



In the Community to Serve®

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July 31, 2019

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

RE: Docket LC 69, Cascade Natural Gas 2018 IRP Annual Update

Attention: Filing Center

In compliance with Oregon Administrative Rule (OAR) 860-027-0400(8), Cascade Natural Gas, dba Cascade ("Cascade" or "Company"), hereby files an update to its 2018 Integrated Resource Plan that was previously filed on July 21, 2018 in Docket LC 69. This filing is informational only.

If there are any questions regarding this filing, please contact me at (509) 734-4546 or via email at Brian.Robertson@cngc.com or Mark Sellers-Vaughn at (509) 734-4589 or via email at mark.sellers-vaughn@cngc.com.

Sincerely,
CASCADE NATURAL GAS CORPORATION

A handwritten signature in black ink, appearing to read "Brian Robertson", written in a cursive style.

Brian Robertson
Supervisor, Supply Resource Planning

2018 OR IRP Update

Introduction

Cascade Natural Gas Corporation (Cascade or the Company) is a public utility serving more than 293,600 customers, with approximately 75,600 in Oregon and 218,000 in Washington. The Company's customers are located in 96 communities, 28 of which are in Oregon and 68 in Washington. Cascade's service territory is concentrated in central and eastern Oregon, and in western and central Washington. Cascade is subject to the jurisdictions of the Public Utility Commission of Oregon (OPUC or Commission) and the Washington Utilities and Transportation Commission (WUTC) regarding rates, terms, and conditions of service.

Consistent with the requirements in Oregon and Washington, Cascade prepares and files an Integrated Resource Plan (IRP or Plan) which is a long-term plan for acquiring the necessary resources to deliver a sufficient supply of natural gas to its firm service customers over a twenty-year timeframe. The IRP presents a forecast of customer growth and customer usage, as well as an analysis of the supply and demand side resources that could most reliably and cost effectively be used to meet future core customers' gas requirements.

Cascade filed its most current IRP on February 6, 2018, in Docket No. LC 69. By Commission Order No. 18-279, the Plan was acknowledged effective August 1, 2018. In this annual update, Cascade will address OPUC Staff recommendations that require an update from Order No. 18-279 as well as action items from Cascade's 2018 OR IRP.

Overview of Requirements

The requirements for an IRP are established in OAR 860-027-0400 and Order Nos. 07-002, 07-047, and 08-339. Acknowledgement of an IRP is the Commission's action to represent these requirements have been met with a focus on the utility's two- to four-year action plan.

A year after an IRP is acknowledged, a utility is required to file an update to its IRP that describes the actions it has taken to implement its acknowledged action plan, to provide an assessment of significant changes since the plan was filed, and to discuss any deviations from the action plan.

Mist Storage

NW Natural (NWN) announced firm storage capacity available at their Mist storage facility which they were offering to existing Mist storage customers and other interested parties. Cascade was interested in acquiring Mist storage to assist the

Company in serving system load. On April 8, 2019, NWN issued the Mist RFP (Request for Proposal) for firm service for its Mist storage facility.

The Mist storage field is located about 60 miles northwest of Portland, Oregon and is directly connected to NWN's pipeline distribution system, as well as to its interstate pipeline near Deer Island and Molalla, OR.

Components of the Mist RFP were:

- Interstate service
- Intra-state service
- Maximum storage capacity (MSC) of up to 600,000 dekatherms (dths).
- Maximum daily withdrawal quantity (MDWQ) of up to 30,000 dths/day.
- The term of service is May 1, 2019 through April 30, 2024.
- Mist is located 60 miles northwest of Portland, OR

Benefits:

- Additional storage flowing from north of the Columbia Gorge and north along the I-5 corridor.
- Mist storage may also be a useful resource from a price arbitrage perspective as well as potentially assisting in addressing other operational events such as balancing, entitlement and operational flow order (OFO) situations.

Scenarios modeled:

- Mist using the 2018 WA IRP configuration, excluding all other alternative resources.
- Mist using the 2018 WA IRP configuration, including all alternative resources, plus the Shelton and GTN proposals as authorized by Cascade's Gas Supply Oversight Committee (GSOC).
- Mist using the 2018 WA IRP configuration, with available Sumas supply limited from 0 to 50% and prices increased by a factor of 5 to 10, with Rockies only increased by a factor of 2, or at a level sufficient to determine the type of scenario SENDOUT® might utilize for Mist.

SENDOUT®'s modeling results are based on a straight least cost calculation and are a valuable tool for GSOC's consideration regarding Mist. SENDOUT® can inform but it cannot decide. The ultimate decision is voted upon by GSOC.

GSOC had to take into consideration the pros and cons of determining whether to respond to the RFP, keeping in mind incremental price impact, but also the operational benefits of the added storage. GSOC also had to consider other less tangible factors as well, such as reliability (especially since Enbridge Pipeline is still not back to 100%). In the end, GSOC made the best

decision possible given their industry knowledge, experience, and market information available at the time.

On April 19, 2019, GSOC met to discuss the Mist storage bid. GSOC decided the benefits to Cascade's system warranted bidding on the five-year deal. While Cascade's Gas Supply department (Gas Supply) recommended a bid of \$3.38 (approximately 97% of the maximum rate), GSOC felt that 100% of the maximum rate (\$3.461) would at least guarantee Cascade being awarded some portion of the 600,000 dths of storage capacity at Mist. GSOC instructed Gas Supply to bid \$3.461. A bid was then sent to NW Natural. Cascade was awarded 600,000 dths of capacity on April 21, 2019 at a price of \$3.461 per dth.

Hedging

In the 2018 OR IRP, Cascade noted that the Company was actively participating in UM 1720, Investigation into Long-Term Hedging Policy. On January 18, 2018, the docket was closed. The parties agreed to terminate efforts to develop hedging guidelines, and instead committed to developing a process for the Local Distribution Companies (LDCs) to engage with stakeholders to receive feedback about specific potential long-term hedging opportunities.

Cascade also mentioned the Company was actively involved with WUTC Docket UG 132019, Inquiry into Local Distribution Companies' Natural Gas Hedging Practices and Transaction Reporting. Cascade utilized the same portfolio purchasing strategy that was filed in the 2018 OR IRP for the Company's 2018 Annual Hedge Plan filed in Washington. Cascade filed the 2018 Annual Hedge Plan on September 28, 2018 and received an acknowledgement letter on April 29, 2019. The Washington Commission laid out several suggestions for the upcoming 2019 WUTC Annual Hedging Plan that will be filed in July. Cascade has been working diligently with Gelber & Associates, the Company's hedging consultants, on both the Hedge Execution Plan for GSOC and the 2019 Annual Hedging Plan for WUTC. The 2019 Annual Hedging Plan will be filed with the WUTC on or before August 31, 2019.

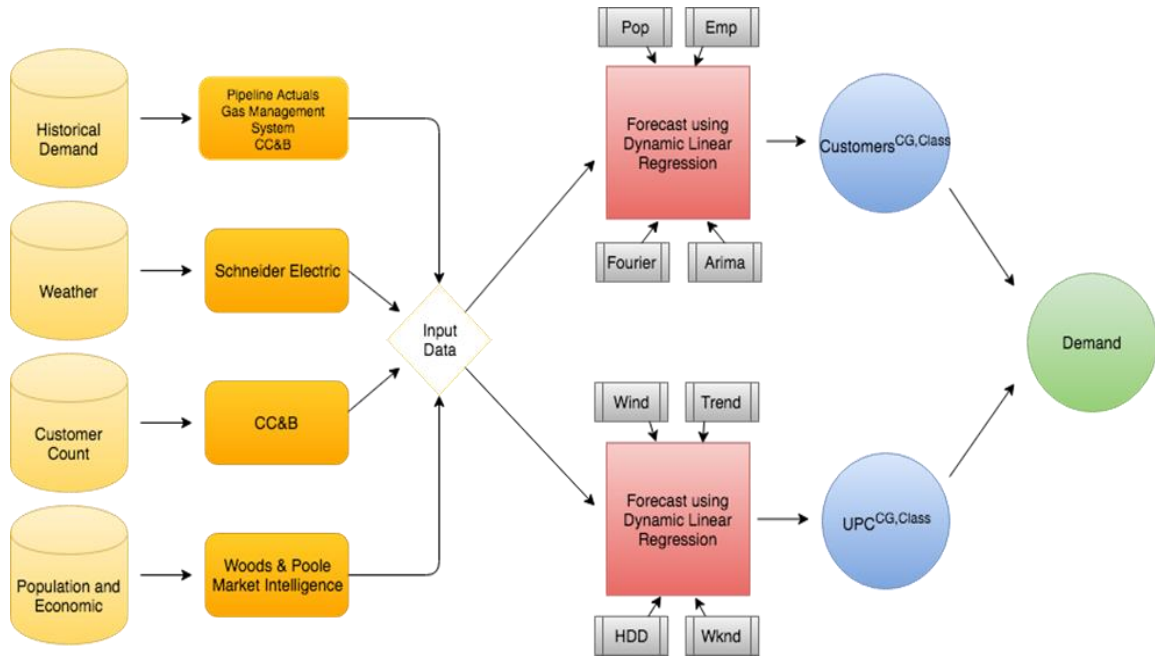
Action Item 1:

Expanding forecast to test Auto-ARIMA functionality in R.

Update: Cascade has enhanced its demand forecast strategy to incorporate many advanced forecasting techniques. These techniques include Fourier terms which assist in capturing multiple seasonalities (if they exist), ARIMA terms which detect the best time series model to apply, and dynamic regression using population and employment. Cascade has also expanded the number of variables that it uses for

dynamic regression to include average daily wind speed. Cascade is also using R Statistical Programming Software to write and compile the code necessary to perform the demand forecast. A flow chart has been provided in figure 1-1.

Figure 1-1: Customer and Demand Forecast Flow Chart



Action Item 2:

Cascade will examine replacing its peak day methodology with a statistically based peak day analysis.

Update: Historically, Cascade utilized the coldest day temperatures in the most recent 30-year history to examine the demand during a peak day event. The system-wide coldest day for Cascade lands on December 21, 1990. Since the Company uses a rolling 30-year historical data, 1990 data will fall outside of the 30-year range in the upcoming IRPs. Therefore, Cascade will examine replacing this methodology with a statistically based peak day analysis.

In the 2018 WA IRP that was filed December 14, 2018, the Company presented a statistically based analysis on weather. This analysis included running Monte Carlo simulations on weather, then utilizing a Cholesky Decomposition Matrix (CDM) to correlate the weather locations together. The CDM is a positive-definite covariance matrix. This matrix is used to draw or sample random vectors from the N-dimensional multivariate normal distribution that follow a desired distribution. This allows for correlations between weather zones to be included when drawing or sampling data distributions for Monte Carlo runs.

By correlating the weather stations using this approach, Cascade is able to create reasonable weather scenarios that represent actual weather. With this methodology, Cascade can analyze impacts on demand with many different weather scenarios, including a percentile that would represent a peak day event.

Cascade plans to present the same analysis in the upcoming 2020 OR IRP.

The peak day event could be the highest percentile or an average of a narrow range. In turn, the peak day event can be analyzed for sensitivity impacts. The Company will work with Staff during the 2020 OR IRP process to determine what percentile would best represent a peak day event.

Action Item 3:

Investigate incorporating distribution system costs into the avoided cost calculation, following guidance from UM 1893.

Update: Cascade introduced a methodology for incorporating distribution system costs into its avoided cost calculation during its 2018 WA IRP. This involves calculating the Company's margin for each rate class and deriving a one-day system weighted margin figure. Cascade will discuss this further with stakeholders during the TAG process of its 2020 OR IRP. The WA System Weighted Margin/Therm values from the 2018 WA IRP have been provided in figure 1-2.

Figure 1-2: Washington System Weighted Margin/Therm

WA System Weighted Margin/Therm Calculation			
Rate Class	Margin/Therm	Therms	Weighted Margin/Therm
502	0.09183	293249	0.00012315
503	0.29484	116691234	0.15733574
504	0.24608	80863982	0.09099849
505x1	0.18843	1465676	0.00126296
505x2	0.15175	4948445	0.00343400
505x3	0.1462	4991516	0.00333720
511x1	0.14834	7308369	0.00495771
511x2	0.11295	1838907	0.00094984
511x3	0.02541	226113	0.00002627
512	0.21479	46552	0.00004573
System Weighted Margin/Therm			0.00862919

Action Item 4:

The Company will acquire cost-effective therm savings by partnering with Energy Trust of Oregon (Energy Trust or ETO) and by delivering programs under the oversight of the Company's Conservation Advisory Group in Washington.

Update: The Company continues to hold ongoing meetings with the Energy Trust of Oregon in support of the organization's efforts to provide cost-effective energy conservation programs to Cascade Natural Gas customers. Meetings included coordination discussions on demand side management planning; strategic planning; program opportunities and challenges; and the organizations' data sharing agreement. Cascade personnel participated as part of the Energy Trust Conservation Advisory Council. Cascade also continued to aggressively pursue cost effective energy conservation in Washington through its Conservation Incentive Program. Updates were made effective February 19, 2019 for qualifying equipment efficiency levels and rebates.

Action Item 5:

The Company will examine the impact changes such as revised building codes, OPUC exemptions granted for non-cost-effective measures, and changes to avoided cost calculations stemming from Docket No. UM 1893, may have on the Company's long- and short-term conservation potentials:

- *The Company shall hold at least one meeting with the Energy Trust to discuss any changes that might affect the Company's energy efficiency therm savings targets, and, if applicable, what actions may need to be taken to comply with or adapt to the changes.*
- *Cascade will provide a summary of its meeting with the Energy Trust in its 2019 IRP Annual Update. In compliance with OAR 860-021-0400(9), the Company will file an update as soon as is reasonably possible if any changes result in a significant deviation from the 2018 IRP.*

Update: Cascade met with the Energy Trust on Tuesday, June 18, 2019 as part of its recurring Utility Coordination Meetings. Cascade added potential changes to savings targets as one of the agenda items.

During this discussion, Energy Trust indicated that it does not anticipate actuals will deviate significantly from 2018 IRP forecasts. While there was initially a significant deficit between forecasts and actuals in 2018, final savings for the year for Cascade were 592,940, or 44,728 therms higher than anticipated. Energy Trust staff noted a possible overestimation of potential in the existing buildings sector and plans to make adjustments to this analysis for the next planning cycle. They are also considering the use of five-year savings forecasts. The next forecast submission for 2020-2021 will be more closely aligned with the budget cycle, which Energy Trust anticipates will result in even more accurate forecasts ongoing.

Action Item 6:

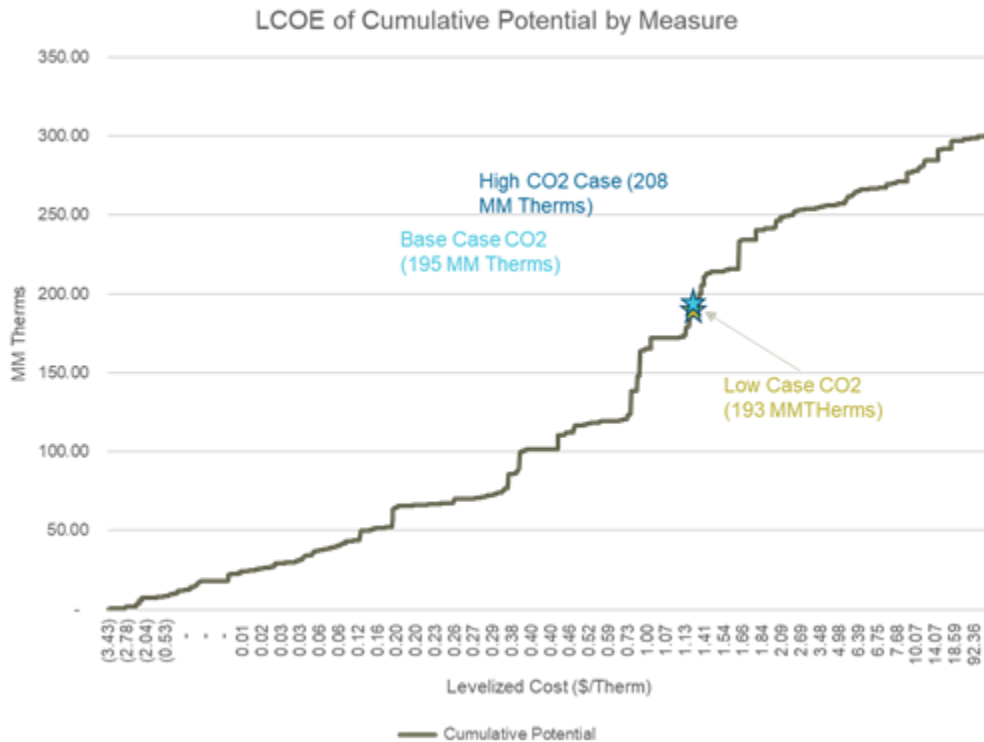
Cascade will examine how carbon tax scenarios impact which energy conservation measures are undertaken with ETO, and how a variety of potential energy efficiency forecasts impact resource integration decisions.

Update: Cascade met with the Energy Trust on Tuesday, June 18, 2019 as part of its recurring Utility Coordination Meetings. Cascade added carbon tax scenario modeling as one of the agenda items. Cascade also met with ETO on July 2, 2019, to discuss Energy Trust's Resource Assessment Model.

During these discussions, the Energy Trust indicated that it is in the process of considering how to best integrate carbon tax scenarios into conservation portfolio planning. Currently modeled carbon compliance values begin at \$.07/therm in 2021 and increase to \$.15/therm in 2036 and ongoing.

The impact of emerging carbon tax scenarios on the Company's energy conservation portfolio will depend on where the carbon tax scenarios fall onto the supply curve as seen in the graph below. For example, a carbon tax scenario may increase the levelized cost by \$.10/therm. Depending where that lands on the supply curve, as shown in figure 1-3, its impact may be significant, or it may be negligible. In the 2020 IRP, Cascade will work with ETO to determine which measures are impacted by the multiple carbon tax scenarios. Those measures will be provided in the IRP.

Figure 1-3: LCOE of Cumulative Potential by Measure¹



Action Item 7:

Cascade will expand on the narrative related to the cost-effectiveness evaluation of proposed infrastructure repairs/replacements in the 2020 IRP.

Update: Cascade utilizes IRP growth data, Synergi design day models, and district information from economic development and new development applications with the municipality to determine the necessity for and nature of infrastructure projects. When formulating the scope of the projects, the engineer will perform a detailed analysis and lay out the project utilizing an executive summary and/or project proposal form. These forms include providing the background for the project, maps of proposed facility locations, schedule and timing justification, cost estimates, and Synergi before and after snapshots. This analysis is repeated within these forms for all the comparable alternatives considered. Then a conclusion is outlined recommending the most cost-effective solution for the project. These summary forms are reviewed collectively by the engineering managers and directors to determine the timing and types of projects to be incorporated into the upcoming years' budgets. Cascade will continue to expand on the narrative related to the cost-effectiveness evaluation of proposed infrastructure repairs/replacements in the 2020 IRP.

¹ Figure 1-3 is informational only and does not represent any actual numbers.

Action Item 8:

Cascade plans to undertake the following distribution system enhancement projects over the next four years:

- *Umatilla 2" Reinforcement*
- *Pendleton 4" IP Reinforcement*
- *Pendleton 4" HP Reinforcement*
- *Pendleton Korvola Road 4" PE RE*
- *Bend 8"/6" HP Steel Reinforcement*
- *RF; 4" PE; Bend; 600' Hayes Ave*
- *RF; 4" PE; Bend; 600' Archie Briggs Rd*

Update:

Figure 1-4: 2018 OR IRP Distribution System Plans

Project	2019 Update
Umatilla 2" Reinforcement	Completed and in service on March 12, 2019
Pendleton 4" IP Reinforcement	Budgeted for 2021
Pendleton 4" HP Reinforcement	Budgeted for 2022
Pendleton Korvola Road 4" PE RE	Budgeted for 2023
Bend 8"/6" HP Steel Reinforcement	Ongoing; completed 2,000 ft replacement in 2018, planned 2,400 ft replacement in 2019. Projects budgeted for 2020, 2021, 2022, and 2023
RF; 4" PE; Bend; 600' Hayes Ave	Project has been rescoped as original project suggested was not constructable. New project and scope budgeted for 2020.
RF; 6" PE; Bend; 1,200' Ponderosa St.	
RF; 4" PE; Bend; 600' Archie Briggs Rd	
	Designed and planned for construction in 2019

The RF; 4" PE; Bend; 600' Hayes Ave project was rescoped and found to be not constructible. The project required installation under the highway via directional drill. This conflicted with other utilities and rock subsurface that makes directional drilling in this location incredibly expensive and nearly impossible. Therefore, the alternative further south (installing larger pipe in an existing casing under the highway) was identified to be more cost effective and still able to provide the necessary system capacity improvements.

Action Item 9:

Cascade will examine modifications to its methodology for producing stochastic analysis, specifically related to Monte Carlo simulations.

Update: Cascade has expanded its use of Monte Carlo simulations into areas such as price, demand growth, and weather. Cascade is able to produce Monte Carlo simulations for various scenarios related to price and growth. Also, Cascade is able to produce summary statistics for Monte Carlo simulations on weather (that is, heating degree days or HDD's) which include minimum, median, 99th percentile, and maximum draws. Cascade now runs the Monte Carlo simulations

within R, which will allow the Company to perform simulations with significantly more draws. This analysis will be discussed further in the 2020 OR IRP.

Action Item 10:

The Company will continue discussions with upstream pipeline and other parties to address the potential 2020 shortfall along the I-5 corridor through other parties via capacity release or other resources. Provide Gas Supply Oversight Committee (GSOC) with the model results from the most recent proposals from the upstream pipeline and other parties. Perform any additional analysis requested by GSOC. Communicate these findings to the WA IRP stakeholders for input and feedback. Seek GSOC approval of the appropriate action regarding acquiring additional capacity along the I-5 corridor.

Update: In the 2018 Oregon IRP, Cascade noted a potential 2020 shortfall along the I-5 corridor. Cascade held many discussions with Northwest Pipeline (NWP) where different proposals were discussed and analyzed. NWP visited Cascade's offices on May 1 to discuss a new proposal. After Cascade modeled the new proposal, the Company suggested changes to the proposal. After multiple discussions, both NWP and Cascade were satisfied with a proposal that could be presented to Cascade's GSOC. NWP and Cascade's Gas Supply team presented the proposal to GSOC on May 20th. GSOC voted to approve the proposal.

Details of the proposal are:

- CNGC will be releasing 10,000 dths of Sumas capacity to Grays Harbor Energy for 10 years with the rights to terminate or recall the capacity at the end of the term.
- CNGC will be shifting 4,114 dths of existing Starr Rd receipt capacity to create 10,000 dths/day receipt at Palouse (5,886 of incremental) through hydraulic efficiency.
- CNGC will receive an additional 10,000 dths of discounted (Nov-Mar) delivery capacity from Mist Storage.
- CNGC will receive 20,000 dths/day of JP segmentation on existing capacity that will allow for another 20,000 dths withdrawal rights at Mist (no additional cost).

With the additional flexibility of Mist and JP storage delivery, Cascade is able to solve the potential I-5 corridor shortfall. As part of this agreement, Cascade released 10K dths of Sumas capacity to Grays Harbor Energy along the Bremerton/Shelton Lateral. After discussions with NWP and analysis at Cascade, it was determined that Cascade has secondary-primary capacity and the citygates have enough physical capability along the Bremerton/Shelton lateral that the release of 10,000 dths would not create a shortfall within the next 10 years.

Action Item 11:

Evaluate the cost of purchasing incremental GTN capacity now versus in 4 years. Confirm with GTN on the availability of upstream capacity either from Kingsgate to Malin or from Turquoise Flats to Kingsgate. At a minimum, on a quarterly basis analyze the potential availability and price of GTN capacity currently compared to at least four years out. Provide the results of this analyses to GSOC to determine actions necessary to meet Bend capacity shortfalls anticipated late in the upcoming decade.

Update: In the Oregon IRPs prior to the 2018 Oregon IRP, Cascade noted a potential shortfall along GTN. The 2016 WA IRP again noted a potential shortfall along GTN. During the 2018 OR IRP modeling period, Cascade purchased 10,000 dths/day of GTN north to south forward haul on December 1st, 2017. Due to the timing, Cascade did not include this 10,000 dths in the modeling and instead included it in the solve for the GTN shortfall. The 2018 OR IRP showed a GTN shortfall beginning in 2019-2020 which was delayed until 2026-2027 because of the 10,000 dths/day that was already purchased.

The Company takes into account many different factors when it comes to evaluating the cost of purchasing incremental GTN capacity now versus in 4 years. These factors include, but are not limited to, cost of capacity, risk of availability of capacity, and risk around error in the Company forecast. Looking further into these factors Cascade found:

- The cost of capacity now will more likely be cheaper than capacity four years from now.
- It is Cascade's understanding that GTN is near fully subscribed.
- Cascade's Bend growth forecast from 2018 to 2019 in the OR IRP was 2.44% but has actually seen a 3.33% increase from January 2018 to January 2019. In the 2018 WA IRP, which accounted for the higher growth rate, it was shown that the GTN shortfall started in 2023.

The factors listed above were provided to GSOC which determined that purchasing 10,000 – 20,000 dths/day would be the necessary action to meet Bend capacity shortfalls. Cascade signed a non-binding term sheet between GTN and the Company on April 18, 2019. The non-binding term sheet essentially states Cascade will participate with interest in 10,000 – 20,000 dths/day of GTN capacity if GTN holds an open season. Cascade will continue to monitor the situation and will keep the OPUC up to date through the PGA quarterly meetings.

Action Item 12:

Active participation in regional LDC IRP processes.

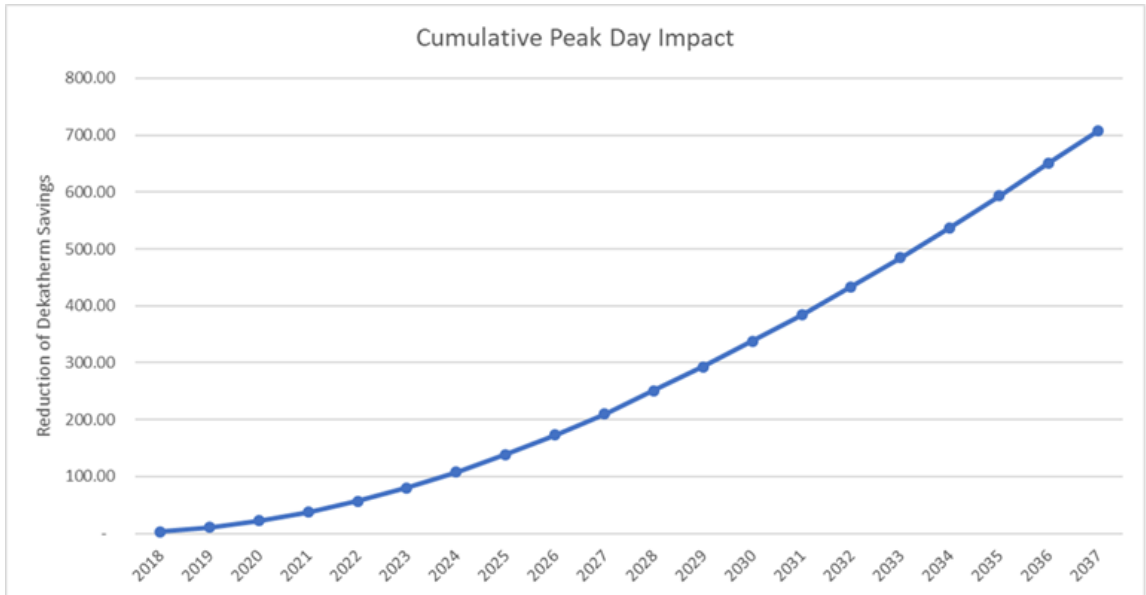
Update: Cascade has actively participated in other LDC IRP processes since the 2018 OR IRP. Cascade has attended meetings with Avista, NWN, and PSE as well as called-in to other regional utilities IRP meetings. The Company plans to continue staying involved in these IRP processes.

Staff Recommendation 2b:

In its 2018 IRP update, the Company should model the impact of lower than projected energy efficiency savings on supply availability.

Update: Cascade does not believe lower than projected DSM will have any impact on supply availability, as supply continues to be plentiful at all basins so long as the Company has sufficient upstream pipeline capacity. Cascade worked with ETO to produce a DSM forecast based on lower than projected energy efficiency (EE) savings, which is included. In 2020, the first year of projected shortfalls, ETO forecasts a cumulative annual EE reduction of approximately 1,977 dekatherms in their low case, which has an impact on peak day across all of Oregon of approximately 22 dekatherms. In 2037, the peak day reduced impact becomes approximately 708 dekatherms for the entire 20-year planning horizon. Since upstream capacity is typically acquired in blocks of at least 10,000 dekatherm increments, Cascade does not expect lower than projected energy efficiency savings to materially impact its resource acquisition decision. Figure 1-5 shows the annual peak day impact.

Figure 1-5: Cumulative Peak Day Impact



Staff Recommendation 5:

Cascade represented at the Commissioner workshop and its final comments that the Company will secure resources necessary to meet the anticipated 2022 shortfall along the I-5 corridor. Staff recommends that the Company provide a narrative update on the status of these acquisitions in its 2018 IRP update.

Update: A response to this recommendation is provided in Action Item 9.

Staff Recommendation 6:

Staff recommends that as part of its next IRP, Cascade develop a methodology to incorporate distribution system costs into its avoided cost calculation.

Update: Similar to the update to Action Item 3, Cascade introduced a methodology for incorporating distribution system costs into its avoided cost calculation during its 2018 WA IRP. This involves calculating the Company's margin for each rate class and deriving a one-day system weighted margin figure. Cascade will discuss this further with stakeholders during the TAG process of its 2020 OR IRP.

Staff Recommendation 7:

Staff recommends Commission acknowledgment of the Company's 2018 Action Plan, provided that the Company provide updates to Staff with respect to resource acquisition and avoided costs consistent with the assertions made in the Company's final comments.

Update: With this 2018 OR IRP Update, Cascade has provided an update to Staff with respect to resource acquisition and avoided costs consistent with the assertions made in the Company's final comments.