energy Trust using the Navigant-developed *Energy Trust Resource Assessment Model* in the development of the Oregon Demand Side Management projections for Cascade Natural Gas.

- Measure Identification and Characterization
- Measure Lists Development
    - Measure Characterization Inputs
    - Measure Characterization Approaches
        - Energy Savings and Costs Approaches
        - Density and Initial Saturation
        - Treatment of Bundled Measures vs. Individual Measures in New Construction Applications
        - Tax Credits
    - Emerging Technologies
    - Code Adjustments
- Estimation of Technical, Achievable, and Cost-Effective Achievable Potential
    - Types of Potential
    - Approach to Calculating Cost Effectiveness
    - Approach to Simulating Tiered Potential Savings

Oregon Demand Side Management Projections - 2015 to 2034

Utilizing the *Energy Trust Resource Assessment Model*, Energy Trust produced the following DSM projections for Cascade Natural Gas' Oregon service area for the period 2015 to 2034. In producing this forecast, Energy Trust utilized the following global inputs which are consistent with the inputs utilized by Cascade in the production of the Washington DSM projections.

- A long term discount rate of 4.17%.

- Avoided cost of conservation values provided from Cascade Natural Gas dated July 1, 2015. "Nominal cost per therm" values were converted to real values using an inflation rate of 2.00%, which is listed as the EIA inflation rate Cascade utilized in the same avoided cost file. The Northwest Power Act 10% cost credit for conservation was also applied.

- The most recent demand forecast and customer count forecast supplied by Cascade on March 3, 2015 were utilized. Since the data is only at a sector level, Energy Trust used ACS survey data to split residential forecasts into single family, multifamily, and mobile homes. Actual utility account data supplied to Energy Trust by Cascade as part of the data sharing agreement was used to split the commercial and industrial forecasts into specific sub-sectors.

Table 6-19 displays the Technical, Achievable, and Cost Effective conservation potential for the Residential sector. This table lists the specific measures that were analyzed and ranks them by their average levelized cost per therm. The levelized cost cutoff for cost-effectiveness utilized was $0.50 per therm.

As will be discussed in a later section concerning Issues and Legislation, the results of the recent OPUC decision in Docket UM-1622 applied by Energy Trust, is as follows. All known conservation measures were included in the analysis determining total technical conservation potential. This includes measures such as residential wall and floor insulation that were determined in UM 1622 not to be qualified for cost-effectiveness exceptions based upon OPUC Docket UM 551. It seems wholly appropriate to include these measures in the calculation of Technical Potential. All of the measures that did not qualify for exceptions from the UM 551 guidelines in UM 1622 were subsequently modeled as non-cost-effective utilizing the *Energy Trust Resource Assessment Model* and therefore, do not impact Cascade's projected conservation savings.

Put another way, Energy Trust has the ability to force the outcome of the cost effectiveness determination within its resource assessment model. To address the outcomes of the cost effectiveness rulings in UM 1622, Energy Trust set measures that were not given exceptions by the OPUC to fail the cost effectiveness screen within the model. As a consequence, the potential from these measures would be in the technical and achievable potential, but not in the cost-effective potential used in Energy Trust's deployment.

Finally, there are some dual fuel measures with cost-effective savings over the cost effective threshold where the combined benefits of electric and gas savings make the measures cost effective. Where applicable, Energy Trust evaluates the cost effectiveness of a measure in each applicable home, business, or industry type, and in each year of the 20-year forecast. With this approach, some measures are cost effective in certain situations but not all. The following are the five affected dual fuel measures

- Smart Devices Home Automation (RET)
- Energy Star New Home BOP 1 - Gas SH
- Opower- Behavior Savings (RET)
- Opower- Behavior Savings (NEW)
- Smart Devices Home Automation (NEW)

For other measures, the model makes an estimate of cost effectiveness using the Total Resource Cost (TRC) test. This is only an estimate, as Energy Trust's Planning department makes the final and official determination of cost effectiveness for each measure. Measures in the resource assessment may not always align with the specific offerings of Energy Trust because some measures in the resource assessment are intended to represent a broad array of measures offered by Energy Trust.

Table 6-20 displays the Technical, Achievable, and Cost Effective conservation potential for the Commercial sector. This table lists the specific measures analyzed and ranks them by their average levelized cost per therm. The levelized cost cutoff utilized for cost-effectiveness was $0.46 per therm.

Table 6-21 displays the Technical, Achievable, and Cost Effective conservation potential for the Industrial sector. This table lists the specific measures analyzed and ranks them by their average levelized cost per therm. The levelized cost cutoff utilized for cost-effectiveness was $0.35 per therm. This relatively low cutoff level in the industrial sector appears illusory simply because the next measure on the Table 6-19, Wall Insulation - VIP, R0-R35, has an average levelized cost of $1.46 per therm and is significantly above any reasonable cutoff level.

Table 6 - 19

Oregon Residential Conservation Measures
Technical, Achievable and Cost Effective Potential by 2034

Measure	20-Year Technical Potential (Mmtherms)	20-Year Achievable Potential (Mmtherms)	20-Year Cost Effective Potential (Mmtherms)	% Cost Effective / Achievable	Average Levelized Cost ($/therm)
Elec Hi-eff Clothes Washer - Gas DHW	0.01	0.01	0.01	100%	-$3.41
Showerheads - Gas DHW	0.43	0.37	0.37	100%	-$1.75
Bathroom Faucet Aerators, 1.0 gpm- Gas	0.29	0.25	0.25	100%	-$1.75
Kitchen Faucet Aerators, 1.5 gpm- Gas	0.13	0.11	0.11	100%	-$1.74
50 Gallon Solar Thermal Water Heating Unit, ET-Z2, Gas (NEW ONLY)	0.07	0.06	0.05	86%	-$0.27
Gas Hearth	0.00	0.00	0.00	100%	$0.00
Absorption Gas Heat Pump Water Heater-Z2	0.39	0.33	0.01	4%	$0.00
Absorption Gas Heat Pump Water Heater-Z2 (NEW ONLY)	0.15	0.13	0.12	92%	$0.00
Tankless Gas Hot Water Heater-Z2	1.61	1.37	0.03	2%	$0.00
Window Replacement (U=.30), Gas SH, Z2	0.01	0.01	0.01	100%	$0.02
50 Gallon Solar Thermal Water Heating Unit, ET-Z2, Gas	0.08	0.07	0.04	63%	$0.05
Window Replacement (U<.20), Gas SH, Z2 (NEW ONLY)	0.32	0.27	0.27	100%	$0.13
Window Replacement (U<.20), Gas SH, Z2	0.31	0.26	0.26	100%	$0.15
Energy Star New Home BOP 1 - Gas SH, Z2	0.05	0.04	0.04	100%	$0.29
Window Replacement (U=.30), Gas SH, Z2, MH	0.00	0.00	0.00	100%	$0.33
Window Replacement (U<.20), Gas SH, Z2, MH	0.01	0.00	0.00	100%	$0.42
AFUE 90 to 95 Furnace, Z2 - SF	0.01	0.01	0.01	78%	$0.50
Wx insulation (ceiling), Gas SH, Z2	0.08	0.07	-	0%	$0.60
AFUE 90 to 95 Furnace, Z2	0.00	0.00	-	0%	$0.62
0.67/0.70 EF Gas Storage Water Heater-Z2	0.51	0.43	-	0%	$0.67
HRV, Gas SH, Z2	0.02	0.01	0.00	7%	$0.67
Wx insulation (wall), Gas SH, Z2	0.16	0.14	-	0%	$1.16
Smart Devices Home Automation (RET)	0.13	0.11	0.10	92%	$1.33
Res - Energy Star New Home BOP 1 - Gas SH	0.96	0.81	0.01	1%	$1.37
Res- Opower- Behavior Savings (RET)	0.15	0.13	0.13	100%	$1.44
Duct Sealing, Gas SH, Z2	0.19	0.16	-	0%	$1.44
Opower- Behavior Savings (NEW)	0.03	0.03	0.03	100%	$1.44
AFUE 98/96 Furnace, Z2 - SF	0.01	0.01	-	0%	$1.47
Smart Devices Home Automation (NEW)	0.10	0.08	0.08	98%	$1.49
Wx insulation (floor), Gas SH, Z2	0.16	0.13	-	0%	$1.65
50 Gallon Solar Thermal Water Heating Unit-Z2, Gas	0.07	0.06	0.05	84%	$1.97
50 Gallon Solar Thermal Water Heating Unit-Z2, Gas (NEW ONLY)	0.01	0.01	0.00	11%	$2.09
AFUE 98/96 Furnace, Z2	0.00	0.00	-	0%	$2.21
AFUE 98/96 Furnace, Z2 (NEW ONLY)	0.01	0.01	-	0%	$2.22
Wx insulation (ceiling), NEW, ET, Gas SH, Z2	0.02	0.02	-	0%	$4.16
Wx insulation (ceiling), RET, ET, Gas SH, Z2	0.04	0.03	-	0%	$6.79
Elec Hi-eff Dishwasher - Gas DHW - SF	0.00	0.00	-	0%	$9.08
Elec Hi-eff Dishwasher - Gas DHW	0.00	0.00	-	0%	$13.26
Wx insulation (wall), NEW, ET, Gas SH, Z2	0.07	0.06	-	0%	$15.44
Wx insulation (wall), RET, ET, Gas SH, Z2	0.10	0.08	-	0%	$23.66
0.67/0.70 EF Gas Storage Water Heater for M/F Centralized H/W System	0.00	0.00	-	0%	$27.39
Tankless Gas Hot Water Heater-Z2 (NEW ONLY)	0.52	0.44	0.03	7%	INF
AFUE 90 to 95 Furnace, Z1	-	-	-	n/a	n/a
AFUE 90 to 95 Furnace, Z1 - SF	-	-	-	n/a	n/a
AFUE 98/96 Furnace, Z1	-	-	-	n/a	n/a
AFUE 98/96 Furnace, Z1 - SF	-	-	-	n/a	n/a
AFUE 98/96 Furnace, Z1 (NEW ONLY)	-	-	-	n/a	n/a
Duct Sealing, Gas SH, Z1	-	-	-	n/a	n/a
Energy Star New Home BOP 1 - Gas SH, Z1	-	-	-	n/a	n/a
HRV, Gas SH, Z1	-	-	-	n/a	n/a
Window Replacement (U<.20), Gas SH, Z1	-	-	-	n/a	n/a
Window Replacement (U<.20), Gas SH, Z1 (NEW ONLY)	-	-	-	n/a	n/a
Window Replacement (U<.20), Gas SH, Z1, MH	-	-	-	n/a	n/a
Window Replacement (U=.25), Gas SH, Z1	-	-	-	n/a	n/a
Window Replacement (U=.25), Gas SH, Z1 (NEW ONLY)	-	-	-	n/a	n/a
Window Replacement (U=.25), Gas SH, Z1, MH	-	-	-	n/a	n/a
Window Replacement (U=.25), Gas SH, Z2	-	-	-	n/a	n/a
Window Replacement (U=.25), Gas SH, Z2 (NEW ONLY)	-	-	-	n/a	n/a
Window Replacement (U=.25), Gas SH, Z2, MH	-	-	-	n/a	n/a
Window Replacement (U=.30), Gas SH, Z1	-	-	-	n/a	n/a
Window Replacement (U=.30), Gas SH, Z1, MH	-	-	-	n/a	n/a
Wx insulation (ceiling), Gas SH, Z1	-	-	-	n/a	n/a
Wx insulation (ceiling), NEW, ET, Gas SH, Z1	-	-	-	n/a	n/a
Wx insulation (ceiling), RET, ET, Gas SH, Z1	-	-	-	n/a	n/a
Wx insulation (floor), Gas SH, Z1	-	-	-	n/a	n/a
Wx insulation (wall), Gas SH, Z1	-	-	-	n/a	n/a
Wx insulation (wall), NEW, ET, Gas SH, Z1	-	-	-	n/a	n/a
Wx insulation (wall), RET, ET, Gas SH, Z1	-	-	-	n/a	n/a
0.67/0.70 EF Gas Storage Water Heater-Z1	-	-	-	n/a	n/a
0.67/0.70 EF Gas Storage Water Heater-Z1 (NEW ONLY)	-	-	-	n/a	n/a
0.67/0.70 EF Gas Storage Water Heater-Z2 (NEW ONLY)	-	-	-	n/a	n/a
50 Gallon Solar Thermal Water Heating Unit-Z1, Gas	-	-	-	n/a	n/a
50 Gallon Solar Thermal Water Heating Unit-Z1, Gas (NEW ONLY)	-	-	-	n/a	n/a
50 Gallon Solar Thermal Water Heating Unit, ET-Z1, Gas	-	-	-	n/a	n/a
50 Gallon Solar Thermal Water Heating Unit, ET-Z1, Gas (NEW ONLY)	-	-	-	n/a	n/a
Absorption Gas Heat Pump Water Heater-Z1	-	-	-	n/a	n/a
Absorption Gas Heat Pump Water Heater-Z1 (NEW ONLY)	-	-	-	n/a	n/a
Bathroom Faucet Aerators, 1.5 gpm- Gas	-	-	-	n/a	n/a
Kitchen Faucet Aerators, 2.0 gpm- Gas	-	-	-	n/a	n/a
Tankless Gas Hot Water Heater-Z1	-	-	-	n/a	n/a
Tankless Gas Hot Water Heater-Z1 (NEW ONLY)	-	-	-	n/a	n/a
Total Residential Technical, Achievable and Cost Effective Potential (Therms)	**7,188,952**	**6,110,609**	**2,020,622**		

Table 6 - 20
Oregon Commercial Conservation Measures
Technical, Achievable and Cost Effective Potential by 2034

Measure	20-Year Technical Potential (Mmtherms)	20-Year Achievable Potential (Mmtherms)	20-Year Cost Effective Potential (Mmtherms)	% Cost Effective / Achievable	Average Levelized Cost ($/therm)
Cond Furnace	0.07	0.06	0.06	100%	$0.00
Energy Star Convection Oven	0.08	0.07	0.07	100%	$0.00
Demand Control Ventilation	0.49	0.42	0.42	100%	$0.03
Hot Water Temperature Reset	0.04	0.03	0.03	100%	$0.07
SPC High efficiency Boiler	0.26	0.22	0.22	100%	$0.08
Roof Insulation	0.15	0.13	0.13	100%	$0.15
Energy Star Fryer	0.32	0.27	0.27	100%	$0.20
DHW Condensing Tankless	0.50	0.43	0.43	100%	$0.28
Steam Trap Maintenance	0.14	0.12	0.12	100%	$0.39
High Efficiency Unit Heater	0.00	0.00	0.00	100%	$0.46
Wall Insulation	0.09	0.08	-	0%	$0.48
Steam Balance	0.03	0.02	-	0%	$0.95
Windows Upgrade (New)	0.16	0.14	-	0%	$1.18
DDC HVAC Controls	1.46	1.24	1.21	98%	$1.38
AC Heat Recovery, HW	0.30	0.25	-	0%	$2.51
Highly Insulated Windows (NEW)	0.02	0.01	-	0%	$3.75
Highly Insulated Windows (RET)	0.13	0.11	-	0%	$4.18
Gas-fired HP, Heating	0.07	0.06	-	0%	$4.46
Windows Upgrade (RET)	0.13	0.11	-	0%	$4.61
HVAC System Commissioning	0.30	0.25	-	0%	$5.15
VIP, R-35 wall (NEW)	0.03	0.03	-	0%	$6.23
Gas-fired HP HW	0.14	0.12	-	0%	$6.63
Smart/Dynamic Windows (NEW)	0.06	0.05	-	0%	$6.65
Advanced Ventilation Controls	0.12	0.10	0.10	100%	$7.61
Energy Recovery Ventilator - Gas Heating	1.67	1.42	-	0%	$11.54
VIP, R-35 wall (RET-no insl'n)	0.02	0.01	-	0%	$12.99
VIP, R-35 wall (RET-R-11)	0.04	0.03	-	0%	$14.21
Smart/Dynamic Windows (RET)	0.10	0.09	-	0%	$26.07
DHW Condensing Storage	-	-	-	n/a	n/a
Total Commercial Technical, Achievable and Cost Effective Potential (Therms)	**6,921,029**	**5,882,874**	**3,059,596**		

Table - 21
Oregon Industrial Conservation Measures
Technical, Achievable and Cost Effective Potential by 2034

Measure	20-Year Technical Potential (Mmtherms)	20-Year Achievable Potential (Mmtherms)	20-Year Cost Effective Potential (Mmtherms)	% Cost Effective / Achievable	Average Levelized Cost ($/therm)
Steam line pipe insulation	0.04	0.04	0.04	100%	$0.01
Vent Damper Control	0.06	0.05	0.05	100%	$0.01
Boiler Load Control	0.06	0.05	0.05	100%	$0.01
Process Boiler Insulation	0.07	0.06	0.06	100%	$0.02
Steam Trap Maintenance	0.09	0.08	0.08	100%	$0.02
High Efficiency Unit Heater	0.06	0.05	0.05	100%	$0.03
Boiler Tune-up	0.22	0.19	0.19	100%	$0.03
Boiler Heat Recovery	0.09	0.08	0.08	100%	$0.04
Roof Insulation- R0-R30	0.17	0.14	0.14	100%	$0.05
Wall Insulation- R0- R11	0.17	0.14	0.14	100%	$0.05
Burner upgrades	0.33	0.28	0.28	100%	$0.06
High Efficiency Boiler	0.08	0.07	0.07	100%	$0.08
Greenhouse Upgrade	0.14	0.12	0.12	100%	$0.22
Gas-fired HP Water Heater	0.11	0.10	0.10	100%	$0.25
Steam Balance	0.15	0.13	0.10	78%	$0.35
Wall Insulation- VIP, R0-R35	0.02	0.02	-	0%	$1.46
Total Industrial Technical, Achievable and Cost Effective Potential (Therms	**1,855,507**	**1,577,181**	**1,528,991**		

Once Technical, Achievable and Cost Effective conservation potential have been projected, and the individual measures applicable for each sector have been determined on the basis of their average levelized cost, Energy Trust develops their conservation deployment projections for each market segment. The deployment projections are the basis for determination of the annual therm savings estimated to be delivered by their conservation efforts in Cascade's Oregon service area. These annual deployment projections are based upon recent program history and longer-term program goals taking into account recent regulatory program delivery constraints coming out of OPUC Docket UM 1622. The impact of UM 1622 on these deployment projections is discussed in the 'Future Issues and Legislation' section of this report.

Tables 6-22 and 6-23 display Energy Trust's estimates of 'Gross Annual Therms" and "Net Annual Therms" by customer class, as well as Residential Market Transformation for the period 2015 – 2034.

Gross Annual Savings represent total estimated therm reductions from conservation with no deductions made for the impact of free riders or other market effects. This represents the best approximation of actual load reductions from conservation that Cascade should expect to see over the next 20 years. *Net Annual Savings* takes into account Energy Trust's best estimates of the impact of free ridership, and other market effects, and best tie to Energy Trust's program goals which are required by the OPUC to be free of such impacts.

Residential Market Transformation savings represents Energy Trust's best estimate of annual therm savings for Cascade in Oregon due to improvements in residential building codes traditionally pursued and supported by both Energy Trust and the Northwest Energy Efficiency Alliance (NEEA).

Table 6 - 22

Cascade Natural Gas Oregon Service Area
Gross Annual Therm Savings 2015-2034

	Commercial	Industrial	Residential	Residential-Market Transformation	Total
2015	296,345	44,469	96,037	45,736	**482,587**
2016	291,917	44,469	97,940	58,580	**492,905**
2017	216,517	50,582	83,282	58,580	**408,961**
2018	199,566	50,790	82,651	58,580	**391,587**
2019	184,928	50,273	84,742	35,148	**355,091**
2020	173,712	50,558	83,663	35,148	**343,080**
2021	143,281	55,256	82,412	35,148	**316,097**
2022	122,522	55,600	82,081	21,089	**281,292**
2023	115,460	55,185	79,523	21,089	**271,256**
2024	114,452	58,966	78,464	21,089	**272,970**
2025	104,518	59,239	77,350	21,089	**262,196**
2026	104,839	59,701	76,234	21,089	**261,863**
2027	102,937	59,377	81,726	21,089	**265,129**
2028	103,671	59,896	81,099	21,089	**265,755**
2029	97,458	57,947	80,023	21,089	**256,517**
2030	97,764	58,501	78,987	21,089	**256,341**
2031	96,413	58,250	77,456	21,089	**253,207**
2032	98,365	58,858	76,484	21,089	**254,795**
2033	87,847	56,932	70,770	21,089	**236,637**
2034	83,782	57,572	74,837	21,089	**237,281**

Table 6 - 23
Cascade Natural Gas Oregon Service Area
Net Annual Therm Savings 2015-2034

	Commercial	Industrial	Residential	Residential-Market Transformation	Total
2015	260,822	35,015	91,447	45,736	433,020
2016	259,779	35,015	93,697	58,580	447,071
2017	190,438	39,828	78,466	58,580	367,313
2018	176,703	39,992	77,892	58,580	353,168
2019	164,854	39,585	80,041	35,148	319,627
2020	155,995	39,809	79,017	35,148	309,969
2021	129,220	43,509	77,822	35,148	285,699
2022	111,903	43,779	77,547	21,089	254,318
2023	105,959	43,453	75,346	21,089	245,846
2024	105,655	46,430	74,338	21,089	247,512
2025	96,476	46,645	73,276	21,089	237,486
2026	97,066	47,009	72,219	21,089	237,383
2027	95,452	46,753	77,288	21,089	240,582
2028	96,020	47,162	76,681	21,089	240,953
2029	90,635	45,627	75,658	21,089	233,009
2030	91,031	46,064	74,675	21,089	232,858
2031	89,894	45,866	73,236	21,089	230,085
2032	91,600	46,345	72,314	21,089	231,348
2033	82,652	44,828	67,164	21,089	215,733
2034	79,238	45,333	70,747	21,089	216,407

Oregon Low-Income Energy Conservation Program

Cascade Natural Gas, in combination with the five Oregon Community Action agencies that serve low-income Oregonians in Central and Eastern Oregon, administers and delivers the Oregon Low-Income Energy Conservation Program (OLIEC) and the associated two-year (2014-15) Conservation Achievement Tariff (CAT) pilot program. Each program is briefly described below. Cascade has filed an annual program report each year with the Oregon PUC since the inception of the program.

During the last full program year, October 1, 2013 to December 30, 2014, the combined OLIEC / CAT program weatherized 24 homes in Cascade's Oregon service are with an estimated annual total therm savings of 3,402 therms. This resulted in payments to our partner CAP agencies of $98,306 for the installation of weatherization measures and an additional $5,400 for agency administration. Over the life of the OLIEC program, from 2006 to 2014, 411 homes have been weatherized saving an estimated annual total of 60,675 therms. Resulting payments to our partner CAP agencies has totaled $652,230 with payments for agency administration totaling $92,475. These funds are sourced from the previously described public purpose charge.

The OLIEC program is 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 Community Action Agency (CAA). The rebates are determined on the basis of the first year dollar value of the conserved natural gas as reflected by our avoided cost of natural gas. The OLIEC program provides incentives for ten specific measures. In addition to the OLIEC rebates, agencies receive an additional $225 for administrative and direct program costs incurred by them.

Incentives are available through the OLIEC program for the following measures:

- Ceiling Insulation
- Floor Insulation
- Wall Insulation
- Duct Insulation
- Duct Sealing
- Air Sealing
- High-efficiency Natural Gas Furnaces
- Direct Vent Space heaters
- Existing Natural Gas Furnace Tune-up
- High Efficiency Natural Gas Water Heater

An additional incentive is available through the program for:

- Construction of Qualified Homes to Energy Star Standards

The CAT pilot overlay provides a separate mechanism by which the total rebate for installing each measure can increase to cover 100 percent of the cost of each measure as billed to the agency by contractors. In total, during the CAT pilot program, agencies can receive rebates up to 100 percent of the cost of installing OLIEC-qualified measures.

The following chronicles the evolution of the Conservation Achievement Tariff and reflects upon our experience to date with this two year pilot scheduled to expire on December 31, 2015

- Cascade held discussions with the Oregon Low Income Advisory Committee with the goal to provide more Oregon low-income household weatherization through the existing Oregon Low Income Energy Conservation Program, and better utilize available surplus weatherization funding. The CAP agencies, Community Action Partnership of Oregon (CAPO), OPUC staff and Gil Peach, a recognized national thought leader in low-income issues, helped to create the concept that led to the two-year CAT pilot launched on January 1, 2014.

- After a few months of operation of the CAT it became apparent the expected increase in weatherization completions was not materializing. In fact, it was beginning to look like the number of completions was decreasing compared to the previous year. This seemed highly counterintuitive considering the CAT pilot was jointly developed with the Advisory Group as a mechanism to overcome the historic primary obstacle to natural gas weatherization completions – limitations on utility funding which covered only a small portion of the total cost of installing a weatherization measure. In addition, the agencies had recently proven their ability to weatherize a substantial number of natural gas homes with the availability of American Recovery and Reinvestment Act (ARRA) funds. Cascade also learned this dramatic drop-off in weatherization completions was not isolated only to Cascade Natural Gas, but to NW Natural and Avista (Oregon) as well. Further, Cascade was simultaneously experiencing a dramatic drop-off in low-income weatherization completions in our Washington service.

- After researching this situation, Cascade came to the conclusion the primary cause of this counterintuitive result is the strict interpretation of, and adherence to, U.S. Department of Energy Weatherization Assistance Program (DOE-WAP) rules and guidelines by the State agencies in Oregon and Washington that administered the DOE-WAP program. These rules and guidelines included prioritization where agencies were instructed to develop an “actual waiting list” to determine which household is next to receive weatherization services with priority given to::
    - Persons 60 years of age or older,
    - Persons with disabilities, and
    - Families with children six years of age and under,

Priority *can* also be given to… (emphasis added)

- High residential energy users (as measured by total dollars spent annually on base-load and space heat), and
- Households with a high energy burden.

- Prioritizing households on the basis of need is a valuable tool for ensuring the most vulnerable low-income households receive preferential treatment in receiving services. However, when a jurisdiction adopts the philosophy that the supplemental energy use and energy burden components of prioritization be used along with age, disability and the presence of young children in the household, significant dislocations with other low-income weatherization programs occur. For example, in Oregon, between 2008 and 2013, average residential electric revenue per customer has increased by 20.9 percent for Pacific Power and 66.2 percent for Idaho Power. During this same period, average natural gas residential revenue per customer has decreased by 32.9 percent for Cascade Natural Gas. Even if a natural gas customer not from a priority group made it onto an agency waiting list, a new applicant with priority would move ahead of them. In the current energy price environment natural gas customers will nearly always be disadvantaged regardless of their need and regardless of the existence of leveraged resources available from other ratepayer-funded weatherization programs.

Cascade, the Agencies, CAPO and the OPUC staff are working together to develop program modifications within the CAT pilot to help achieve the original goals where more Oregon low-income households receive weatherization services and that available surplus weatherization funding be better utilized. Results as of the filing of this IRP are promising. Cascade will be working with parties throughout the remainder of the CAT pilot to find pathways toward success.

Future Issues and Legislation That Could Impact Demand Side Management Savings

At the present time there are several regulatory and legislative issues that can impact the demand-side management portion of the IRP. To the best extent possible, these potential impacts have been incorporated into the Oregon DSM projections.

Oregon Governor's 10-Year Energy Plan: On December 17, 2012, Governor Kitzhaber released a 10-Year Energy Action Plan that protects Oregon consumers and ensures energy investments made today will strengthen the economy. According to the U.S. Energy Information Administration, Oregonians spend approximately $14 billion on energy each year, and most of that money leaves the state. The comprehensive plan outlines strategies to meet energy efficiency, renewable energy, greenhouse gas reduction, and transportation objectives, with strategies that help to create investment opportunities to keep more capital circulating in Oregon.

Despite the original plan not containing regulatory or legislative guidance to dramatically impact natural gas DSM, it is anticipated the outcomes may heavily influence utility DSM policy, existing energy codes, and perceptions regarding optimal fuel mix and future natural gas use in the state. There is also discussion of aggressive carbon regulation and emissions caps which may ultimately serve to increase the range of viable conservation measures commensurate with the inclusion of carbon-adders to the avoided cost of natural gas.

Further, our opinion is that recent changes in the Oregon Governor's office do not necessarily lead to fundamental changes to the energy policy direction and guidance contained in the 10-year plan. Consequently, Cascade Natural Gas will continue to monitor developments closely and will work with the Energy Trust of Oregon and/or other participating entities in order to serve as environmental stewards - optimizing the use of natural gas and energy efficient natural gas measures and technologies to the fullest extent possible.

Oregon Senate Bill 844:

Oregon SB 844(2013) directs Oregon Public Utility Commission to establish voluntary emission reduction program(s) for the purpose of incentivizing public utilities that furnish natural gas to invest in projects to reduce greenhouse gas (GHG) emissions while providing benefits to customers of public utilities that furnish natural gas. The measure specifies criteria for participation, including guidance that projects reduce emissions (either directly or indirectly), that projects benefit the utility's customers, that the utility would otherwise not make the investment without the incentive, that stakeholders be involved in the development of the project, and that the aggregate effect of projects undertaken by a utility not exceed a rate impact specified by OPUC by rule. Cascade attended and provided comments at various OPUC workshops while the SB 844 rules and procedures were under development.

While Cascade has not yet identified a project within our Oregon service area that might qualify as a SB 844 project we remain interested in the concept and will be tracking regulatory and program developments related to the initial activities of other Oregon natural gas utilities. Consequently, no assumptions regarding possible SB 844 activity by Cascade are included in this IRP.

It is worth noting from an IRP perspective, a utility's SB 844 project's overall GHG emission reduction impact *could* lead to either an *increase* in natural gas usage (from substituting natural gas for a higher GHG-emitting fuel source) or a *decrease* in natural gas consumption from the implementation of a new or creative method of reducing overall natural gas usage. These impacts will be carefully analyzed and incorporated into future IRPs if Cascade pursues SB 844 projects.

Oregon PUC docket UM 1622: On September 30, 2014 the OPUC announced a decision in UM 1622 on a portion of natural gas energy-efficiency measures and programs then supported by Energy Trust through an OPUC exception to the cost-effectiveness requirement. This decision followed a public process conducted by the OPUC to gather data and information on the costs and benefits of these measures. Cascade participated in various workshops and provided comments in this docket. Current low natural gas prices, and other factors, were leading to certain, long-standing, natural gas conservation measures no longer passing the cost-effectiveness test relied upon by the OPUC.

The OPUC decision required Energy Trust implement changes to some natural gas measures and programs offered in Oregon, particularly residential, multifamily and solar program offerings.

OPUC Orders 14-332 (October 1, 2014) and Errata Order 14-343 (October 3, 2014) contains the full details of the OPUC decision, including exceptions requested by Energy Trust that were approved, and recommendations made by Energy Trust adopted by the OPUC relating to program performance reporting and the process for reviewing exceptions.

Incentives for the following natural gas conservation measures were impacted by the decision in UM 1622

- Residential and commercial solar water heating and solar pool heating (discontinue new incentive commitments after November 7, 2014)
- Single-family wall, floor and duct insulation (discontinue after April 30, 2015)

- Single-family air sealing (discontinue as a stand-alone measure after April 30, 2015; continue only through a pilot initiative combining air sealing and ceiling insulation)
- Multifamily wall, floor and duct insulation (discontinue after April 30, 2015)
- Multifamily windows (discontinue after April 30, 2015)
- Commercial vent hoods with variable speed drives, 2 and 2.5 horsepower (discontinue after January 1, 2015)
- New commercial buildings condensing tank water heater (modify; except for school buildings, discontinue when not cost-effective after January 1, 2015)
- New commercial non-multifamily buildings with condensing unit heater (modify; discontinue when not cost-effective after January 1, 2015)

Energy Trust, as noted earlier in this report, has incorporated these known incentive and program modifications into the analysis conducted for Cascade using the *Energy Trust Resource Assessment Model.* For example, while the conservation potential of each of the impacted measures were modeled to calculate overall Technical and Achievable conservation potential, these measures were excluded from the final analysis because they were no longer deemed to be cost effective utilizing current OPUC cost-effectiveness tests.

Other activities and matters related to UM 1622 are currently underway at the OPUC with the assistance of multiple parties. Among these are efforts to arrive at some measure of a ‘hedge value’ from natural gas conservation that could be added to non-energy benefits of specific measures to improve their overall cost-effectiveness and potentially lead to the re-establishment of Energy Trust incentives. The possible results of these ancillary UM 1622 activities are unknown at present and have not been included in this IRP.

Section 7

Resource Integration

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

Resource Optimization Analysis Tools

SENDOUT™'s broad capabilities allow the Company to develop supply and demand relationships that closely mirror Cascade's existing operations. Cascade continued to model demand areas grouped by the various pipeline zones, a practice that began with the 2008 IRP. With the introduction of our new load forecast model (LFM) application, this IRP takes a more CityGate 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 7-A. Figure 7-B shows the network rolled up to the zonal level. These demand centers reflect on a daily basis, the aggregate 20 year load forecasts of Cascade's core market customers being served from either Northwest Pipeline GP (NWP) or Gas Transmission Northwest (GTN) interstate pipeline facilities. Individual transportation segments, storage, supply and demand side resources, both existing and potential, are targeted to these pipeline zones. 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 can be part of each resource's basic model inputs. The ability to model resources in this fashion allows SENDOUT™ to tailor its optimization within envisioned constraints and ensures that the model's optimal solution can work under anticipated operating conditions.

However, because SENDOUT™ utilizes a linear programming approach, its results are considered "deterministic". For example, 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.

Since decisions are made in the context of uncertainty about the future, in 2006 Cascade purchased VectorGas™. VectorGas™ was an add-in product to the SENDOUT™ model that facilitates the ability to model gas price and load uncertainty (driven by weather) into the future. VectorGas™ utilizes a Monte Carlo approach in combination with the linear programming approach in SENDOUT™. The VectorGas™ functionality was integrated in the SENDOUT™ software with Version 12.5, which is the platform that Cascade prepared its integration analysis on. The addition of the Monte-Carlo modeling capability provides additional information to decision makers under conditions of uncertainty. This tool continues to enhance the robustness of the Company's long-term resource planning and acquisition activities.

FIGURE 7-A

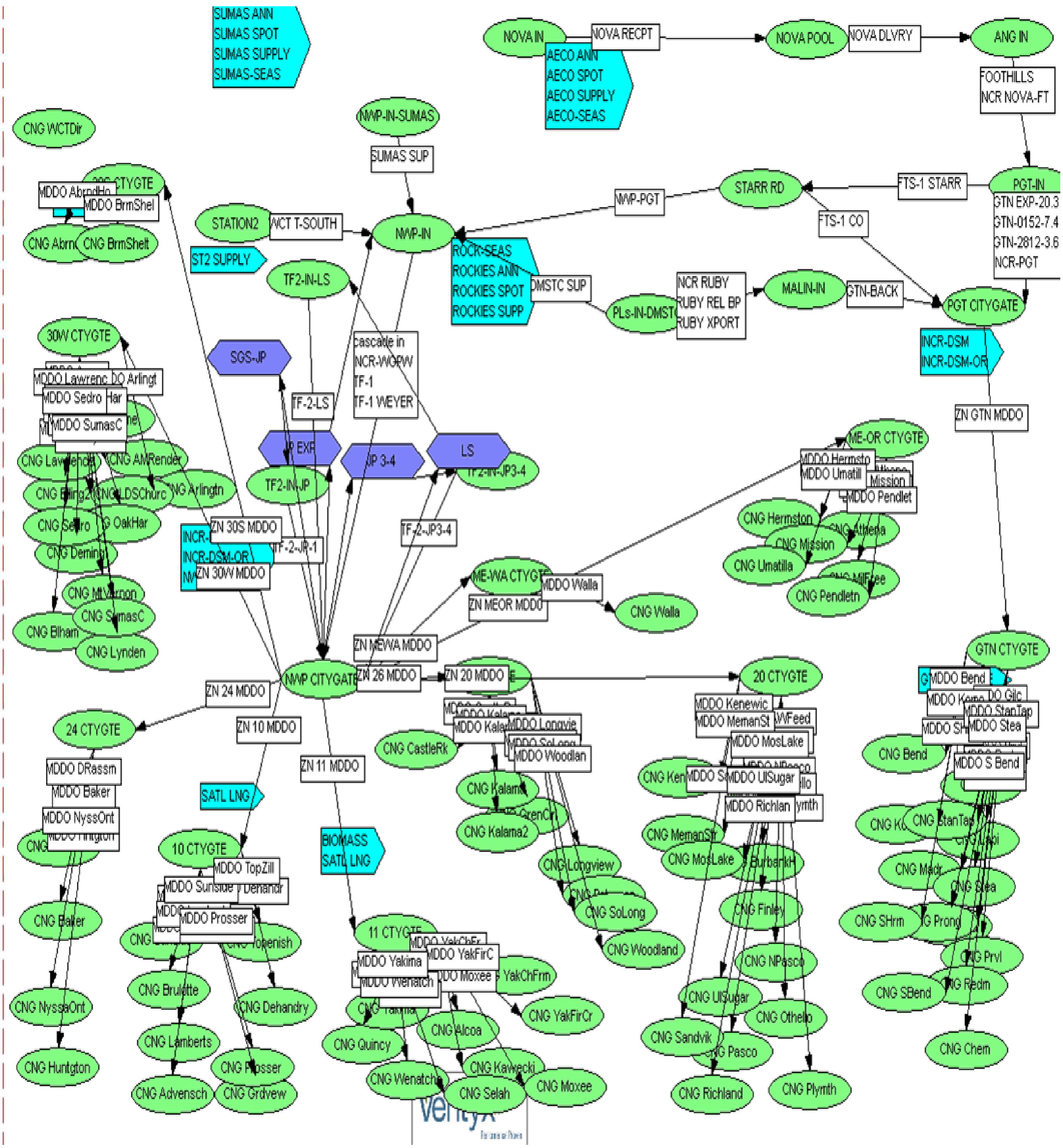
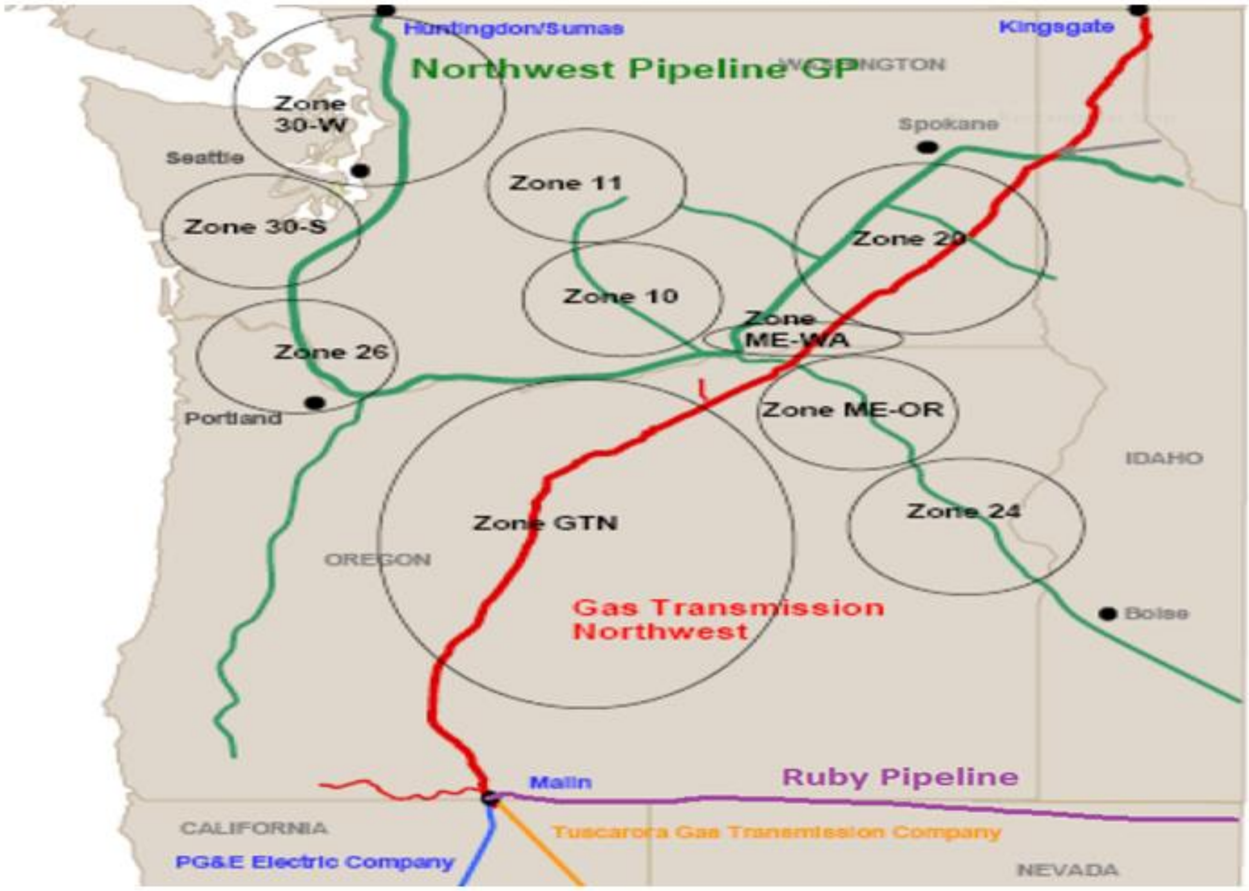


FIGURE 7-B



SENDOUT Resource Optimization Inputs

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. Daily temperature patterns are available as either design or average weather. Since the model has several distinct demand areas, both usage factor and temperature pattern inputs are developed within Sendout® on an area specific basis.

In Sendout® each supply contract requires a Maximum Daily Quantity (MDQ) input to establish its specific delivery capabilities. The user can establish whether daily, annual, monthly or seasonal minimum utilization of the contract is required or desired. 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. There are also several fixed and variable cost rate inputs available to establish 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 desired.

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 Daily MDQ inputs, the user establishes inventory maximums and/or minimums. If monthly inventory levels are to change over the years or within a year, Sendout® allows the user 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 or 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 user also can establish whether inventory exists at the beginning of the planning period and whether various prices and specific quantities exist at that time. Sendout® offers the user five separate volume and price levels to reflect existing inventories.

SENDOUT 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 the user with 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 allow the user to 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 available to the Sendout® user. These reports summarize various aspects of the optimal portfolios 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 number of very informative aspects of the optimization run. The report provides the user with a breakdown of portfolio costs, on a yearly as well as a total planning period basis, in several different formats. For example, an aggregate portfolio cost total is provided for easy comparison between years, as well as between various optimization runs, if the user is attempting to quickly compare the influence 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 provides unit cost detail of the total portfolio as well as each resource selected and utilized by the model in the optimization process. The user is provided with individual resource takes and available maximums to quickly determine how much of a portfolio resource the model actually uses.

Finally, the report also contains the Resource Mix summary. This report summarizes Sendout's decisions regarding the sizing and optimal mix of incremental resources, which enables the user to determine 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 some indication of individual resource utilization, the Month to Month summary allows the user to examine more closely 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, the user may offer annual supply contracts to Sendout® to address load growth over the planning period. The user 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 user 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 more of this monthly information in other, more 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 situation is also present with respect to the Transportation Summary Report and the Storage Summary Report. Sendout® also offers monthly supply utilization information in a Load Factor Summary Report which some users may prefer to use in their approach to analyzing Sendout's results.

Key Output Report - Supply vs. Requirements

This report compares a particular forecast's monthly demand requirement quantity against the optimal portfolio's various supply quantities. The user can observe supply utilization as well as determine 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. Armed with this information, the user can readily

access the Daily Unserved Demand reports to determine 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 user could turn to the Peak Day Reports to determine if the shortfall is supply or transportation related. If the shortfall occurs on a number of days surrounding the peak or at other times during the year, the user 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 by the user through Sendout's output reports contribute to developing better resource portfolios. Sendout's output report(s) can overwhelm the user with information, which can complicate the analysis process in some respects. Sendout® offers the user a Custom Report Writer ("Report Agent") module, which can isolate certain information contained in the various output reports, and improve the analysis activity. The report writer 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 a spreadsheets or databases. Provided the information is available, the user 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 of Sendout's output information can be accessed through this module.

Scenarios versus Simulations

Prior to discussing the modeling process, inputs, and ultimately the results of the analyses, a brief discussion of the term scenarios versus simulations is necessary. As stated earlier, SENDOUT™ relies on a series of inputs or assumptions and then solves for the least cost solution based on the information provided to the model. Each group of assumptions is considered a scenario. For example, the company models medium load growth under average weather conditions where the assumed daily weather pattern is input into the SENDOUT™ model. The company also runs scenarios utilizing the low and high growth forecasts and historically has run several different price assumption scenarios. The results of each of these scenarios provide an answer or a least cost solution, which the optimization model has solved based on its perfect knowledge. Historically, this has provided the range of expected outcomes. However, with the addition of the Monte-Carlo functionality, the Company can now run simulations to determine if the scenario results are reasonable and to provide an expected range of results based on a statistical analysis.

Table 7-1 provides the list of scenarios included in this IRP and their key assumptions. To assess the impacts due to variations in pricing and weather, the company ran Monte- Carlo simulations on the Basecase scenario. The Company utilized the Basecase scenario as it represents the scenario Cascade considers most likely to be experienced over the planning horizon.

The basecase (Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event) includes existing supply contracts, incremental supplies (peaking, annual, seasonal and CityGate) from various receipt points (AECO, Rockies, Sumas, Station 2 and Malin). Other incremental supplies also include biogas and satellite LNG (behind CityGate). The basecase includes current upstream pipeline transport capacity, as well as Ruby and incremental NWP and GTN capacity. We also included Cascade's current Jackson Prairie storage accounts, our Plymouth LNG account, as well as the potential to obtain a third party's Jackson Prairie account, as well as Wild Goose, Gill Ranch, Ryckman Creek or Mist storage.

In addition to the 200 draws, the Company prepared several sensitivity scenarios to test the resource selections when the baseline conditions were changed. Table 7-2 below describes those sensitivity scenarios.

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 will provide the quantifiable output from numerous model inputs. The model does not prescribe the ultimate resource portfolio. It can only determine the least cost set of resources given their specific pricing and quantifiable constraint characteristics. However, there are many other combinations of resources that may be available over the planning horizon. Cascade must still make subjective risk judgments about unquantifiable and intangible issues related to resource selections. These will include future flexibility, supplier deliverability risk, pipeline(s) risk, financial risk to the utility and its ratepayers, operational constraints, regulatory risk, etc. The risk judgments are combined with the quantitative IRP analysis to form actual resource decisions.

TABLE 7-1
SUMMARY OF PORTFOLIO ANALYSIS AND RESOURCE ALTERNATIVES

ID	SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in **RED** mean those elements were excluded from the scenario		
1	All in Case	**Current Station2** **Current NOVA-Foothills** **Current GTN** **Current NWP** **Current Ruby** **Ryckman Crk Storage** **Incremental JP** **Mist Storage** **Wild Goose Storage**	**Incremental NOVA** **Incremental GTN** **Incremental NWP** **Incremental Ruby** **JP1, JPExp, JP3-4, LS** **T-South-So Crossing** **Pacific Connector** **N-MAX-Stan-Madr** **N-MAX Madr I-5**	**AECO Year, Seas, Spot** **Sumas Year, Seas, Spot** **Rockies Year, Seas, Spot** **Station2Year, Seas, Spot** **CityGate GTN, NWP** **BioNatualGas** **Satellite LNG** **WA Expansion** **Gill Ranch Storage**
2	As Is	**Current Station2** **Current NOVA-Foothills** **Current GTN** **Current NWP** **Current Ruby** ***Ryckman Crk Storage*** ***Incremental JP*** ***Mist Storage*** ***Wild Goose Storage***	**Incremental NOVA** **Incremental GTN** **Incremental NWP** **Incremental Ruby** **JP1, JPExp, JP3-4, LS** ***T-South-So Crossing*** ***Pacific Connector*** ***N-MAX-Stan-Madr*** ***N-MAX Madr I-5***	**AECO Year, Seas, Spot** **Sumas Year, Seas, Spot** **Rockies Year, Seas, Spot** **Station2Year, Seas, Spot** **CityGate GTN, NWP** ***BioNatualGas*** ***Satellite LNG*** ***WA Expansion*** ***Gill Ranch Storage***
3	Limited Canadian Imports	**Current Station2** **Current NOVA-Foothills** **Current GTN** **Current NWP** **Current Ruby** **Ryckman Crk Storage** ***Incremental JP*** ***Mist Storage*** **Wild Goose Storage**	**Incremental NOVA** **Incremental GTN** **Incremental NWP** **Incremental Ruby** **JP1, JPExp, JP3-4, LS** ***T-South-So Crossing*** ***Pacific Connector*** ***N-MAX-Stan-Madr*** ***N-MAX Madr I-5***	**AECO *Year, Seas*, Spot** **Sumas Year, Seas, Spot** **Rockies Year, Seas, Spot** **Station2 *Year, Seas*, Spot** **CityGate GTN, NWP** **BioNatualGas** **Satellite LNG** ***WA Expansion*** **Gill Ranch Storage**

ID	SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in **RED** mean those elements were excluded from the scenario		
4	Ryckman Creek	**Current Station2 Current NOVA-Foothills Current GTN Current NWP Current Ruby Ryckman Crk Storage** ***Incremental JP Mist Storage Wild Goose Storage***	**Incremental NOVA Incremental GTN Incremental NWP Incremental Ruby JP1, JPExp, JP3-4, LS** ***T-South-So Crossing Pacific Connector N-MAX-Stan-Madr N-MAX Madr I-5***	**AECO Year, Seas, Spot Sumas Year, Seas, Spot Rockies Year, Seas, Spot Station2Year, Seas, Spot CityGate GTN, NWP BioNatualGas Satellite LNG** ***WA Expansion Gill Ranch Storage***
5	Mist	**Current Station2 Current NOVA-Foothills Current GTN Current NWP Current Ruby** ***Ryckman Crk Storage Incremental JP*** **Mist Storage** ***Wild Goose Storage***	**Incremental NOVA Incremental GTN Incremental NWP Incremental Ruby JP1, JPExp, JP3-4, LS** ***T-South-So Crossing Pacific Connector N-MAX-Stan-Madr N-MAX Madr I-5***	**AECO Year, Seas, Spot Sumas Year, Seas, Spot Rockies Year, Seas, Spot Station2Year, Seas, Spot CityGate GTN, NWP BioNatualGas Satellite LNG** ***WA Expansion Gill Ranch Storage***
6	All Storage Options	**Current Station2 Current NOVA-Foothills Current GTN Current NWP Current Ruby Ryckman Crk Storage Incremental JP Mist Storage Wild Goose Storage**	**Incremental NOVA Incremental GTN Incremental NWP Incremental Ruby JP1, JPExp, JP3-4, LS** ***T-South-So Crossing Pacific Connector N-MAX-Stan-Madr N-MAX Madr I-5***	**AECO Year, Seas, Spot Sumas Year, Seas, Spot Rockies Year, Seas, Spot Station2Year, Seas, Spot CityGate GTN, NWP BioNatualGas Satellite LNG** ***WA Expansion*** **Gill Ranch Storage**
7	T-South Enhancement with incremental Sumas (WA Expansion)	**Current Station2 Current NOVA-Foothills Current GTN Current NWP Current Ruby Ryckman Crk Storage** ***Incremental JP Mist Storage Wild Goose Storage***	**Incremental NOVA Incremental GTN Incremental NWP Incremental Ruby JP1, JPExp, JP3-4, LS T-South-So Crossing** ***Pacific Connector N-MAX-Stan-Madr N-MAX Madr I-5***	**AECO *Year, Seas*, Spot Sumas Year, Seas, Spot Rockies Year, Seas, Spot Station2 *Year, Seas*, Spot CityGate GTN, NWP BioNatualGas Satellite LNG WA Expansion** ***Gill Ranch Storage***

ID	SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in **RED** mean those elements were excluded from the scenario		
8	T-South Enhancement/Southern Crossing	**Current Station2**	**Incremental NOVA**	**AECO Year, Seas, Spot**
		Current NOVA-Foothills	**Incremental GTN**	**Sumas Year, Seas, Spot**
		Current GTN	**Incremental NWP**	**Rockies Year, Seas, Spot**
		Current NWP	**Incremental Ruby**	**Station2 Year, Seas, Spot**
		Current Ruby	**JP1, JPExp, JP3-4, LS**	**CityGate GTN, NWP**
		Ryckman Crk Storage	**T-South-So Crossing**	**BioNatualGas**
		Incremental JP	***Pacific Connector***	**Satellite LNG**
		Mist Storage	***N-MAX-Stan-Madr***	***WA Expansion***
		Wild Goose Storage	***N-MAX Madr I-5***	**Gill Ranch Storage**
9	Pacific Northwest Regional (NMAX, WA Expansion)	**Current Station2**	**Incremental NOVA**	**AECO Year, Seas, Spot**
		Current NOVA-Foothills	**Incremental GTN**	**Sumas Year, Seas, Spot**
		Current GTN	**Incremental NWP**	**Rockies Year, Seas, Spot**
		Current NWP	**Incremental Ruby**	**Station2Year, Seas, Spot**
		Current Ruby	**JP1, JPExp, JP3-4, LS**	**CityGate GTN, NWP**
		Ryckman Crk Storage	***T-South-So Crossing***	**BioNatualGas**
		Incremental JP	***Pacific Connector***	**Satellite LNG**
		Mist Storage	**N-MAX-Stan-Madr**	**WA Expansion**
		Wild Goose Storage	**N-MAX Madr I-5**	***Gill Ranch Storage***
10	Wild Goose	**Current Station2**	**Incremental NOVA**	**AECO Year, Seas, Spot**
		Current NOVA-Foothills	**Incremental GTN**	**Sumas Year, Seas, Spot**
		Current GTN	**Incremental NWP**	**Rockies Year, Seas, Spot**
		Current NWP	**Incremental Ruby**	**Station2Year, Seas, Spot**
		Current Ruby	**JP1, JPExp, JP3-4, LS**	**CityGate GTN, NWP**
		Ryckman Crk Storage	***T-South-So Crossing***	**BioNatualGas**
		Incremental JP	***Pacific Connector***	**Satellite LNG**
		Mist Storage	***N-MAX-Stan-Madr***	***WA Expansion***
		Wild Goose Storage	***N-MAX Madr I-5***	***Gill Ranch Storage***
11	Gill Ranch	**Current Station2**	**Incremental NOVA**	**AECO Year, Seas, Spot**
		Current NOVA-Foothills	**Incremental GTN**	**Sumas Year, Seas, Spot**
		Current GTN	**Incremental NWP**	**Rockies Year, Seas, Spot**
		Current NWP	**Incremental Ruby**	**Station2Year, Seas, Spot**
		Current Ruby	**JP1, JPExp, JP3-4, LS**	**CityGate GTN, NWP**
		Ryckman Crk Storage	***T-South-So Crossing***	**BioNatualGas**
		Incremental JP	***Pacific Connector***	**Satellite LNG**
		Mist Storage	***N-MAX-Stan-Madr***	***WA Expansion***
		Wild Goose Storage	***N-MAX Madr I-5***	**Gill Ranch Storage**

ID	SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in **RED** mean those elements were excluded from the scenario		
12	Expected (basecase)	**Current Station2** **Current NOVA-Foothills** **Current GTN** **Current NWP** **Current Ruby**	**Incremental NOVA** **Incremental GTN** **Incremental NWP** **Incremental Ruby** **JP1, JPExp, JP3-4, LS**	**AECO Year, Seas, Spot** **Sumas Year, Seas, Spot** **Rockies Year, Seas, Spot** **Station2Year, Seas, Spot** **CityGate GTN, NWP**
		Ryckman Crk Storage ***Incremental JP*** ***Mist Storage*** ***Wild Goose Storage***	***T-South-So Crossing*** ***Pacific Connector*** ***N-MAX-Stan-Madr*** ***N-MAX Madr I-5***	***BioNatualGas*** **Satellite LNG** **WA Expansion** ***Gill Ranch Storage***

TABLE 7-2
SENSITIVITIES ANALYSES

Scenario Name	Key Assumptions
High Growth	Strong Economic Growth result in High Load growth, Average Weather, Medium Gas Prices
Low Growth	Economic Conditions result in Low Load growth, Average Weather, Medium Gas Prices
Environmental Externalities Carbon 1	Medium Load Growth, Average Weather, Assumes Carbon Adder Implemented in 2017 for CO2 emissions at $15/ton with adder increasing annually by 3% plus CPI (Consumer Price Index)
Environmental Externalities Carbon 2	Medium Load Growth, Average Weather, Assumes Carbon Adder Implemented in 2017 for CO2 emissions at $20/ton with adder increasing annually by 3% plus CPI (Consumer Price Index)
Environmental Externalities Carbon 3	Medium Load Growth, Average Weather, Assumes Carbon Adder Implemented in 2017 for CO2 emissions at $30/ton with adder increasing annually by 3% plus CPI (Consumer Price Index)

Key Inputs
Demand Forecast Items & Weather Assumptions
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. Using the LFM application as the source, the company develops usage factors for each of the 55 CityGate/CityGate loops shown on Figure 7-A; Cascade has a total of 76 CityGates. Two currently have no flow, nine that only feed non-core customers, and 65 that have at least one core customer behind it. Of the 65 CityGates that serve core customers, 18 CityGates are grouped into 8 different loops. The SENDOUT model is built from the CityGate level up as it is the smallest level at which there is a high degree of consistency and availability of raw data. This is a change of methodology from previous years where SENDOUT models were built from the district or zonal level. The CityGate results are rolled up into zones and districts which segregate Cascade's system based on pipelines and weather (see Appendix C).

Demand Side Alternatives
For purposes of this IRP, the Company has utilized the annual achievable potential schedule shown on Table 6-18 in Section 6 as an input to the optimization model. Because the company models demand by individual zone, conservation has been treated as a "must-take" supply alternative available at the pipeline CityGate level. This approach allows the conservation resource to displace supply and pipeline transportation resources that would otherwise be necessary to meet demand requirements. For purposes of modeling, 80% of the identified Oregon Conservation resources are assumed to occur on the GTN pipeline with the remaining 20% occurring on Northwest pipeline. Washington conservation was modeled as a must-take resource at the NWP CityGate. Because the acquisition of

DSM is dependent upon a number of small purchases, determining which pipeline zones will procure the most conservation at this point is still premature. In future planning cycles, the company will continue to review the results of the participation levels and determine if more detailed assumptions on conservation acquisition can be modeled. Under the basecase scenario, the company has assumed conservation resources could be purchased on a levelized cost per therm basis of $6. The cost per therm figure of $6 is an estimate of the combined Total Resource Cost for all measures included in the program, including program delivery and administration costs.

Supply Side Resource Alternatives

For modeling purposes, supply side alternatives are grouped into one of three categories: gas supply, storage facilities, or pipeline transportation. As discussed in Section 5, some of the supply alternatives include one or more of these categories. For example, a gas supply resource may be delivered at Cascade’s CityGate, essentially reducing the requirement for firm pipeline capacity. A satellite LNG facility (whether trucked in or liquefied on site) located within Cascade’s distribution system can reduce the need for pipeline capacity on a peak day as the supplies will be available to be directly flowed into Cascade’s local system. The following table provides a high level summary of the resource alternatives considered over the planning horizon.

Table 7-3
Supply Side Alternatives Modeled

Resource	Scenario Considered
Conventional Gas Supply Contracts with annual, seasonal or winter only characteristics delivered to Northwest Pipeline & GTN Systems	All
Conventional Gas Supply Peaking Contracts Delivered to Northwest Pipeline & GTN Systems	All
Gas Supply Peaking Contract delivered to Cascade's CityGates	All
Incremental Storage Delivered to Northwest Pipeline and GTN systems	All
Satellite LNG Storage within Cascade's distribution system	All
Additional Pipeline Capacity secured through medium--long term capacity agreements	All

Natural Gas Price Forecast

Price volatility has become an on-going factor in the natural gas industry since 2005. Prices in the natural gas market continued to be volatile through 2008 (upwards to $13 per Dth), but have since dropped considerably (currently around $3-$4). As discussed in Section 5, natural gas prices will continue to be influenced by demand, oil price volatility, the global economy, electric generation, new extraction technologies, hurricanes and other weather activity. As a result, it is impossible to accurately estimate what future natural gas prices will be over the planning horizon. However, Cascade has considered price forecasts from several sources, such as Wood Mackenzie, Energy Information Administration, the Financial Forecast Center's forecast, as well as our observations of the market to develop our low, base and high price forecast. As mentioned earlier, details of the company's price forecast can be found in Appendix E.

The Company compared the Monte-Carlo price simulation results to the low, base and high forecasts and found that the 200 draws captured the same range of pricing outlined in the forecasts shown in the Appendix. Therefore, individual deterministic runs under the low and high price forecast were not run.

Integration Results and Key Findings

As described earlier in this section, Cascade performed several different scenarios and the results are summarized below. However, it should be noted that the results of these analyses should be considered broadly. Like all analyses, the results of the resource optimization models are dependent upon the input assumptions provided. Scenario and

Monte-Carlo analysis help by providing information on the ranges of input assumptions. Whether Cascade eventually secures these particular resources, acquires ones of comparable size and characteristics, or decides on an alternative approach is subject to ongoing resource investigation and evaluation activities. Specific resources made available to the model at this time may or may not be physically available at the time they are needed or economically attractive in comparison to alternatives that may become available in the future. Therefore, prior to securing any of these resources, additional analyses of the specific resource must be completed.

The results of the various scenarios are fairly consistent and reveal the following general trends:

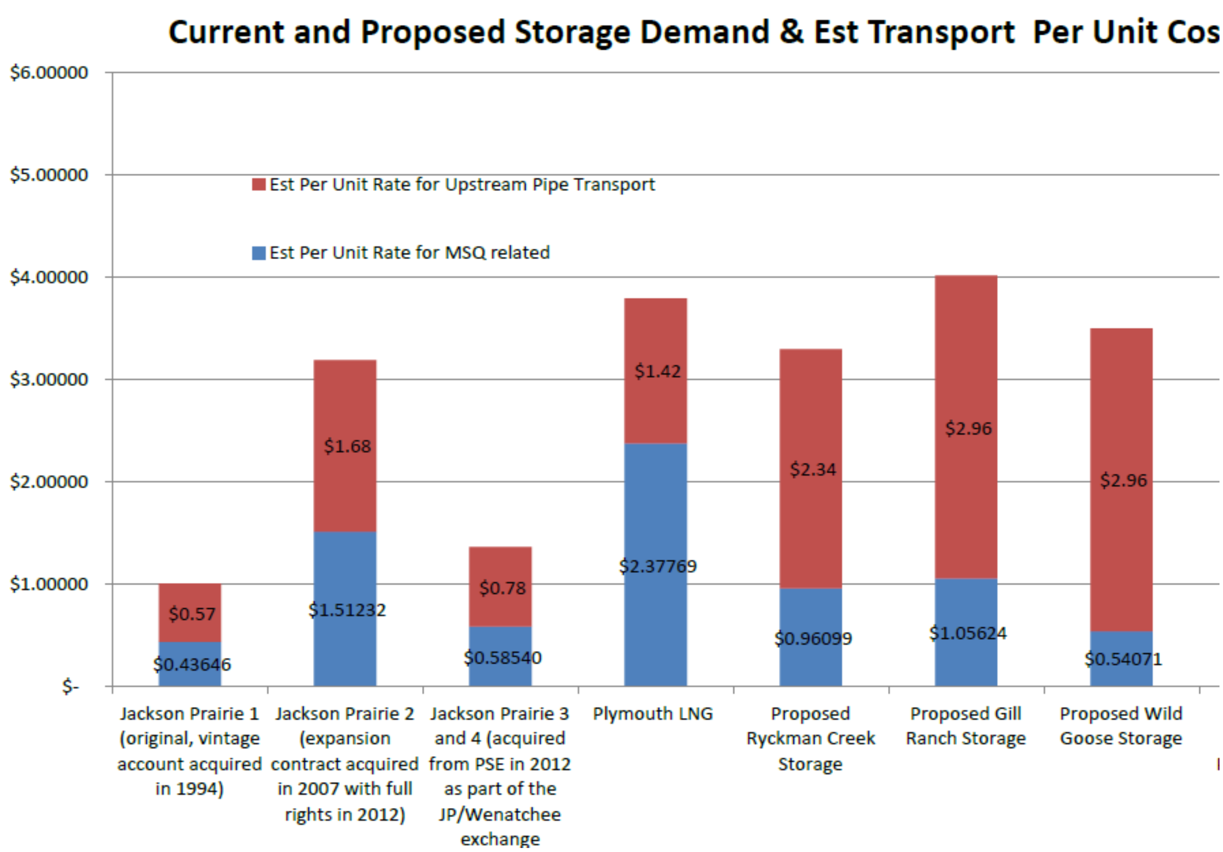
- Even with energy efficiency programs, Cascade will need to acquire additional capacity resources to meet anticipated peak day requirements, due to Cascade's continued growth in its residential and commercial customer base. Several of Cascade's existing transportation agreements will expire over the next several years. In most cases, Cascade has the unilateral right to extend or cancel the expiring contracts upon one year's notice. As a result, the company will have the opportunity to review alternatives to extend or replace those contracts.

- Satellite LNG/Peak shaving facilities located within Cascade's distribution system (for example Zones 10 and 11—the Wenatchee lateral) may also be an attractive alternative to incremental pipeline capacity in areas where physical limitations at the gate stations would result in even higher costs associated with a pipeline solution. There may be additional advantages to such a strategy to the extent a facility could be strategically located on a portion of the distribution system that will eliminate or reduce distribution system constraints.

- Based on the shale boom, continuing low price supplies and increasing demand in Asia, it looks like LNG will become an export from the Pacific Northwest as opposed to an import. In a situation such as that with Pacific Connector, Cascade will not become a shipper to the export facility, but rather, will compete for supplies at the Malin hub where several pipelines, including Pacific Connector, will have supply trading activities.

- We considered the impact of possible reductions in exports of gas supplies physically produced in British Columbia and Alberta, by limiting the amount of physical Canadian supplies that could be exported via existing infrastructure at Station 2, Sumas, or AECO, to approximately 60% by not making several packages of these supplies available to the model. Under this scenario, the model chose to increase the amount of imported Rockies gas via either a Ruby/Malin transaction or Malin/Stanfield exchange. Given the proliferation of shale gas, we do not see access to Canadian gas being a problem - gas will be available - however, we will be competing with many parties and consequently, may experience potential volatility and price spikes.

- We modeled Ryckman Creek storage at varying reservation rates and working inventory levels. In a range of reservation rates that are essentially equivalent to slightly lower than Jackson Prairie expansion and significantly higher, SENDOUT consistently selected Ryckman Creek storage with working inventory between 300,000 and 500,000 (units?). It should be noted that the model also suggested picking up incremental GTN backhaul service as well as increased amounts of Ruby capacity. The model selected incremental Ruby capacity both on a seasonal basis as well as an annual basis, depending on the reservation rate. It appears that Cascade should continue to hold discussions with Ryckman Creek as well as do additional analysis in order to make a final determination of what level of participation would be appropriate. The chart below provides a bit more context of Ryckman vs other incremental storage options.



- The company will continue to evaluate potential options to acquire more on system storage capabilities. However, it is worth noting that when we ran incremental Jackson Prairie as well as giving the model the option to pick up Mist, Jackson Prairie was selected. Using the current tariff rate for Mist, the model did not select Mist as a storage alternative, even when attached to discounted or current NWP transportation.

- 20 year portfolio costs on are expected to range between $4,796,510,000 to $5,718,027,716 for the planning period, with an average cost per therm ranging between $.48 and $.75.

Table 7-4 on the following pages summarizes the results from each of the modeling scenarios mentioned in Table 7-1. They are ranked from least expensive to most expensive portfolio.

Table 7-4
SUMMARY OF PORTFOLIO ANALYSIS RESULTS

ID	SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in **RED** mean those elements were excluded from the scenario	NPV 20 Year Costs in $000s	Average Cost Per Therm
2	As Is	**Current Station2** / **Incremental NOVA** / **AECO Year, Seas, Spot** **Current NOVA-Foothills** / **Incremental GTN** / **Sumas Year, Seas, Spot** **Current GTN** / **Incremental NWP** / **Rockies Year, Seas, Spot** **Current NWP** / **Incremental Ruby** / **Station2Year, Seas, Spot** **Current Ruby** / **JP1, JPExp, JP3-4, LS** / **CityGate GTN, NWP** Excluded (red): ***Ryckman Crk Storage*** / ***T-South-So Crossing*** / ***BioNatualGas*** ***Incremental JP*** / ***Pacific Connector*** / ***Satellite LNG*** ***Mist Storage*** / ***N-MAX-Stan-Madr*** / ***WA Expansion*** ***Wild Goose Storage*** / ***N-MAX Madr I-5*** / ***Gill Ranch Storage*** The As Is Case run allows the company to see what the model does without the alternative resources attached. It sets a bench mark to test the validity of the information (for instance comparing system costs the first year to the most recent PGA). Additionally, the model is given some minor limits to determine see the range of served and unserved peak day load is. Unserved peak day load during the planning horizon was approximately 8,156,000 therms.	Not applicable; large volume of unserved load	

ID	SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in **RED** mean those elements were excluded from the scenario	NPV 20 Year Costs in $000s	Average Cost Per Therm
12	Expected (basecase)	**Current Station2** · **Incremental NOVA** · **AECO Year, Seas, Spot** **Current NOVA-Foothills** · **Incremental GTN** · **Sumas Year, Seas, Spot** **Current GTN** · **Incremental NWP** · **Rockies Year, Seas, Spot** **Current NWP** · **Incremental Ruby** · **Station2Year, Seas, Spot** **Current Ruby** · **JP1, JPExp, JP3-4, LS** · **CityGate GTN, NWP** **Ryckman Crk Storage** · ***T-South-So Crossing*** · ***BioNatualGas*** ***Incremental JP*** · ***Pacific Connector*** · **Satellite LNG** ***Mist Storage*** · ***N-MAX-Stan-Madr*** · **WA Expansion** ***Wild Goose Storage*** · ***N-MAX Madr I-5*** · ***Gill Ranch Storage*** We chose this combination as the base case in that it contains the solid mix of existing supplies and transport. As identified earlier, Ryckman Creek storage is consistently selected by the model regardless of the scenarios. Ryckman is primarily used to provide supplemental storage to Oregon locations; however, it should be pointed out that in some scenarios we tested we could replace Ryckman with additional NGTL, Foothills and GTN southbound capacity. We continue have concerns about a future at Ryckman expansion, so while it is advisable to consider this a viable resource for the horizon, we put off the decision for several years and look at southbound incremental GTN capacity as a backup solution. Incremental JP is not currently available or anticipated. While we have managed to pick up some of PSE's excess JP storage, it appears from theirs (and other LDCs IRPs) that the ability to pick up long-term storage from existing customers is not likely. Unless steeply discounted, the model did not select any other incremental storage when it was run separately. We will watch for an open season, but at this point given the model results this doesn't strike us as prudent choice for the base case. In most of the runs for T-South/Southern Crossing, that resource was only selected at volumes of less than 2000 Dths/day; the volume is insignificant and the nomination scheduling is operationally more complicated (Westcoast, Fortis, South Crossing, Nova, Foothills, GTN). We see limited value in T-South Enhancement at this time. We have excluded Pacific Connector supplies at Malin from the base case as it is only selected during cold events (e.g. Dec peak day), but it is not certain that the pipeline will get built to the LNG facility, let alone have supplies competitively priced for Cascade to obtain. The N-MAX and WA Expansions seem attractive on the surface in that the projects are along our distribution system and demand in the Pacific Northwest will require some type of additional pipeline infrastructure—so it seems prudent to include these resources at this time as viable resource candidates for the base case. There has been a bit of interest raised in the last year or so by parties seeking to move biogas on the distribution system; additionally, we still view Satellite LNG at specific locations to be a cost effective solution to meet winter loads without incurring the additional expense of pipeline infrastructure. Therefore, we include small amounts of these potential resources in the base case portfolio.	$5,198,207	$0.609505

<table>
<tr>
<th>ID</th>
<th>SCENARIO NAME</th>
<th>KEY ELEMENTS IN SENDOUT SCENARIO
Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in RED mean those elements were excluded from the scenario</th>
<th>NPV 20 Year Costs in $000s</th>
<th>Average Cost Per Therm</th>
</tr>
<tr>
<td>1</td>
<td>All in Case</td>
<td>
<table>
<tr><td>Current Station2</td><td>Incremental NOVA</td><td>AECO Year, Seas, Spot</td></tr>
<tr><td>Current NOVA-Foothills</td><td>Incremental GTN</td><td>Sumas Year, Seas, Spot</td></tr>
<tr><td>Current GTN</td><td>Incremental NWP</td><td>Rockies Year, Seas, Spot</td></tr>
<tr><td>Current NWP</td><td>Incremental Ruby</td><td>Station2Year, Seas, Spot</td></tr>
<tr><td>Current Ruby</td><td>JP1, JPExp, JP3-4, LS</td><td>CityGate GTN, NWP</td></tr>
<tr><td>Ryckman Crk Storage</td><td>T-South-So Crossing</td><td>BioNatualGas</td></tr>
<tr><td>Incremental JP</td><td>Pacific Connector</td><td>Satellite LNG</td></tr>
<tr><td>Mist Storage</td><td>N-MAX-Stan-Madr</td><td>WA Expansion</td></tr>
<tr><td>Wild Goose Storage</td><td>N-MAX Madr I-5</td><td>Gill Ranch Storage</td></tr>
</table>

The All In Case run allows the company to see what the model would select if all current and probably resources are available.

AECO supplies, as the cheapest basin in the horizon, were selected, which makes sense as T-South Enhancement is essentially creates a slight discount to T-South on Spectra. Almost four times as much AECO is selected as compared of the base case. Gas at Malin on its way to the LNG facility is not selected as there are multitude of less expensive resources (for completion purposes we treat Pacific Connector supplies at Malin priced at AECO Plus $2, to mimic the Asian competition for the supplies. The proposed regional pipeline is selected to take gas from Stanfield, past Madras and on to Bellingham. It is important to note that we set the transport rates for Palomar, N-MAX and WA South Expansion at approximately 2X times the current NWP rate. Until the pipeline(s) reveal the rates, we cannot reliably count on this as a valid resource option for the base case. Ryckman Creek is selected at levels between .3 and 5 Bcf, and is consistently selected regardless of the scenario. Hence we believe it is logical to include Ryckman Creek as part of the base case.
</td>
<td>$5,199,687</td>
<td>$0.609835</td>
</tr>
</table>

ID	SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in **RED** mean those elements were excluded from the scenario	NPV 20 Year Costs in $000s	Average Cost Per Therm
4	Ryckman Creek	**Current Station2** · **Incremental NOVA** · **AECO Year, Seas, Spot** **Current NOVA-Foothills** · **Incremental GTN** · **Sumas Year, Seas, Spot** **Current GTN** · **Incremental NWP** · **Rockies Year, Seas, Spot** **Current NWP** · **Incremental Ruby** · **Station2Year, Seas, Spot** **Current Ruby** · **JP1, JPExp, JP3-4, LS** · **CityGate GTN, NWP** **Ryckman Crk Storage** · ***T-South-So Crossing*** · **BioNatualGas** ***Incremental JP*** · ***Pacific Connector*** · **Satellite LNG** ***Mist Storage*** · ***N-MAX-Stan-Madr*** · ***WA Expansion*** ***Wild Goose Storage*** · ***N-MAX Madr I-5*** · ***Gill Ranch Storage*** We modeled Ryckman Creek storage at varying reservation rates and working inventory levels. In a range of reservation rates that are essentially equivalent to slightly lower than Jackson Prairie expansion and significantly higher, SENDOUT consistently selected Ryckman Creek storage with working inventory between 300,000 and 500,000. It should be noted that the model also suggested picking up incremental GTN backhaul service as well as increased amounts of Ruby capacity. The model selected incremental Ruby capacity both on a seasonal basis as well as an annual basis, depending on reservation rate. It appears that Cascade should continue to hold discussions with Ryckman Creek as well as do additional analysis in order to make a final determination of what level of participation would be appropriate.	$5,209,426	$0.620024
3	Limited Canadian Imports	**Current Station2** · **Incremental NOVA** · **AECO *Year, Seas*, Spot** **Current NOVA-Foothills** · **Incremental GTN** · **Sumas Year, Seas, Spot** **Current GTN** · **Incremental NWP** · **Rockies Year, Seas, Spot** **Current NWP** · **Incremental Ruby** · **Station2 *Year, Seas*, Spot** **Current Ruby** · **JP1, JPExp, JP3-4, LS** · **CityGate GTN, NWP** **Ryckman Crk Storage** · ***T-South-So Crossing*** · **BioNatualGas** ***Incremental JP*** · ***Pacific Connector*** · **Satellite LNG** ***Mist Storage*** · ***N-MAX-Stan-Madr*** · ***WA Expansion*** **Wild Goose Storage** · ***N-MAX Madr I-5*** · **Gill Ranch Storage** In this scenario, no AECO other than a small amount of an expensive supply (AECO plus $0.50) was made available to the model. In the base case, none of the expensive AECO gas is selected. As expected, the model selects an additional 16000 Dths of GTN northbound (Malin north) capacity and ramps up the Ryckman Creek to .5 Bcf.	$5,212,722	$0.620410

ID	SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in **RED** mean those elements were excluded from the scenario	NPV 20 Year Costs in $000s	Average Cost Per Therm
5	Mist	**Current Station2** **Incremental NOVA** **AECO Year, Seas, Spot** **Current NOVA-Foothills** **Incremental GTN** **Sumas Year, Seas, Spot** **Current GTN** **Incremental NWP** **Rockies Year, Seas, Spot** **Current NWP** **Incremental Ruby** **Station2Year, Seas, Spot** **Current Ruby** **JP1, JPExp, JP3-4, LS** **CityGate GTN, NWP** ***Ryckman Crk Storage*** ***T-South-So Crossing*** **BioNatualGas** ***Incremental JP*** ***Pacific Connector*** **Satellite LNG** **Mist Storage** ***N-MAX-Stan-Madr*** ***WA Expansion*** ***Wild Goose Storage*** ***N-MAX Madr I-5*** ***Gill Ranch Storage*** Unless steeply discounted, the model did not select Mist Storage when it was run separately. We will watch for an open season, but at this point given the model results this doesn't strike us as prudent choice for the base case. We ran this particular scenario without the completion of Ryckman Creek but the model still did not select Mist.	$5,247,142	$0.624446
6	All Storage Options	**Current Station2** **Incremental NOVA** **AECO Year, Seas, Spot** **Current NOVA-Foothills** **Incremental GTN** **Sumas Year, Seas, Spot** **Current GTN** **Incremental NWP** **Rockies Year, Seas, Spot** **Current NWP** **Incremental Ruby** **Station2Year, Seas, Spot** **Current Ruby** **JP1, JPExp, JP3-4, LS** **CityGate GTN, NWP** **Ryckman Crk Storage** ***T-South-So Crossing*** **BioNatualGas** **Incremental JP** ***Pacific Connector*** **Satellite LNG** **Mist Storage** ***N-MAX-Stan-Madr*** ***WA Expansion*** **Wild Goose Storage** ***N-MAX Madr I-5*** **Gill Ranch Storage**	$5,265,794	$0.626633

ID	SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in **RED** mean those elements were excluded from the scenario	NPV 20 Year Costs in $000s	Average Cost Per Therm
7	T-South Enhancement with incremental Sumas (WA Expansion)	**Current Station2** / **Incremental NOVA** / **AECO *Year, Seas*, Spot** **Current NOVA-Foothills** / **Incremental GTN** / **Sumas Year, Seas, Spot** **Current GTN** / **Incremental NWP** / **Rockies Year, Seas, Spot** **Current NWP** / **Incremental Ruby** / **Station2 *Year, Seas*, Spot** **Current Ruby** / **JP1, JPExp, JP3-4, LS** / **CityGate GTN, NWP** **Ryckman Crk Storage** / **T-South-So Crossing** / **BioNatualGas** ***Incremental JP*** / ***Pacific Connector*** / **Satellite LNG** ***Mist Storage*** / ***N-MAX-Stan-Madr*** / **WA Expansion** ***Wild Goose Storage*** / ***N-MAX Madr I-5*** / ***Gill Ranch Storage*** In most of the runs for T-South/Southern Crossing, that resource was only selected at volumes of less than 2000 Dths/day; the volume is insignificant and the nomination scheduling is operationally more complicated (Westcoast, Fortis, South Crossing, Nova, Foothills, GTN). We see limited value in T-South Enhancement at this time. We left the same parameters as the "Limited Canadian supplies", the only noticeable change was an increase of T-South supplies moving to Kingsgate to serve the Oregon load.	$5,281,914	$0.628523
8	T-South Enhancement/Southern Crossing	**Current Station2** / **Incremental NOVA** / **AECO Year, Seas, Spot** **Current NOVA-Foothills** / **Incremental GTN** / **Sumas Year, Seas, Spot** **Current GTN** / **Incremental NWP** / **Rockies Year, Seas, Spot** **Current NWP** / **Incremental Ruby** / **Station2 Year, Seas, Spot** **Current Ruby** / **JP1, JPExp, JP3-4, LS** / **CityGate GTN, NWP** **Ryckman Crk Storage** / **T-South-So Crossing** / **BioNatualGas** ***Incremental JP*** / ***Pacific Connector*** / **Satellite LNG** ***Mist Storage*** / ***N-MAX-Stan-Madr*** / **WA Expansion** **Wild Goose Storage** / ***N-MAX Madr I-5*** / **Gill Ranch Storage** When no restrictions were placed on Canadian supplies the model did select a higher level of volumes to run on T-South/Southern Crossing, It should be noted that this resource is bi-directional, and even though it was the least expensive leg the model never selected the Kingsgate to Huntingdon/Sumas path. While the volumes have increased the nomination scheduling is operationally more complicated (Westcoast, Fortis, South Crossing, Nova, Foothills, GTN). We see limited value in T-South Enhancement at this time. We left the same parameters as the "Limited Canadian supplies", the only noticeable change was an increase of T-South supplies moving to Kingsgate to serve the Oregon load.	$5,292,254	$0.629736

ID	SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in **RED** mean those elements were excluded from the scenario	NPV 20 Year Costs in $000s	Average Cost Per Therm
9	Pacific Northwest Regional (NMAX, WA Expansion)	**Current Station2** — **Incremental NOVA** — **AECO Year, Seas, Spot** **Current NOVA-Foothills** — **Incremental GTN** — **Sumas Year, Seas, Spot** **Current GTN** — **Incremental NWP** — **Rockies Year, Seas, Spo** **Current NWP** — **Incremental Ruby** — **Station2Year, Seas, Spo** **Current Ruby** — **JP1, JPExp, JP3-4, LS** — **CityGate GTN, NWP** **Ryckman Crk Storage** — ***T-South-So Crossing*** — **BioNatualGas** ***Incremental JP*** — ***Pacific Connector*** — **Satellite LNG** ***Mist Storage*** — **N-MAX-Stan-Madr** — **WA Expansion** ***Wild Goose Storage*** — **N-MAX Madr I-5** — ***Gill Ranch Storage*** The N-MAX and WA Expansions seem attractive on the surface in that the projects are along our distribution system so it seems prudent to include these resources at this time as viable resource candidates for the base case. We priced these at approximately 2X the NWP tariff; still the model looked at this a viable solution to address identified CityGate capacity shortfalls along the I-5 corridor.	$5,293,561	$0.629889
10	Wild Goose	**Current Station2** — **Incremental NOVA** — **AECO Year, Seas, Spot** **Current NOVA-Foothills** — **Incremental GTN** — **Sumas Year, Seas, Spot** **Current GTN** — **Incremental NWP** — **Rockies Year, Seas, Spo** **Current NWP** — **Incremental Ruby** — **Station2Year, Seas, Sp** **Current Ruby** — **JP1, JPExp, JP3-4, LS** — **CityGate GTN, NWP** ***Ryckman Crk Storage*** — ***T-South-So Crossing*** — **BioNatualGas** ***Incremental JP*** — ***Pacific Connector*** — **Satellite LNG** ***Mist Storage*** — ***N-MAX-Stan-Madr*** — ***WA Expansion*** **Wild Goose Storage** — ***N-MAX Madr I-5*** — ***Gill Ranch Storage*** Unless steeply discounted, the model did not select this Storage when it was run separately. We will watch for an open season, but at this point given the model results this doesn't strike us as prudent choice for the base case. We ran this particular scenario without the completion of Ryckman Creek but the model still did not select Wild Goose. Wild Goose would require acquiring capacity on PG&E California system, impacting overall costs. However, due a possible deal with a third party, it would appear that Wild Goose is would still be less expensive than Gill Ranch.	$5,294,807	$0.630035

ID	SCENARIO NAME	KEY ELEMENTS IN SENDOUT SCENARIO Medium Load Growth, Medium Gas Price Forecast, Average weather with Peak Event. All elements considered. All items in **RED** mean those elements were excluded from the scenario	NPV 20 Year Costs in $000s	Average Cost Per Therm
11	Gill Ranch	Current Station2; Incremental NOVA; AECO Year, Seas, Spot Current NOVA-Foothills; Incremental GTN; Sumas Year, Seas, Spot Current GTN; Incremental NWP; Rockies Year, Seas, Spot Current NWP; Incremental Ruby; Station2Year, Seas, Spot Current Ruby; JP1, JPExp, JP3-4, LS; CityGate GTN, NWP *Ryckman Crk Storage*; *T-South-So Crossing*; BioNatualGas *Incremental JP*; *Pacific Connector*; Satellite LNG *Mist Storage*; *N-MAX-Stan-Madr*; *WA Expansion* *Wild Goose Storage*; *N-MAX Madr I-5*; Gill Ranch Storage Unless steeply discounted, the model did not select this Storage when it was run separately. We will watch for an open season, but at this point given the model results this doesn't strike us as prudent choice for the base case. We ran this particular scenario without the completion of Ryckman Creek but the model still did not select Wild Goose. Wild Goose would require acquiring capacity on PG&E California system, impacting overall costs.	$5,313,505	$0.632228

At TAG 4 WUTC requested that Cascade run a scenario where the amount of Washington conservation modeled in the IRP for cost-effectiveness be equivalent to 100% of the achievable economic potential (with administrative costs included). While we indicated that Cascade might not have sufficient time to run such a scenario. However, while we did not do as much analysis of the results as we would have preferred it is interesting to note that when we applied full achievable economic potential over the course of the 20 year horizon, the NPV was $93M lower.

It should be noted that in running the SENDOUT runs there seemed to be a narrow range of NPV, regardless of the type of reasonable scenario run. Further analysis into the detailed SENDOUT reports seem to bear out that because Cascade's base resource basins (Rockies, British Columbia, Alberta) are utilized on an equal basis ("a third, a third, a third"), the mix of the alternative facilities and transport applied on top of those base resources had limited effect on the overall costs of the portfolio.

Peak Day Planning Results

Figures 7-B-1 through 7-B-3 show the projected peak day requirements compared to the Company's existing capacity resources under the medium load growth forecast. This same comparison was completed for both the high and low load growth forecasts and results of the zone by zone analysis are included in Appendix F. Under all growth scenarios, the company will require incremental peak day delivery in order to meet Cascade's anticipated peak loads located on the Northwest Pipeline system. This shortfall results from the expiration of a leased storage agreement that ended in April 2007. As discussed in Section 5, the company has acquired incremental Jackson Prairie storage inventory and withdrawal capability through the participation in the JP expansion open season, which took place during early 2006. The Company has also entered into a companion transportation agreement with Northwest Pipeline for the transportation to deliver the stored supplies under this agreement to Cascade's service territory. In the interim, Cascade will meet its peak day requirements with CityGate peaking resources, acquiring vintage transportation returned to the pipeline, and where operationally feasible, re-aligning existing contract delivery rights from areas where we project excess capacity to areas where we forecast potential shortfalls.

FIGURE 7-B-1

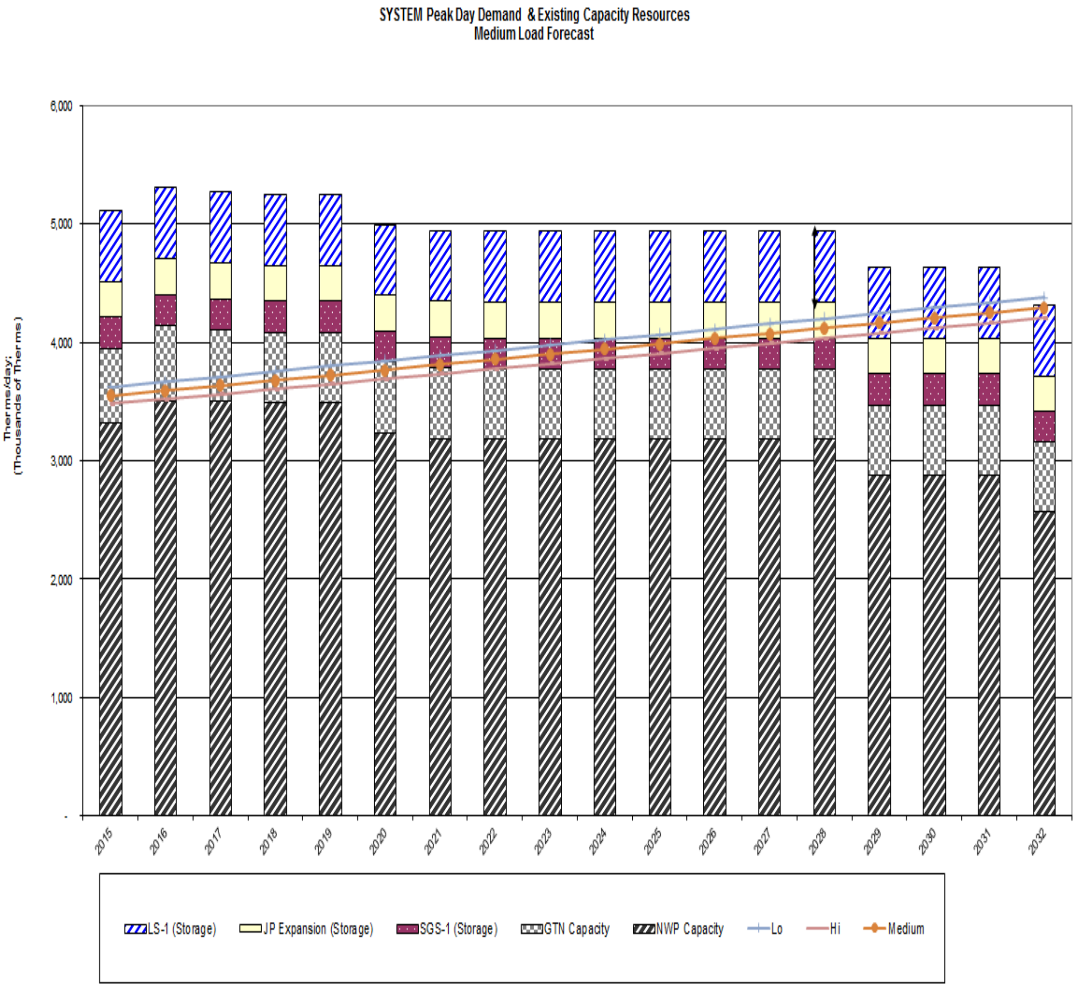


Figure 7-B-2

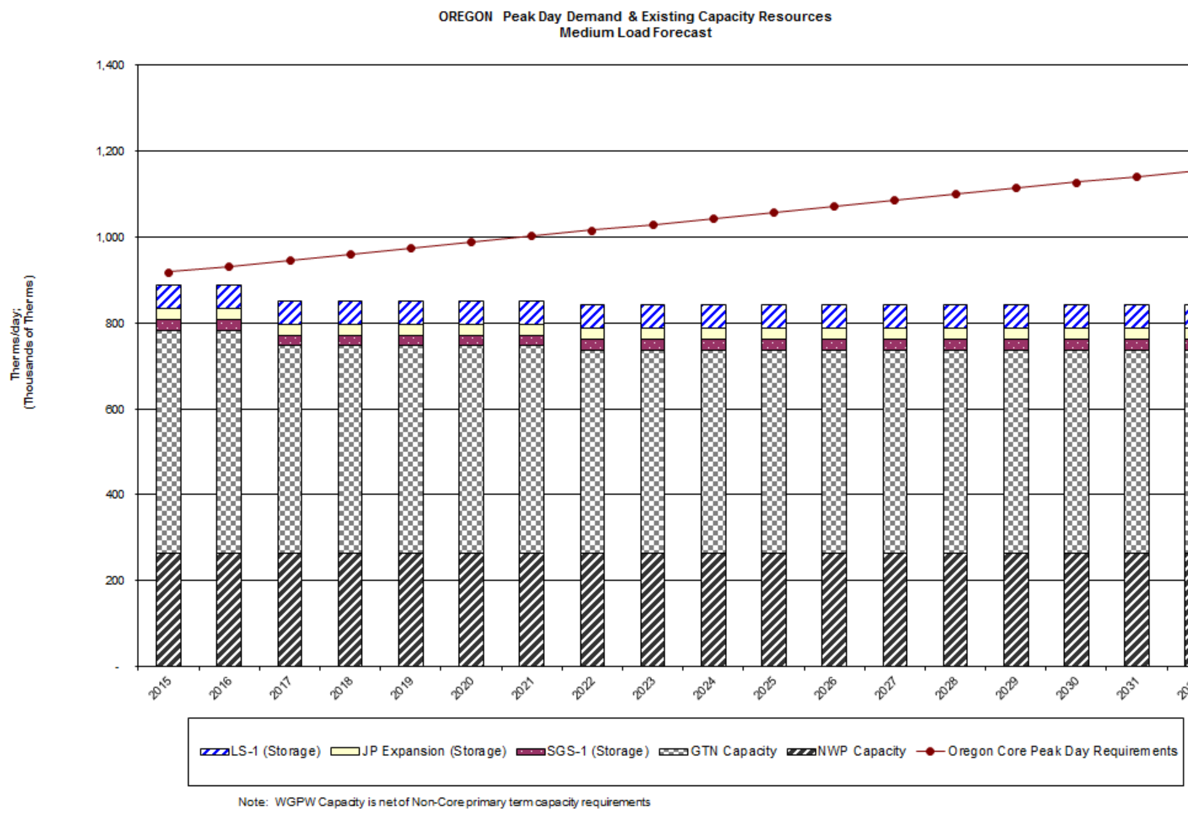
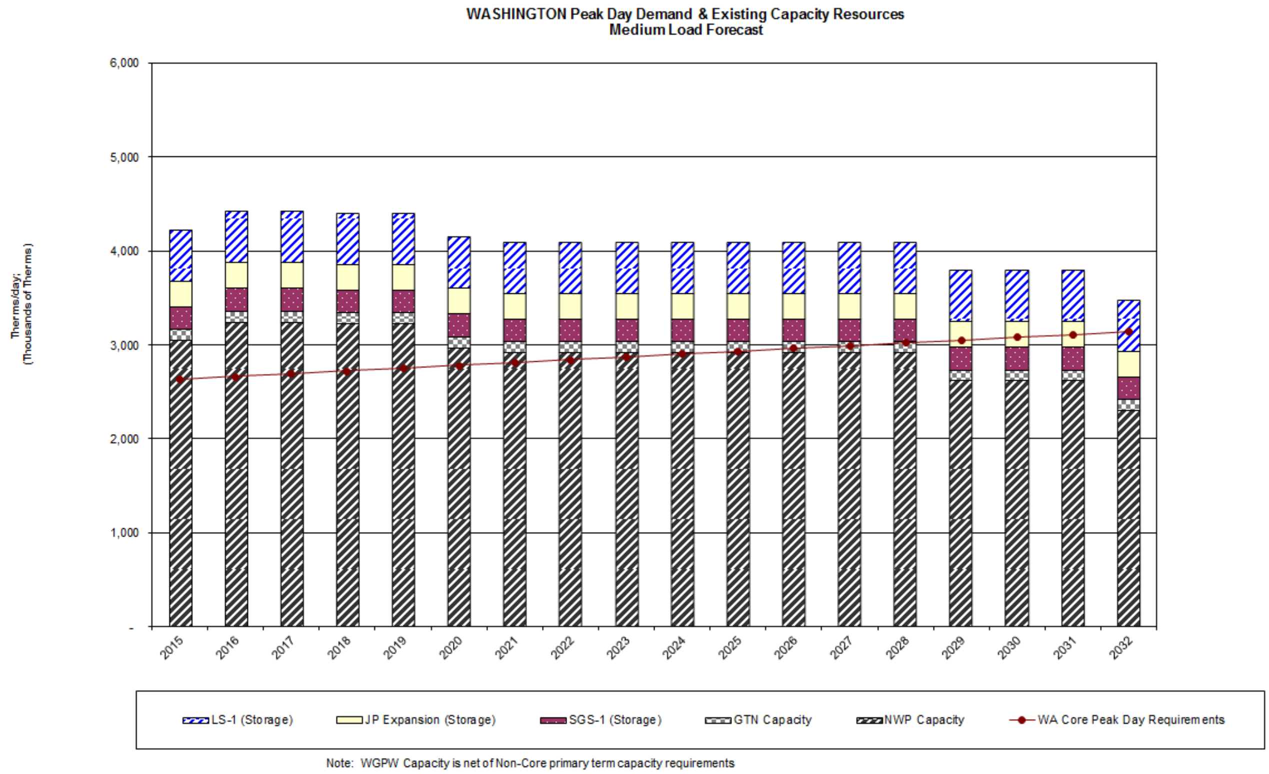


Figure 7-B-3



For modeling purposes, the company included several capacity alternatives to meet peak planning needs. Based on the analysis, peak day requirements will be met through a blend of resources. For purposes of the graphical depiction, the company has shown the incremental conservation resources as a capacity resource.

FIGURE 7-C-1

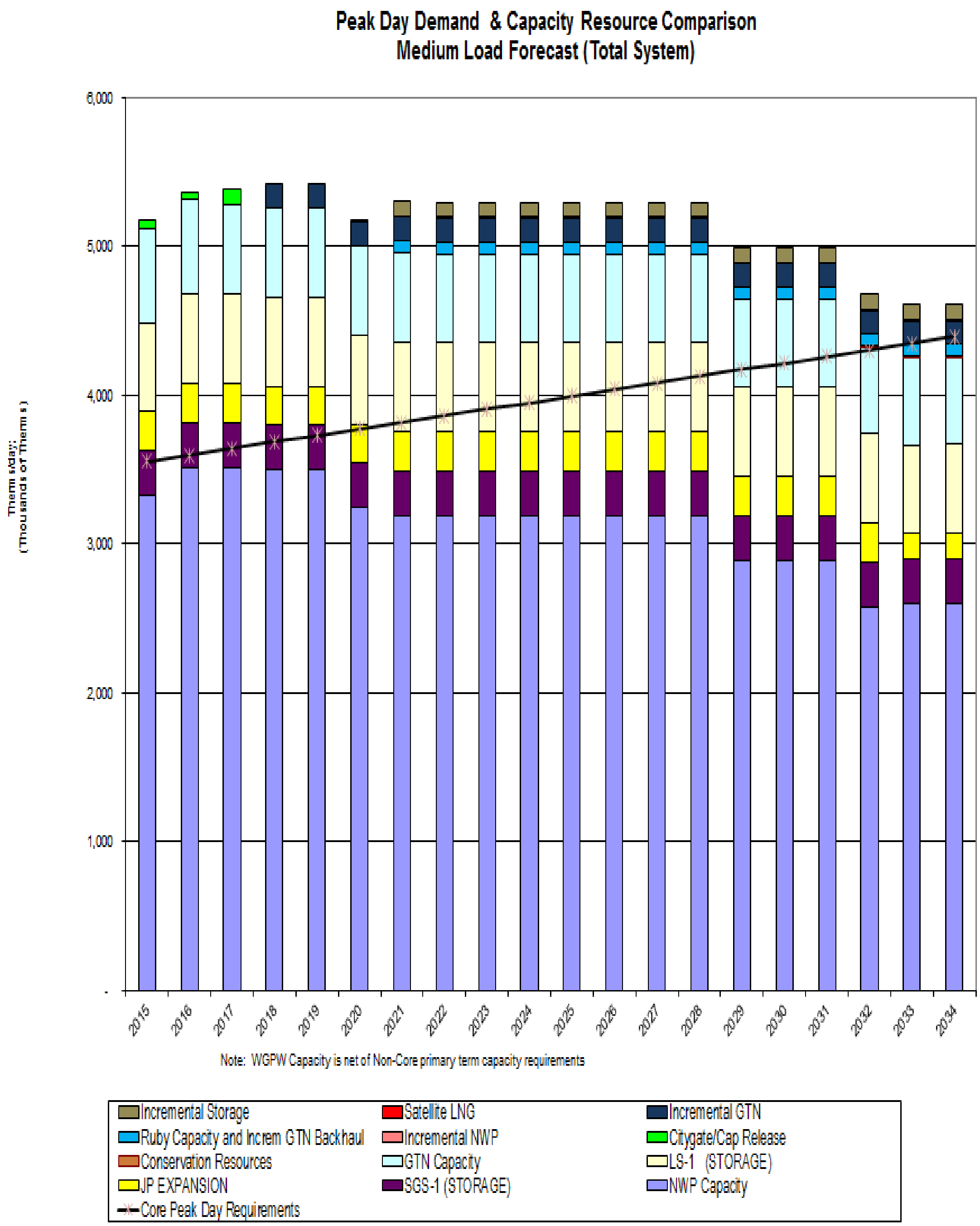
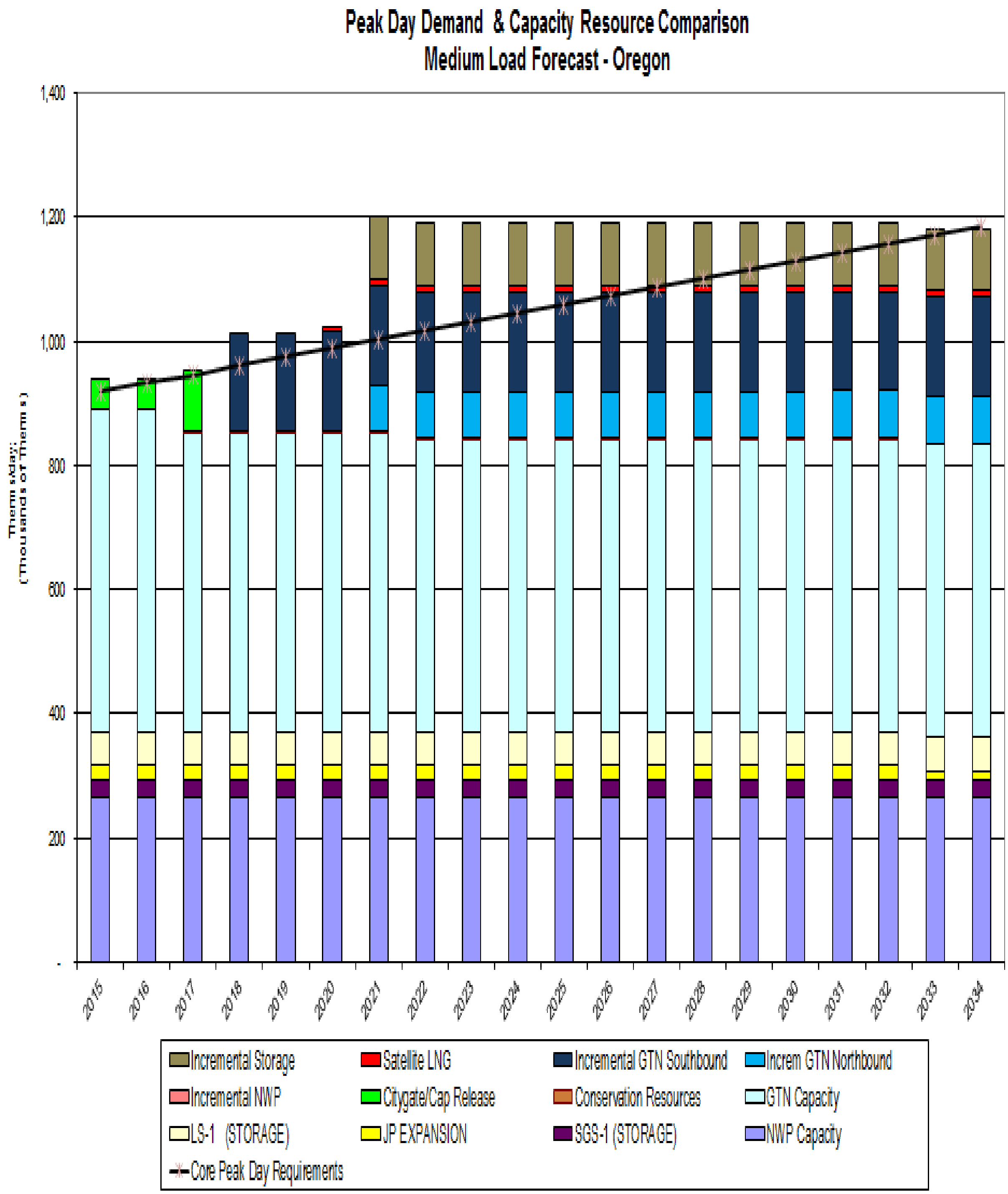
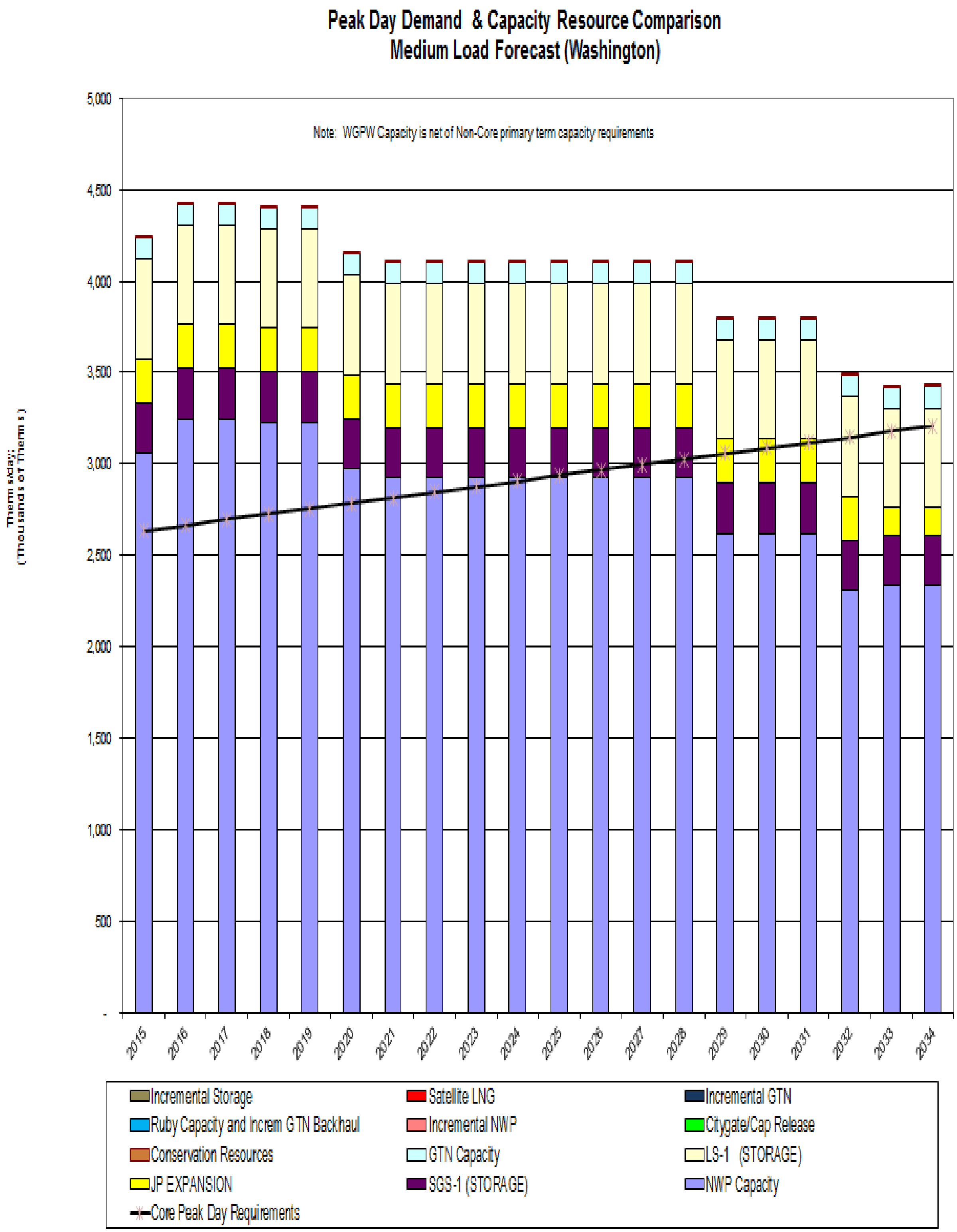


FIGURE 7-C-2



Peak Day Demand & Capacity Resource Comparison
Medium Load Forecast - Oregon
Therm s/day
(Thousands of Therm s)
1,400
1,200
1,000
800
600
400
200
-
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
Incremental Storage
Satellite LNG
Incremental GTN Southbound
Increm GTN Northbound
Incremental NWP
Citygate/Cap Release
Conservation Resources
GTN Capacity
LS-1 (STORAGE)
JP EXPANSION
SGS-1 (STORAGE)
NWP Capacity
Core Peak Day Requirements

FIGURE 7-C-3


Peak Day Demand & Capacity Resource Comparison
Medium Load Forecast (Washington)
Note: WGPW Capacity is net of Non-Core primary term capacity requirements
Therms/day (Thousands of Therms)
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
-
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
Incremental Storage
Satellite LNG
Incremental GTN
Ruby Capacity and Increm GTN Backhaul
Incremental NWP
Citygate/Cap Release
Conservation Resources
GTN Capacity
LS-1 (STORAGE)
JP EXPANSION
SGS-1 (STORAGE)
NWP Capacity
Core Peak Day Requirements

Annual Load Requirements and Weather Uncertainty

The annual load requirements will vary dramatically based on the weather assumptions. Through the use of SENDOUT™ Monte-Carlo functionality, the company has the ability to analyze the impacts of weather on its load forecast. Figure 7-D shows the overall expected range of the load forecasts before considering load reductions that can be achieved through incremental conservation programs. T he chart provides the upper parameter, which is based on the assumption that the high load growth forecast occurs with the lower parameter occurring under the low load growth forecast. Capturing the uncertainty around the medium load growth forecast was accomplished through SENDOUT™'s Monte-Carlo functionality. T he Monte-Carlo simulation performed 200 draws, with each draw calculating the monthly load based on the weather as randomly determined by the model for each of the weather zones. Figure 7-E provides a more in depth look at the medium scenario results. The absolute maximum and absolute minimum amounts depict the minimum or maximum system demand from the 200 draws for a particular year. The absolute maximum/minimum does not represent any single results for the 20 year planning horizon.

Figure 7-D

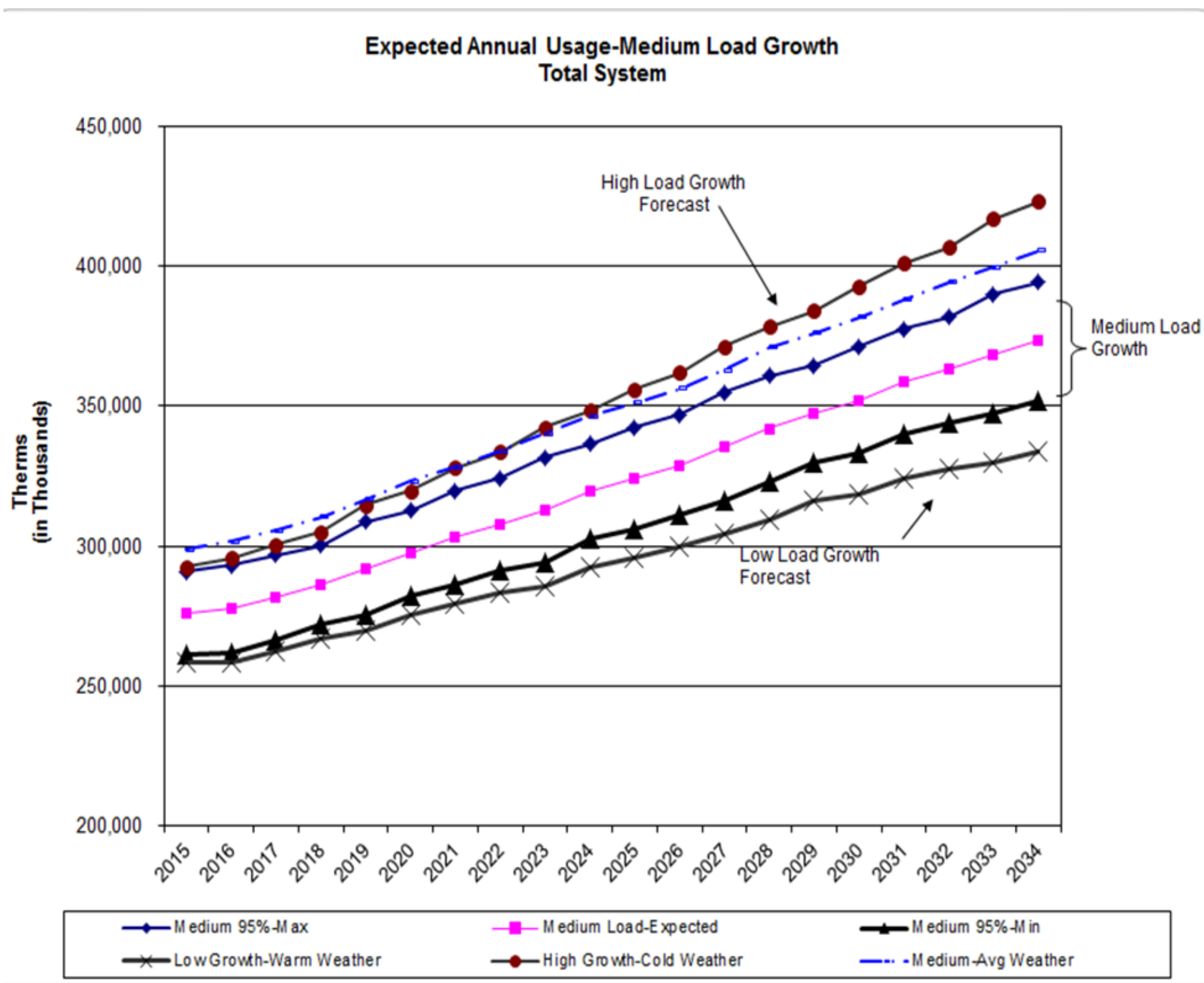
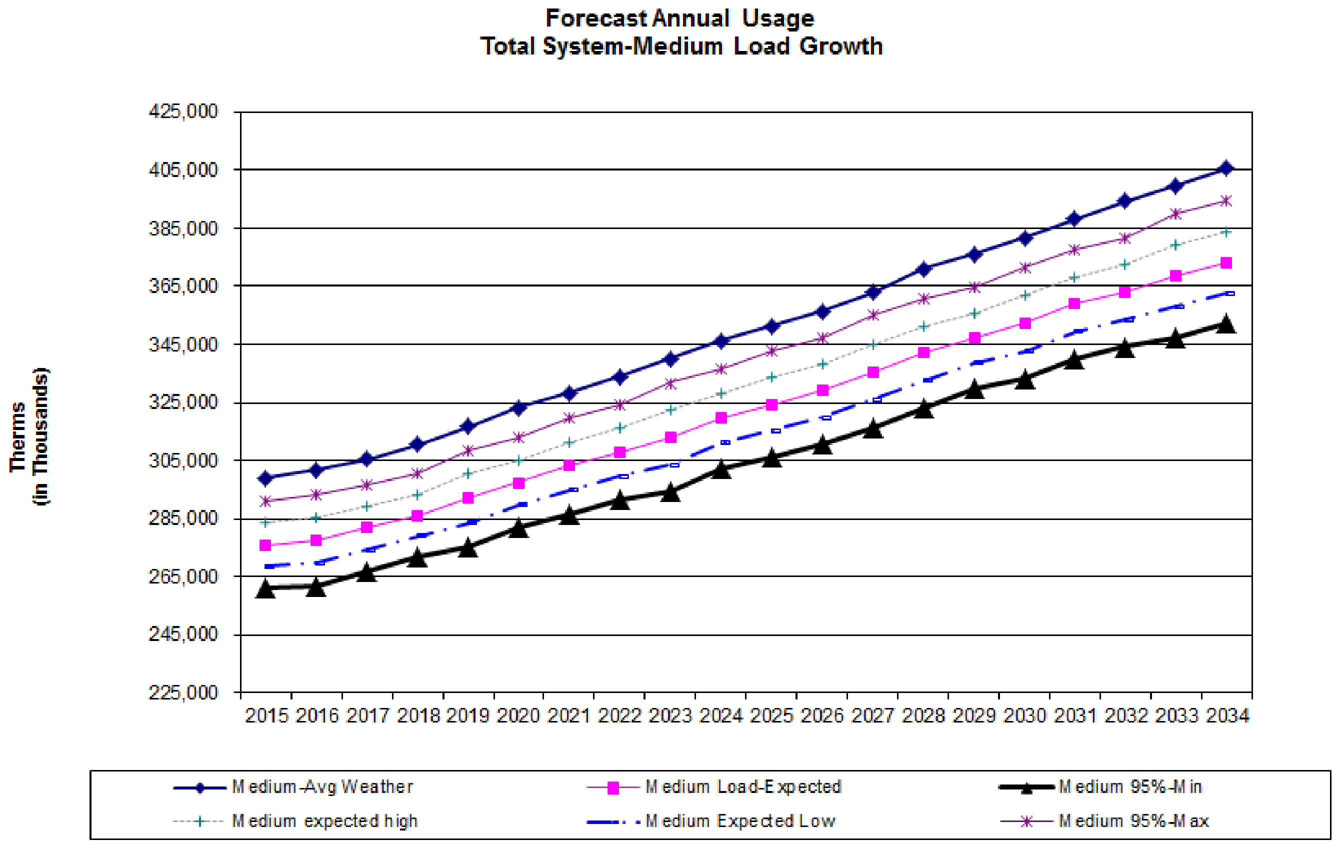


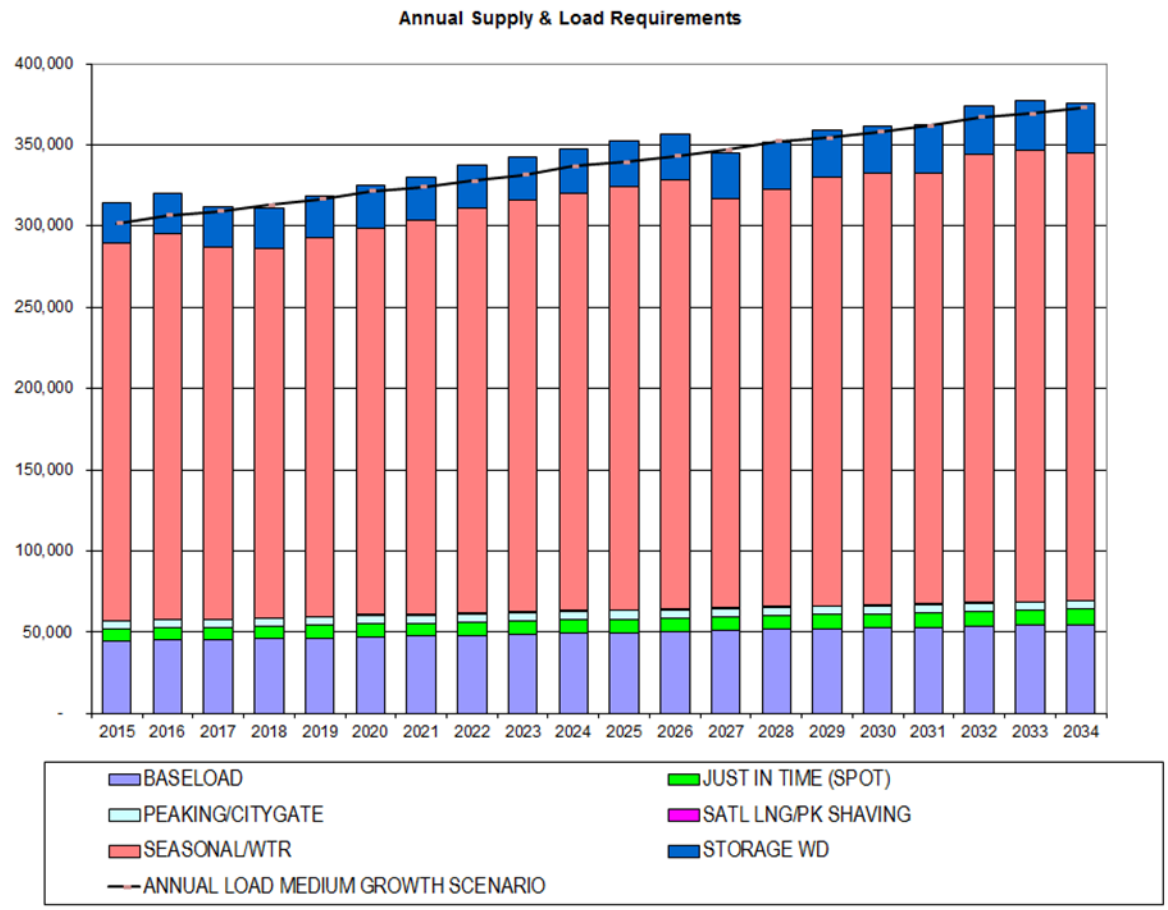
Figure 7-E



Additional tables and graphical analyses summarizing the weather and its impact on the annual load forecast are included in Appendix G-1.

To meet this demand, the company will need to acquire a blend of gas supply and conservation resources. For purposes of this plan, the company has estimated the level of conservation that is achievable over the course of the planning horizon, which was discussed at length in Section 6. Figure 7-F shows how the company anticipates meeting the projected load over the planning horizon under the basecase scenario. Variations in the portfolio in order to meet actual load requirements during any year will occur primarily through the purchase of seasonal/winter, just-in-time or spot gas purchases.

Figure 7-F



Impacts of Price Uncertainty and Overall System Costs

The ability to accurately forecast long-term gas prices is influenced by two different types of uncertainty: uncertainty related to long-term changes in the industry and uncertainty related to short-term gas price variability. Contributing to long-term uncertainty are long term supply and demand issues, including growth in demand for electric generation, changes in LNG import infrastructure, and possible pipelines to bring Alaskan and other frontier gas supplies to market. Short-term price variability also affects the long-term predictability of gas prices. Even if long-term supply and demand outcomes are exactly as projected, actual prices in future months will still reflect variability due to short-term market conditions. In order to estimate this uncertainty, the Company utilized SENDOUT's™ Monte-Carlo functionality to analyze the impacts of price on the portfolio costs. Since natural gas is becoming more of a national market, the company believes that volatility in the NYMEX prices will have a far larger influence on the portfolio's price volatility compared to the volatility in the AECO, Sumas and Rocky Mountain basin differentials.

Figure 7-H compares the expected range of NYMEX prices from the Monte-Carlo analysis including the Environmental Externality costs that were discussed in Section 6. Further tables and graphical analyses summarizing the pricing simulations are included in Appendix G-2.

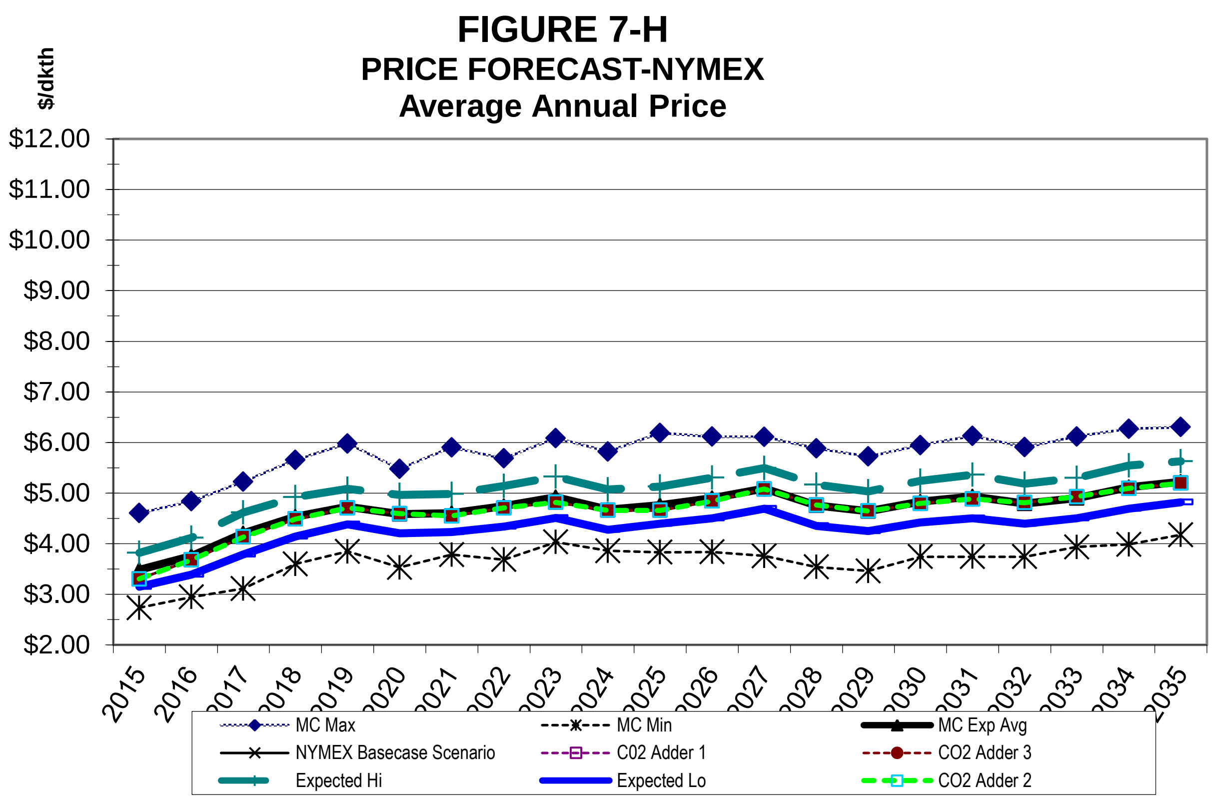


Table 7-5 summarizes the Net Present Value of the 20-year portfolio costs and average cost per therm for each of the scenarios and includes the anticipated range of costs from the Monte-Carlo modeling.

TABLE 7-5

	NPV 20-Yr Portfolio Costs in $000's	Average Cost Per Therm
Scenario Results:		
Basecase Scenario	$5,198,207	$0.61
High Load Growth	$6,183,827	$0.67
Low Load Growth	$4,886,315	$0.57
Environmental Externalities Case 1	$5,061,637	$0.64
Environmental Externalities Case 2	$6,071,947	$0.71
Environmental Externalities Case 3	$5,723,642	$0.67
Washington with 100% Achievable	$5,104,223	$0.58
Simulation Results:		
Monte-Carlo Average	$5,193,009	$0.62
Monte-Carlo Expected High	$5,718,027	$0.76
Monte-Carlo Expected Low	$4,796,510	$0.48

Based on the basecase results, Cascade has calculated its avoided costs. Cascade's avoided cost estimates represent the marginal cost of natural gas usage incremental to the forecasted demand. In other words, avoided cost is the unit cost to serve the next unit of demand during any given period of time. If demand-side management measures reduce customer demand, the Company is able to "avoid" certain commodity and transportation costs. This concept is important to assessing the proper value to demand-side management efforts. As discussed in Section 6, when calculating the avoided cost figures, the company includes an incremental cost advantage for conservation resources to recognize the non-quantifiable benefits associated with conservation such as price certainty and hedge value against future carbon costs.

Two-year Action Plan

Prior IRP Action Plan and Progress Review

Cascade filed its last Integrated Resource Plan in December 2010. Since that time, Cascade has made significant progress in meeting its 2-Year Action Plan. Appendix I includes the detailed Two-year Action Plan along with a description of the Company's progress on each of the items.

2014 Action Plan

Cascade's 2012 Action Plan continues to focus on the following five areas:

- Demand Forecasting
- Distribution System Constraint Analysis
- Demand Side Resources
- Supply Side Resources
- Integration

The 2 year action plan embodies Cascade's commitment to maximizing the efficiency from its Integrated Resource Plan and to achieving the lowest cost resource portfolio of reliable natural gas services and conservation.

1. In continuing efforts to create a more accurate load forecast, Cascade will research the viability of expanding the detail of the data by determining therm usage per customer per degree day by customer class (residential, commercial, etc.) along with the non-heat sensitive baseload usage. This is largely dependent upon the capabilities of the Company's new Customer Information System which came on-line in July 2010. We are continuing to work toward generating reports and data extracts from the new system to improve the forecast process.

2. Cascade will continue to monitor outside determinants of natural gas usage, such as legislative building code changes and electrical "Direct Use" campaigns as they are determined to significantly affect the Company's forecast.

3. Cascade will continue to monitor the effectiveness of the Oregon Public Purpose Fund to ensure the funds are adequate to capture significant portions of achievable therm savings in Oregon.

4. The company will continue to follow and analyze the impacts of the Western Climate Initiative and proposed carbon legislation at both the state and federal level as they pertain to natural gas conservation, as well as other such acts that may arise from these efforts. The company will continue to monitor the timing and the costs associated with carbon legislation and analyze the impacts on the company's overall portfolio costs. As specific carbon legislation is passed, the company will update its avoided cost calculations, conservation potential and make modifications to its DSM incentive programs as necessary.

5. The company will continue to monitor the cost effectiveness of existing conservation measures and emerging technologies to ensure that the current mix of measures

included in the Washington Conservation program is appropriate. Areas for further analysis include the impacts associated with modifications to building codes along with the cost effectiveness of newer technologies such as the next generation of high efficiency water heaters (.70 EF) and high-efficiency hybrid heat pumps. The applicability of these measures within Cascade's service territory will be analyzed and the company's Conservation Incentive Program will be modified as necessary.

6. The Company will continue to monitor the potential reporting, administrative and potential financial impacts of long term resources as a result of concerns surrounding fracking. In particular we are awaiting the EPA to reveal the results of their current study in alleged water contamination found in Wyoming as a result of fracking activities.

7. Cascade will continue to evaluate gas supply resources on an ongoing basis, including supplies of varying lengths (base, swing, peaking) and pricing alternatives. We will continue to analyze the uncertainties associated with supply and demand relationships.

8. The Company will continue to monitor the proposed pipeline expansion projects to access more supplies out of the Rockies. As cost estimates change, the company will analyze those resources under consideration to determine if modifications to the preferred portfolio are necessary.

9. Cascade will continue to refine our specific peak day resource acquisition action plans to address anticipated capacity shortfalls. Possible solutions may be Satellite LNG, incremental storage, peak shaving facilities or pipeline looping to meet the growing requirements of the firm core load. Specifically, the Company will further analyze issues such as determination of project location issues and risks, project cost estimates, and construction/acquisition lead times.

10. The Company will continue to explore options to incorporate biogas into its portfolio, as specific projects are identified in our service territory. Price, location and gas quality considerations of the biogas supply will be evaluated.

11. The Company will continue to monitor proposed LNG import facilities as information becomes available and will evaluate the various options that, if built, could result. Issues to monitor include specific cost, the availability of pipeline capacity and project timing.

12. The Company will continue to monitor the futures market for price trends and will evaluate the effectiveness of its risk management policy. Implementation of Dodd- Frank in the coming year raises potential administrative challenges from a reporting standpoint; additionally it is unknown how the costs associated with the use of clearinghouses might impact prices of natural gas in the future.

GLOSSARY OF TERMS AND ACRONYMS

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.

AFUE
Annual Fuel Utilization Efficiency. 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.

ARRA
The American Recovery and Reinvestment Act of 2009.

BACKHAUL SERVICE
A transaction where gas is transported the opposite direction of normal flow on a unidirectional pipeline.

BASELOAD
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.

BNG
Bio natural gas and 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 (see below) of natural gas has an energy value of 100,000 BTUs and is approximately equivalent to 100 cubic feet of natural gas.

CD
Contract Demand

CITY GATE (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

CNG
Compressed Natural Gas

CNGC
Cascade Natural Gas Corporation

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.

CONTRACT DEMAND
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.

COP
Coefficient of Performance

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

COST EFFECTIVNESS
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.

CPI
Consumer Price Index, as calculated and published by the U.S. Department of Labor, Bureau of Labor Statistics

DEKATHERM
Unit of measurement for natural gas; a dekatherm is 10 therms, which is one thousand cubic feet (volume) or one million 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.

DSM
Demand-Side Management

DTH
Unit of measurement for natural gas; a dekatherm is 10 therms, which is one thousand cubic feet (volume) or one million BTUs (energy).

EIA
Energy Information Administration

EXTERNALITIES
Cost 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.

FERC
Federal Energy Regulatory Commission

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.

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.

GAS TRANSMISSION NORTHWEST (GTN)
A subsidiary of TransCanada Pipeline which owns and operates a natural gas pipeline that runs from the Canada/USA border to the Oregon/California border. One of the six natural gas pipelines Cascade transacts with directly.

GHG
Greenhouse Gas

GTN
Gas Transmission Northwest

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 65 degrees Fahrenheit; a daily average temperature represents the sum of the high and low readings divided by two.

HENRY HUB

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; also called liquefaction when the storage facility is a liquefied natural gas plant.

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; the interruption happens when the demand of all firm customers exceeds the capability of the system to continue deliveries to all of those customers.

INTERSTATE PIPELINE
A federally regulated company that transports and/or sells natural gas across state lines.

IOU
Investor owned utility.

IRP
Integrated Resource Plan; the document that explains Cascade's plans and preparations to maintain sufficient resources to meet customer needs at a reasonable price.

JACKSON PRAIRIE
An underground storage project jointly owned by Avista Corp., Puget Sound Energy, and NWP; the project 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.

LIQUEFIED NATURAL GAS (LNG)
Natural gas that has been liquefied by reducing its temperature to minus 260 degrees Fahrenheit at atmospheric pressure.

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.

LNG
Liquefied natural gas. Natural gas that has been liquefied by chilling. 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; 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 in the future.

LOAD MANAGEMENT

Seek to lower 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
Pattern of a customer's gas usage, hour to hour, day to day, or month to month.

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.

MCF
A unit of volume equal to a thousand cubic feet.

MDDO
Maximum Daily Delivery Obligation

MDQ
Maximum Daily Quantity

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.

MOU
Memorandum of understanding.

NAESB
North American Energy Standards Board.

NATIONAL ENERGY BOARD
The Canadian equivalent to the Federal Energy Regulatory Commission (FERC).

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.

NEPA
National Environmental Policy Act

NEW YORK MERCANTILE EXCHANGE (NYMEX)
An organization that facilitates the trading of several commodities including natural gas.

NGV
Natural Gas Vehicles

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 1 year.

NON-CORE CUSTOMER
Large customers who contract with a third party for supply and upstream pipeline capacity. Cascade provides distribution services., Typical customers include large commercial, industrial, cogeneration, wholesale, and electric generation customers.

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 PLANNING COUNCIL
Consist of two members from each of the four Northwest states, Oregon, Washington, Idaho and Montana, to develop a regional plan.

NOVA GAS TRANSMISSION (NOVA)
See TransCanada Alberta System

NWBOP
Northwest Builder Option Packages

NWP
Williams-Northwest Pipeline

NYMEX
New York Mercantile Exchange

NYMEX HH
New York Mercantile Exchange Henry Hub

OEESC
Oregon Energy Efficiency Specialty Code

OFO
Operation Flow Order is an order issued by an upstream pipeline to alleviate conditions, among other things that threaten the safe operations or integrity of the pipeline, or the maintenance of operations required to provide efficient and reliable firm service. The pipeline ability to deliver anticipated quantities and maximize efficiency and capacity utilization is often dependent upon marinating project flow patterns (e.g. receipts, deliveries and balances). Violations or familiar to comply with an OFO can result in the pipeline leveling penalties to offending shippers.

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.

OLIEC
Oregon Low Income Energy Conservation

ON SITE
At the point of injection.

OPUC
Oregon Public Utility Commission

ORSC
Oregon Residential Specialty Code

PASCAL
The SI unit of pressure, equal to one Newton per square meter.

PEAK DAY
The greatest total natural gas demand forecasted in a 24-hour period used as a basis for planning peak capacity requirements.

ORSC
Oregon Residential Specialty Code

PASCAL
The SI unit of pressure, equal to one Newton per square meter.

PTCS
Performance Tested Comfort Systems

REAL
Discounting method that excludes inflation.

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.

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.

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 there are not high system demands.

SENDOUT®
Natural gas planning system from Ventyx; 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 power 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.

SWAP
Parties agree to exchange an index price for a fixed price over a defined period

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.

TRANSCANADA ALBERTA SYSTEM
Previously known as NOVA Gas Transmission; 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
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 is 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.

TRC
Total Resource Cost

TSA
Transportation Service Agreement

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.

UPSTREAM PIPELINE CAPACITY
The pipeline delivering natural gas to another pipeline at an interconnection point where the second pipeline is closer to the consumer.

VECTORGAS™
Add-in product to the SENDOUT™ model that facilitates the ability to model gas price and load uncertainty (driven by weather) into the future. **VECTORGAS™** utilizes a Monte Carlo approach in combination with the linear programming approach in SENDOUT™.

WINTER GAS SUPPLIES
Gas supply purchased for all or part 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.

ZONE
A geographical area. A geological zone, however, 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 based on where the upstream pipelines have major compressor stations, have been historical upstream pipeline constraint or in specific weather areas. Where appropriate the Zone-IRP is separated by state. Please see the following chart that references the CityGate/location to the appropriate IRP zone.

ZONE/GATE LOCATION (sorted by gate/location)

DESCRIPTION	METER	ZONEID	PIPELINE
7TH DAY ADVENTIST FARM TAP	ADVENSCH	ZONE 10	NWP
A & M RNDERING	AMRENDER	ZONE 30-W	NWP
A&W FEED LOT FARM TAP	AWFEED	ZONE 20	NWP
ABERDEEN/HOQUIAM/MCCLEARY	ABRNDHOQ	ZONE 30-S	NWP
ACME	ACME	ZONE 30-W	NWP
ALCOA, WENATCHEE	ALCOA	ZONE 11	NWP
ARLINGTON	ARLINGTN	ZONE 30-W	NWP
ATHENA/WESTON	ATHENA	ZONE ME-OR	NWP
BAKER	BAKER	ZONE 24	NWP
BELLINGHAM II	BLLINGII	ZONE 30-W	NWP
BELLINGHAM/FERNDALE	BLHAM	ZONE 30-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
CHEMCIAL LIME	CHEMLIME	ZONE 24	NWP
CHEMULT	CHEM	ZONE GTN	GTN
DEHANNS DAIRY FARM TAP	DEHANDRY	ZONE 10	NWP
DEMING	DEMING	ZONE 30-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-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
LAWRENCE	LAWRENCE	ZONE 30-W	NWP
LDS CHURCH FARM TAP	LDSCHURC	ZONE 30-W	NWP
LONGVIEW-KELSO	LONGVIEW	ZONE 26	NWP
LYNDEN	LYNDEN	ZONE 30-W	NWP
MADRAS TAP	MADR	ZONE GTN	GTN
MENAN STARCH	MEMANSTR	ZONE 20	NWP
MILTON FREEWATER	MILFREE	ZONE ME-OR	NWP
MISSION TAP	MISSION	ZONE ME-OR	NWP
MOSES LAKE	MOS LAKE	ZONE 20	NWP
MOUNT VERNON	MTVERNON	ZONE 30-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-W	NWP
OTHELLO	OTHELLO	ZONE 20	NWP
PASCO	PASCO	ZONE 20	NWP
PATERSON	PATERSON	ZONE 26	NWP
PENDLETON	PENDLETN	ZONE ME-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-W	NWP
SELAH	SELAH	ZONE 11	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
STEARNS TAP	STEA	ZONE GTN	GTN
SUMAS, CITY OF	SUMASC	ZONE 30-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-WA	NWP
WALLA WALLA	WALLA	ZONE ME-WA	NWP
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

ZONE/GATE LOCATION (sorted by IRP Zone)

DESCRIPTION	METER	ZONEID	PIPELINE
7TH DAY ADVENTIST FARM TAP	ADVENSCH	ZONE 10	NWP
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DEHANNS DAIRY FARM TAP	DEHANDRY	ZONE 10	NWP
GRANDVIEW	GRDVEW	ZONE 10	NWP
LAMBERT'S HORTICULTURE	LAMBERTS	ZONE 10	NWP
PROSSER	PROSSER	ZONE 10	NWP
SUNNYSIDE	SUNSIDE	ZONE 10	NWP
TOPPENISH ET AL. (ZILLAH)	TOPENISH	ZONE 10	NWP
ALCOA, WENATCHEE	ALCOA	ZONE 11	NWP
KAWECKI, WENATCHEE	KAWECKI	ZONE 11	NWP
MOXEE CITY	MOXEE	ZONE 11	NWP
QUINCY	QUINCY	ZONE 11	NWP
SELAH	SELAH	ZONE 11	NWP
WENATCHEE	WENATCHE	ZONE 11	NWP
YAKIMA CHIEF FARMS	YAKCHFRM	ZONE 11	NWP
YAKIMA FIRING CENTER	YAKFIRCR	ZONE 11	NWP
YAKIMA/UNION GAP	YAKIMA	ZONE 11	NWP
A&W FEED LOT FARM TAP	AWFEED	ZONE 20	NWP
BURBANK HEIGHTS	BURBANKH	ZONE 20	NWP
FINLEY	FINLEY	ZONE 20	NWP
KENNEWICK	KENEWICK	ZONE 20	NWP
MENAN STARCH	MEMANSTR	ZONE 20	NWP
MOSES LAKE	MOS LAKE	ZONE 20	NWP
NORTH PASCO METER STATION	NPASCO	ZONE 20	NWP

OTHELLO	OTHELLO	ZONE 20	NWP
PASCO	PASCO	ZONE 20	NWP
PLYMOUTH	PLYMTH	ZONE 20	NWP
RICHLAND	RICHLAND	ZONE 20	NWP
SANDVIK, KENNEWICK	SANDVIK	ZONE 20	NWP
U & I SUGAR, MOSES LAKE	UI SUGAR	ZONE 20	NWP
BAKER	BAKER	ZONE 24	NWP
CHEMCIAL LIME	CHEMLIME	ZONE 24	NWP
HUNTINGTON	HTINGTON	ZONE 24	NWP
NYSSA-ONTARIO	NYSSA	ZONE 24	NWP
CASTLE ROCK	CASTLERK	ZONE 26	NWP
GREEN CIRCLE FARM TAP	GRENCIRL	ZONE 26	NWP
KALAMA FARM TAP	KALAMA	ZONE 26	NWP
KALAMA NO. 2	KALAMA2	ZONE 26	NWP
LONGVIEW-KELSO	LONGVIEW	ZONE 26	NWP
PATERSON	PATERSON	ZONE 26	NWP
SOUTH LONGVIEW FIBRE	SOLONG	ZONE 26	NWP
WOODLAND WA	WOODLAND	ZONE 26	NWP
ABERDEEN/HOQUIAM/MCCLEARY	ABRNDHOQ	ZONE 30-S	NWP
BREMERTON (SHELTON)	BREMERTON	ZONE 30-S	NWP
A & M RNDERING	AMRENDER	ZONE 30-W	NWP
ACME	ACME	ZONE 30-W	NWP
ARLINGTON	ARLINGTN	ZONE 30-W	NWP
BELLINGHAM II	BLLINGII	ZONE 30-W	NWP
BELLINGHAM/FERNDALE	BLHAM	ZONE 30-W	NWP
DEMING	DEMING	ZONE 30-W	NWP
LAWRENCE	LAWRENCE	ZONE 30-W	NWP
LDS CHURCH FARM TAP	LDSCHURC	ZONE 30-W	NWP
LYNDEN	LYNDEN	ZONE 30-W	NWP
MOUNT VERNON	MTVERNON	ZONE 30-W	NWP
OAK HARBOR/STANWOOD	OAKHAR	ZONE 30-W	NWP
SEDRO/WOOLLEY ET AL.	SEDRO	ZONE 30-W	NWP
SUMAS, CITY OF	SUMASC	ZONE 30-W	NWP
BEND TAP	BEND	ZONE GTN	GTN
CHEMULT	CHEM	ZONE GTN	GTN
GILCHRIST TAP	GILC	ZONE GTN	GTN
KOMOS FARMS TAP	KOMO	ZONE GTN	GTN
LA PINE TAP	LAPI	ZONE GTN	GTN
MADRAS TAP	MADR	ZONE GTN	GTN
NORTH BEND	NBEND	ZONE GTN	GTN
PRINEVILLE TAP	PRVL	ZONE GTN	GTN
PRONGHORN TAP	PRONGHORN	ZONE GTN	GTN
REDMOND TAP	REDM	ZONE GTN	GTN
SOUTH BEND	S BEND	ZONE GTN	GTN
SOUTH HERMISTON TAP	SHRM	ZONE GTN	GTN
STANFIELD CITY TAP	STTAP	ZONE GTN	GTN
STEARNS TAP	STEA	ZONE GTN	GTN
ATHENA/WESTON	ATHENA	ZONE ME-OR	NWP
HERMISTON	HERMSTON	ZONE ME-OR	NWP
MILTON FREEWATER	MILFREE	ZONE ME-OR	NWP
MISSION TAP	MISSION	ZONE ME-OR	NWP
PENDLETON	PENDLETN	ZONE ME-OR	NWP
UMATILLA	UMATILLA	ZONE ME-WA	NWP
WALLA WALLA	WALLA	ZONE ME-WA	NWP