BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

LC 69

In the Matter of CASCADE NATURAL GAS COMPANY dba CASCADE NATURAL GAS, 2018 2018 Integrated Resource Plan	Staff Opening Comments

Introduction

The Public Utility Commission of Oregon (OPUC or Commission) Staff files these initial comments on the Cascade Natural Gas (Cascade, CNG or Company) 2018 Integrated Resource Plan (IRP or Plan), filed in Docket No. LC 69 on February 7, 2018. Staff's comments are organized according to subject and detail Staff's primary areas of focus for these initial comments. Staff continues to evaluate the Company's Plan, conduct discovery and will review the participants' comments prior to issuing final comments and recommendations in July 2018. The Commission is currently scheduled to make a decision on whether to acknowledge the IRP at the regular public meeting on July 31, 2018.

Background to the 2018 IRP

Following non-acknowledgment of its 2014 Oregon IRP, Cascade has worked closely with Commission Staff to take the steps necessary for an improved 2018 IRP process. Staff recognizes CNG for the improvements it has made in staffing, as well as technical modelling and planning for its 2018 IRP.

Cascade initiated a series of informal technical working group meetings on the IRP in May of 2017. The informal process included four technical meetings between May and October of 2017. Many participants attended and participated in these technical meetings, including Staff, NW Natural Gas, Northwest Pipeline, and Avista Utilities.

Following the technical working group meetings, Cascade circulated a draft IRP, in January of 2018, for informal stakeholder comment. A phone call between Staff and the Company to discuss Staff's informal comments was held in January 2018. Appendix J contains a matrix of Staff's comments and CNG's responses.

An additional phone call between Staff, Energy Trust of Oregon, and CNG was held in February of 2018 to discuss the energy efficiency modeling performed by Energy Trust of Oregon for the IRP.

Applicable Law or Rule

The Commission adopted least-cost planning as the preferred approach to utility resource planning in 1989.[1] In 2007, the Commission updated its existing least-cost planning principles and established a comprehensive set of "IRP Guidelines" to govern the IRP process. The IRP Guidelines found in Order Nos. 07-002 (corrected by 07-047) and 12-013 clarify the procedural steps and substantive analysis required of Oregon's regulated utilities in order for the Commission to consider acknowledgement of a utility's resource plan.[2]

The IRP Guidelines and Commission rules require a utility to file an IRP with a planning horizon of at least 20 years within two years of its previous IRP acknowledgment order, or as otherwise directed by the Commission.[3] Further, the IRP must also include an "Action Plan" with resource activities that the utility intends to take over the next two to four years.[4] The utility's IRP should

[1] Order No. 89-507.
[2] Orders 07-002 and 07-047. Additional refinements to the process have been adopted: See Order No. 08-339 (IRP Guideline 8 was later refined to specify how utilities should treat carbon dioxide (CO2) risk in their IRP analysis); Order No. 12-013 (guideline added directing utilities to evaluate their need and supply of flexible capacity in IRP filings).
[3] Order No. 07-002 (Guidelines 1(c) and 3(a)) and OAR 860-027-0400.
[4] Order No. 14-415 at 3.

satisfy the IRP Guidelines and Commission rules for its determination of future long-term resource needs, its analysis of the expected costs and associated risks of the alternatives reviewed to meet its future resource needs, and its near-term Action Plan to achieve the IRP goal of selecting the "portfolio of resources with the best combination of expected costs and associated risks and uncertainties for the utility and its customers."[5] This is often referred to as the "least cost/least risk portfolio." The Commission recently reiterated key components it expects to see in an IRP that are consistent with its Order No. 07-047 Guidelines, including:

- Identification of capacity and energy needs to bridge the gap between expected loads and resources;
- Identification and estimated costs of all supply-side and demand-side resource options;
- Construction of a representative set of resource portfolios;
- Evaluation of the performance of the candidate portfolios over the range of identified risks and uncertainties;
- Selection of a portfolio that represents the best combination of cost and risk for the utility and its customers; and
- Creation of an Action Plan that is consistent with the long-run public interest as expressed in Oregon and federal energy policies.[6]

The Commission reviews the utility's plan for adherence to the procedural and substantive IRP Guidelines and generally acknowledges the overall plan if it is reasonable based on the information available at the time.[7] However, the Commission explains: "We may also decline to acknowledge specific action items if we question whether the utility's proposed resource decision presents the least cost and risk option for its customers."[8]

Demand Forecasts

Staff reviewed Cascade's demand forecasting methodology used in its 2018 IRP. Staff notes that the Company anticipates solid load growth across its Oregon service territory, even when projected economic conditions are poor. Staff notes at the outset that when gas prices are low, customers may be less responsive to changes in price, which raises some preliminary concerns regarding the assumptions employed by CNG in its demand modeling. According to CNG's predictions, load growth across the Company's system through 2037 is expected to increase by a range of 1.50 percent and 1.65 percent annually after smoothing the leap year anomaly. Load growth is split between residential, commercial, and industrial customers with residential and commercial customer classes expected to grow at a rate near 1.4-1.6 percent annually, while industrial expects a growth rate of around 1.9 percent. In absolute numbers, system load under normal weather conditions is expected to exceed 417 million therms in 2037. Residential customers are expected to grow from 53.1 percent of the total core load to 54.1 percent of the total core load by 2037. Load across Cascade's two-state service territory is expected to increase 34.6 percent over the planning horizon, with the Oregon portion outpacing Washington at 41.6 percent versus 32.2 percent. Staff offers the following observations:

[5] Order No. 07-002 at 1-2.
[6] Order No. 17-386 at 3-4.
[7] *Id.* at 1.
[8] *Id.*

Comparison of Load Forecast, Customer Forecast to Prior Years' Actuals

Staff is currently awaiting a response to an information request to determine whether Cascade's forecasts significantly depart from recent historical trends with respect to:

1. *Customer Count* in comparison to actual customer count over the previous 5 years;
2. *Load Forecast* in comparison to actual use per customer over the previous 5 years; and
3. *Peak Day HDDs* in comparison to actual Peak Day HDDs over the previous 5 years.

Staff has requested these data because it is critical for the evaluation of both the assumptions CNG is employing in its forecasting, as well as the results of the Company's modeling. Once Staff gains access to these data and is able to assess how the Company's prior forecasts align with historical trends, Staff will be in a better position to evaluate its level of confidence with the procedures employed by the Company in its 2018 IRP.

Use of 30-Year Coldest Day

Cascade uses the coldest day within a 30-year historical period to forecast peak usage days. The coldest day in Cascade's 30-year history was December 21st, 1990. Staff notes that this day will be outside of the range of Cascade's 30 year history at the time of Cascade's 2022 IRP. Staff suggests that now is a good time to reconsider the use of a 30-year historical low temperature in forecasting peak usage days. Staff suggests the use of statistical methods to predict the actual peak usage day based on historical data because this approach will better account for uncertainties in changing weather patterns. For example, Cascade could predict the annual peak usage day where there is a 99 percent chance that firm resources can meet the peak usage day requirements in a given year. This would avoid the sharp change in the Company's forecasts each time the coldest day is pushed outside of the 30 year timeframe and a new 30-year coldest day has to be selected.

Price Elasticity of Demand

Price elasticity of demand (price elasticity) is a measure of the percentage change in demand for a corresponding change in the price of a good. Price elasticity can vary with price – Customers can be less responsive to a change in price when prices are low than when prices are higher. Price elasticity can also be higher in the long-run, as customers are better able to adjust to a change in price over the long term through changes in technology or behavior. Cascade uses a short run price elasticity of -0.10 and a long run price elasticity of -0.12 with ranges of plus or minus 0.07. Cascade's estimate indicates that a 1 percent increase in price will cause consumers to reduce gas usage by approximately 0.1 percent in the short run, and by approximately 0.12 percent in the long run.

Cascade bases its price elasticity on an American Gas Association study from 2007. Staff flags that this particular study may not be an accurate indicator of price elasticity today because price elasticity can vary with price and gas prices have decreased significantly over the eleven years since 2007 to now. When gas prices are low, customers may be less responsive to changes in price. Therefore, Cascade's approach is lacking a factual basis and Staff would like the Company to provide clarification on whether it has evaluated other price elasticity studies in the natural gas sector, and how its methodology and assumptions compare to those employed by other utilities.

Model Input and Output Data and Methodology

Access to model input and output data is essential for reviewing forecasts in an IRP, but was not provided by the Company in its initial filing. Written descriptions of the methodology are helpful for understanding the Company's process, but model inputs and outputs allow Staff the opportunity to reproduce the Company's results, which in turn allows Staff to confirm calculations, and evaluate other approaches. Without this ability to verify the forecasting methodology, Staff's ability to review forecasts is limited. Staff requests that in future IRPs, Cascade provide these essential tools with the initial filing to expedite the review process. Staff notes that CNG has been responsive to initial information requests, and has provided elements (though incomplete) of its model inputs and outputs. Staff will continue to work with the Company to acquire these data.

Further, Cascade's methodology for load forecast model selection raises questions and concerns. The Company reports that it creates the base model presented on pg. 3-9 of its Plan for residential, commercial and industrial uses. After determining the appropriate number of autoregressive and moving average terms, it then modifies each model by removing non-significant variables. Cascade claims this procedure is consistent with backwards stepwise regression.

By way of background, stepwise regression is a systematic method of determining the best selection of explanatory variables for a particular model. Most statistical packages have a routine that performs this procedure. Cascade's approach differs in that it only considers removing variables initially determined to be insignificant. Staff has concerns about this process, and notes that a similar issue was raised by Staff in its 2014 IRP update comments.

The significance of an individual explanatory variable is relevant if specific hypothesis testing is required. For example, if Cascade were particularly interested in the effect that say heating degree days had on use per customer, it would be critical that the 95 percent confidence interval lie above zero: while the point estimates provide the best estimate, that interval would provide support to the argument that whatever the exact number is, we can be reasonably confident that the effect is positive (more HDD leads to a higher UPC).

However when constructing a model for predicting the future, explanatory variables with effects not statistically different than zero can have important explanatory power, and variables with "significant" effects can be unhelpful for predictions. Automatic procedures which determine which variables to select (stepwise regression, but also lasso and some machine learning tools) holistically evaluate all variables and select a subset which lead to the best possible model on which to make future predictions, based on a number of criteria the user can select. The selected variables could be statistically significant, though this is not the primary concern. Cascade's method of simply removing individual non-significant variables does not follow this methodology. Therefore, the model results presented by the Company may not be reliable.

Further, as independent variables will have some explanatory power over other independent variables, the order by which they are removed is important. While following the same procedure but removing different insignificant variables to start, one could end up with different final models. Said another way, Staff has no way of determining whether the final models selected provide the best forecast of load over the next 20 years. Staff will work with CNG to determine the order that independent variables were removed from the analysis, and to better understand how the Company justifies the procedures employed in their load forecast.

Sensitivity Analysis

Cascade utilizes SENDOUT sensitivity analysis. This software permits the Company to develop and analyze a variety of resource portfolios to help determine the type, size, and timing of resources best matched to forecast requirements. This program can model load and price for every day of the planning period based on input, and can therefore minimize costs in a way that would not be possible in the real world. It is important to acknowledge that SENDOUT provides helpful but not perfect information to guide decisions. Cascade stress tests the system in SENDOUT by using alternative forecasting methodologies. These alternative forecasting methodologies refer to changing factors that influence demand. Alternative models include high and low customer growth, high and low weather patterns, or a combination thereof. The Company describes efforts to more rigorously test demand/supply sensitivity via Monte Carlo analysis. However, the Company does not explain how or why this particular analysis was performed. Staff has requested more details, including workpapers and calculations, and a better explanation of the purpose of this analysis from the Company. Staff notes that the Company did provide an Excel spreadsheet in response to this inquiry, which purported to show that its chosen Monte Carlo draws adequately capture sensitivities from a stochastic perspective. Nevertheless, Staff remains unconvinced that there is technical merit to this approach, and notes that it is impossible to evaluate how statistical distributions and trends from the Company's actual SENDOUT simulations capture an analysis performed with a larger number of draws based on the dummy calculations contained in the Excel spreadsheet provided by the Company. Staff is concerned that the low number of draws utilized by the Company will produce largely deterministic results, and Staff strongly suggests that in future IRPs, the Company develop a more rigorous approach.

Miscellaneous

For 2016, the long term discount rate used by CNG is 3.52 percent. CNG has not explained why it chooses to use the 30-year mortgage rate as the basis for these calculations. Second, it is also unclear where the following costs stated by the Company in its demand side management calculations come from: $5.19 per dekatherm in 2017 and $7.18 in 2037 are used. Importantly, these costs are not the same as in section 5 of the Plan, avoided costs. Finally, Staff has questions as to why CNG states that 30-50 percent of cost effectiveness is appropriate. These areas of investigation are being addressed through information requests.

Staff Recommendations

- Replace the 30-year historical coldest day with a statistical analysis of coldest days in CNG's 2020 IRP.
- Explain the rationale and factual basis of using Price Elasticity of Demand to calculate historical usage; and price data to calculate Price Elasticity of Demand for its customers.
- Provide Staff requested information regarding the Company's confidence in the final model's ability to forecast load over the next 20 years, particularly with respect to its handling of customer sensitivity to price during poor economic conditions.
- Provide Staff with workpapers showing model inputs and outputs for each forecast in future IRPs during the initial filing.

Supply Side Resources

The Company describes in broad strokes its options for storage resources; its capacity resources; hedging strategies; and current transportation agreements. The Company also predicts some of the load growth over the planning horizon will require Cascade to secure incremental supply side resources. However, Staff notes that there is a major substantive omission in the Supply Side Resources section of the Company's IRP: the Company fails to include any details on resource investments, either in its discussion of supply side resources, or in the Action Plan itself. Staff simply has no way of evaluating whether the Company is selecting appropriate options and mixtures of resource investments without this information. This issue must be addressed in Cascade's Reply Comments. With respect to the modeling of supply side resources, Staff offers the observations discussed below.

Natural Gas Price Forecast

In order to evaluate the price of resource options, the Company analyzed gas price forecasts from various sources. Cascade used Wood Mackenzie, the Energy information Administration (EIA), Northwest Power and Conservation Council (NWPCC), and Cascade's trading partners to develop a blended long-range price forecast. The Company's 2018-2037 price forecast is shown graphically in Figure 1, and its 2015 price forecast for 2015-2020 is shown in Figure 2. Staff notes that the Company is forecasting prices that are over $1.00 USD/Dth lower by 2020 in its 2018 forecast than it forecasted in 2015.

Staff is working with the Company to better understand the drivers for this change in forecast. The Company currently uses a monthly Henry Hub price from the above sources, the Company assigned a weight to each source to develop the monthly Henry Hub price forecast for the 20-year planning horizon. These weights were derived by CNG by calculating the Symmetric Mean Absolute Percentage Error (SMAPE or Errors) of each source versus actual Henry Hub pricing since 2010. The inverse of these Errors was then used to determine the weight given to each source. Staff has requested workpapers and calculations from CNG in order to assess this price forecast modeling strategy. In particular, Staff is aware that the SMAPE method produces more errors for underestimates than for overestimates, and would like the Company to describe, and show mathematically, how this overestimate impacts pricing on a monthly basis, in addition to explaining what weighting the Company undertook to compensate for the overestimates.

Figure 1 CNG's 2018 Price Forecast

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

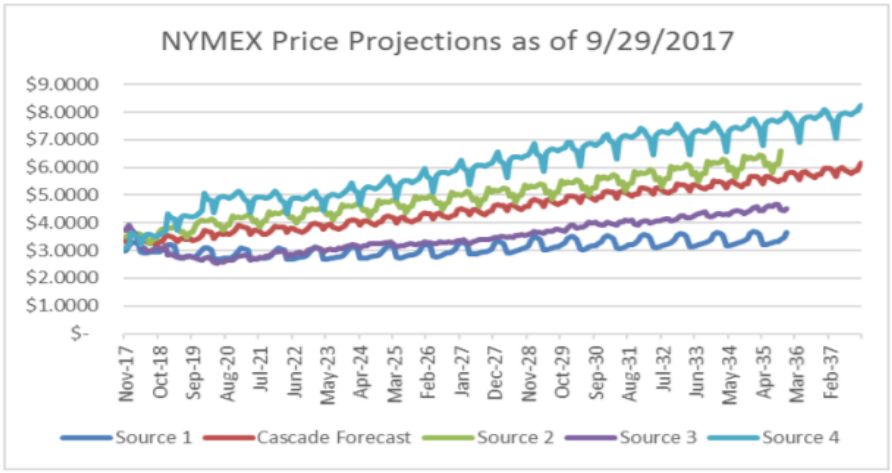
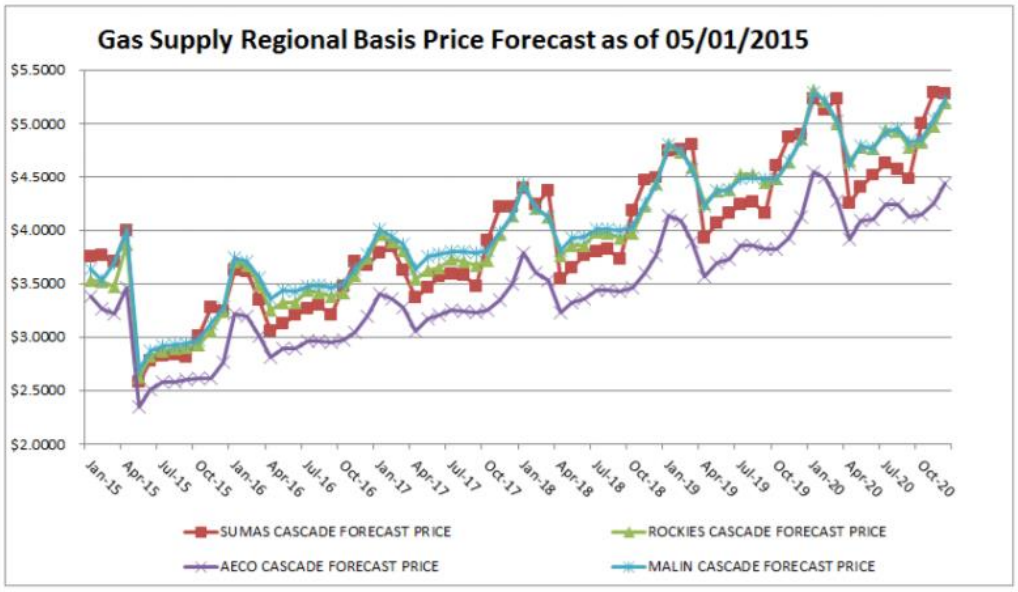


Figure 2 CNG's 2015 Price Forecast



Gas Storage and Supply Resources

The Company lists eight pipeline capacity, five storage opportunity, and three alternative gas supply resources as possibilities to meet its customer demand. The Company describes the spatio-temporal limitations of each available resource, and how supply (either through storage, transportation, or alternative resources) can be met based on season and customer location. Staff has requested details on the data the Company used for its weather predictions, as well as how suppliers are chosen to meet its supply needs. Specifically, Staff is interested in assessing whether there is heterogeneity in the physical location of supplies in order to meet expected load growth based on increasing customer base and future weather patterns. This is important

because the Company's service area is disperse, and falls into different climate zones, which can impact demand. Staff also raises a preliminary concern about the projected energy efficiency savings, and whether gas storage and supply resources are sufficient to meet demand if energy efficiency is lower than expected. Staff is also concerned that the Company does not list resource acquisitions to be undertaken in the next four years in its Action Plan. Staff is seeking clarification from the Company on its Supply-side analysis and the timing of investments. The Company states that it plans to correct this in its amended IRP filing.

CNG has selected the high growth and low growth portfolios using SENDOUT. The Company did not explain whether the high growth and low growth portfolio is a blend of two different portfolios evaluated by the Company, or whether it is a single preferred portfolio. Staff is seeking clarification on this, because it does not see a "high growth and low growth" scenario tested in the Company's IRP, and therefore cannot evaluate its least cost/least risk potential. However, it appears that CNG details $3,000,000 in system costs to meet its growing customer demand. To meet this demand, the Company is taking on several supply side projects over the next 20 years. Staff is working with the Company to clarify which supply side projects (and the cost thereof), the Company proposes. Given CNG's non-contiguous geographical spread across Oregon, Staff recognizes that CNG faces challenges in least cost/least risk planning, as it is necessary for the Company to hold transportation capacity on multiple upstream pipelines to feed a single pipeline connected to a Citygate. However, Staff is unable, due to the limited information currently provided in the Plan, to assess whether the Company's approach is least cost/least risk. Once the Company provided information regarding the costs of its proposed resource investments, Staff will be in a position to evaluate least/cost least risk.

Staff Recommendation

- Staff strongly recommends that the Company list resource acquisitions to be undertaken in the next four years in its Action Plan, or explain why none are anticipated.

Avoided Costs

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

Cascade's avoided cost includes fixed transportation costs, variable transportation costs, fixed storage costs, variable storage costs, commodity costs, a carbon tax, a 10 percent adder, and a hedge premium. Essentially, the avoided cost is the cost of the Company's resource stack on a per therm basis plus three values for benefits specifically acquired with energy efficiency. The largest part of the avoided cost is the cost of gas. First, a carbon tax forecast was added by CNG in anticipation of carbon legislation. The Company included carbon at $10 per ton in 2018 with this cost of carbon escalating to $60 by 2038. This is based on a 2013 study performed by Portland State University. Next, 10 percent is added to the total avoided cost to account for nonquantifiable, environmental benefits. Third, a risk value premium was added to account for the avoidance of hedging costs. This is the first Oregon IRP wherein a hedging value has been included in the Company's avoided cost, a new addition to CNG's avoided cost calculation from prior years' IRPs.

The Company also considered the impact of price elasticity on demand. For the 2018 IRP, the system avoided costs range between $0.4204/therm and $1.2078/therm over the 20-year planning horizon. The increase over time is largely driven by the escalating cost of carbon. For Cascade's 2018 IRP, a short-run coefficient factor of -0.10 and a long-run factor of -0.12 with ranges of plus or minus 0.07 was used.

Staff has concerns about data used by the Company to generate their analysis. Staff also notes that as compared to Northwest Natural Gas Company, Cascade's avoided costs are far lower. Based on Staff analysis of CNG's avoided cost calculations, Staff offers the following observations, and has issued IRs to the Company regarding the same.

Carbon Tax

Staff is concerned about the Company's rationale for its carbon tax calculation. The Company included carbon at $10 per ton in 2018 with this cost of carbon escalating to $60 by 2038. The Company included this adder because of anticipated changes in carbon legislation. CNG cites one 2013 report from PSU that states what could be an efficient climate program. Staff is concerned that resource decisions made from a single study will not be adequately reflective of real world climate program scenarios. Staff recommends that the Company evaluate additional reports to assess climate programs.

Risk Premium

Staff has questions regarding the propriety of the risk premium of $0 used by CNG. The Company gains a value associated with price certainty from demand-side management, hence Staff questions whether a risk premium of $0 is accurate. Staff recommends that CNG explore alternate risk premiums.

Distribution system costs

CNG does not include distribution system costs in its Action Plan, however, they detail over $2,000,000 in distribution projects in their IRP.[9] Avoided distribution system costs are also absent from its avoided cost calculations, which is troubling, and Staff recommends its inclusion in future IRPs. Staff notes that per Order No. 94-590, the long-run incremental cost of the distribution system from the company's last general rate case is used as the avoided distribution capacity costs. Staff believes that CNG should do the same and recommends that these costs be included in future IRPs.

Inflation Rate

Staff has questions about the inflation rate of 1 percent (pg 34 of Plan) used by the Company. Staff questions whether this rate is too low in light of one year of very low inflation in 2015 (0.12 percent). Staff notes that in 2016 it was 1.26 percent and is expected to climb. Even after an information request, Staff does not have enough information to determine where this value is generated; as far as Staff is aware, the BLS does not produce price forecasts.[10] Further, most long-run inflation estimates are at, or are close to, 2 percent. Staff cannot verify whether the values chosen by Cascade are appropriate with the information provided to date.

[9] 8-10 Bend reinforcement investments, and investments listed in Confidential Appendix I.
[10] OPUC 24.

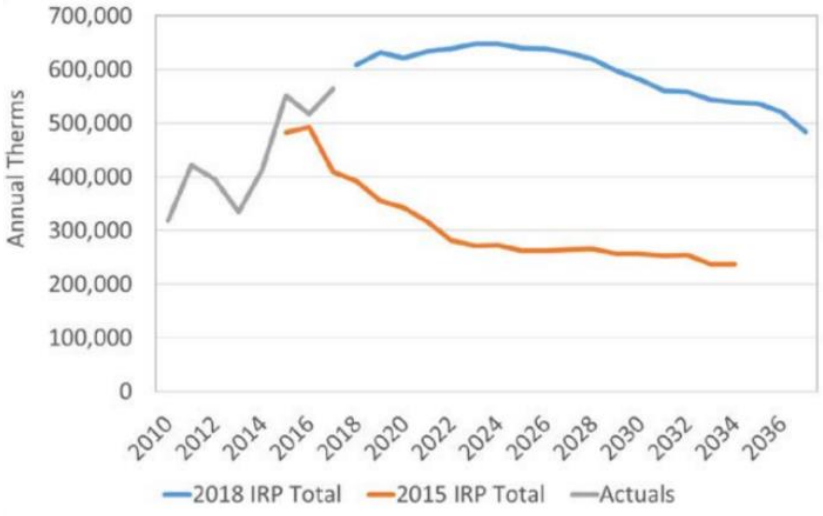
Staff Recommendation

- Staff recommends that the Company acquire additional literature, data, and resources to support their carbon tax calculations.
- Staff recommends that the Company include distribution system costs in future IRP avoided cost calculations.
- Staff recommends that the Company include distribution system costs in their avoided cost calculations.

DSM and Environmental Policy

Energy Efficiency

The proposed energy efficiency action item for the 2018 IRP shows large gains over the past IRP. For the twenty-year planning period, CNG plans to acquire 11.86 million therms of savings. That goal is a 33 percent improvement over the last IRP. Per Cascade's decoupling



arrangement with the OPUC, Energy Trust of Oregon (Energy Trust) implements the energy efficiency program for CNG and developed the savings forecast for this IRP. The graph below depicts the large change in forecasted energy efficiency between the past two IRPs.

Energy Trust states that the increase in savings is due to four factors:

1. Improved modeling assumptions
2. New measures
3. Emerging technologies
4. Updated measure penetration rates

Staff must better understand the extent to which each factor drives the increase in forecasted savings seen in this IRP. It is not clear how much each factor contributes toward the substantial growth in CNG future savings. Staff has issued information requests regarding the impact of the four factors above and plans to explore them more fully before the next set of comments.

Further, although Staff appreciates the planned increase in energy efficiency savings, there are also some concerns with the underlying assumptions in the modeling that Staff needs to explore before recommending acknowledgement. Most notably, nearly 1/3 of the total forecasted savings come from measures that the Energy Trust model believes are not cost effective.

This IRP's high percentage of non-cost effective savings in the forecast is cause for some concern. Staff needs to better understand the Company's assumptions used in the model. For example, Staff plans to explore how the model reflects the fact that cost-effectiveness exceptions expire in the field. When the Commission approves measure exceptions, they are intended to be rare, not a large portion of the overall portfolio, and do not carry on for extended periods of time. Staff plans to evaluate whether it is the model assumptions driving the high level of non-cost effective savings, or whether this is due to anomalies between the modeled measures and actual measures deployed in the field. Regardless, Staff plans to work with Energy Trust and Cascade to better understand these and other modeling issues by the next round of comments as such a high percentage of total savings to be non-cost effective may be an indicator of other issues.

Staff also has concerns about the extent to which Cascade's avoided costs fully capture the value of energy efficiency. Specifically two elements of the Company's avoided costs may be too low and improvements may need to be explored.

The first is the variable transportation element of CNG's avoided cost calculation. Per the IRP Cascade states: For its 2018 IRP, Cascade forecasts shortfalls to begin in 2020. Once these shortfalls begin, the next therm saved would no longer apply to existing contracts, but would rather prevent the need to acquire additional transportation. To this end, variable transportation costs after 2018 represent the average demand charge of all incremental contracts that would be used to solve shortfalls.

The extent that the variable transportation element's current methodology of using the average demand charge in incremental contracts best reflects avoiding future transportation contracts is unclear. Staff will be working with CNG to secure clarifications on this.

Staff's second concern involves the distribution element of CNG's avoided cost calculation. At this time, Cascade's distribution system costs are not included in the Company's avoided cost calculation. The Company continues to work on developing a methodology for quantifying its distribution costs for the purposes of avoided cost calculation.

Staff finds the Company's position on avoided costs challenging to accept especially given the forecasted load growth and the several million in distribution investments planned for the 2018 IRP. Staff believes Cascade must develop an avoided cost value for their distribution element soon, as it has significant impacts on planning and investments. And while Staff appreciates this may be a work in progress, we believe the issue must be resolved and an avoided cost value for the distribution element be adopted by the IRP update.

Staff Recommendation

- Staff recommends that the Company work with Energy Trust of Oregon to describe model assumptions, particularly those regarding non-cost effective savings, and to provide calculations showing what energy efficiency savings would be without these non-cost effective savings.

- Staff recommends that the Company work on developing a methodology for quantifying its distribution costs for the purposes of avoided cost calculation.

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. Staff offers the following comments on CNG's resource integration modeling.

Overall, the resource integration section of the IRP is well reasoned. The process of performing a deterministic "as is" analysis to identify resource deficiencies, followed by introduction of additional resources to meet identified shortfalls; followed by stochastic analysis of candidate portfolios; followed by portfolio ranking; scenario testing; and sensitivity analyses is logical. However, Staff has questions regarding the Company's Monte Carlo simulations. CNG performed 200 simulations on each candidate portfolio under normal weather, growth and pricing conditions. Even after working with the Company via information requests, it remains unclear why 200 draw were chosen, as this number continues to appear arbitrary. CNG provided an Excel sheet showing plots of unrelated Monte Carlo analyses at various numbers of draws which purported to show that 200 draws and 2000 draws show similar distributions. Staff remains unconvinced that this issue was given thorough treatment, and will continue to work with CNG on addressing this issue.

Finally, it is also unclear exactly what candidate portfolio was chosen by SENDOUT, and Staff has requested data and a narrative summary from the Company. The Company graphically shows in figures 7-8 through 7-12 how the candidate portfolio is expected to meet supply and demand, but the graphs are unclear, and contain seemingly different candidate portfolios between them.

Staff Recommendation

- Staff recommends that the Company provide its rationale for why 200 Monte Carlo draws were chosen to model candidate portfolios.
- Staff recommends that the Company provide a clear explanation and list of the selected candidate portfolio.

Distribution System Planning

Distribution system network design fundamentals anticipate demand requirements and identify potential constraints. The Company utilized Geographical Information Systems software to create system models through the use of Synergi software. Distribution system enhancements include analyses of pipelines, regulators, and compressor stations. The Company also considers the impacts of proposed conservation resources on anticipated distribution constraints. Analyses are performed on every system at design day conditions to identify areas where potential outages may occur. Cascade has identified three major enhancement projects over the next three years: Bend 6" HP Steel Reinforcement; Bend 4" IP PE Reinforcement; Bend 4" IP PE Reinforcement, each expected to be complete by 2019 and totaling over $2,000,000 in costs.

Staff commends Cascade's efficient use of GIS and Synergi for resource optimization. This software permits the Company to develop and analyze a variety of resource portfolios to help determine the type, size, and timing of resources best matched to forecast requirements. In its

analysis, the Company considered savings from energy efficiency programs, but states that even after these savings are realized, it 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. Importantly, Staff notes that none of these additional capacity resources are listed in the Company's Action Plan. Also, Staff has questions regarding the energy efficiency savings the Company projects, and raises a preliminary concern as to how resource acquisition and integration needs will change if energy efficiency savings are lower than expected. Staff's reasoning is that since energy efficiency measures can reduce demand in a targeted area by eliminating or forestalling need for additional infrastructure, then lower than expected energy efficiency in a region may require CNG to loop pipelines or modify placement of regulator or compressor stations, to meet demand in certain areas in its network. Staff has issued IRs regarding these questions.

Staff also commends the Company on its clear description of the basic engineering principles of natural gas distribution systems. However, Staff would like to see more detail in in this section of the IRP regarding how anticipated engineering projects are prioritized, and what other cost-effective alternatives were considered by the Company. Staff has issued IRs requesting quantitative engineering data as well as qualitative narratives for how the Company evaluated cost effectiveness.

Staff Recommendation

- Staff recommends that the Company provide calculations and a narrative for how resource acquisition and integration needs will change if energy efficiency savings are lower than expected.
- Staff recommends that the Company provide more data and detail in its distribution planning section on how the Company evaluates cost-effectiveness and alternatives to the proposed infrastructure repairs/replacements.
- Staff recommends that the Company include its proposed distribution system costs in its Action Plan.

The Action Plan

In its 2018 IRP Action Plan, Cascade proposes to introduce and perform several tasks intended to add rigor to its demand, supply, DSM, and avoided costs modeling. These proposed changes are reported in detail below. As noted previously, the Commission's IRP Guidelines are laid out in Commission Order No. 07-002, and corrected in 07-047. IRP Guideline 4(n) requires a utility to file an action plan with resource activities the utility intends to undertake over the next two to four years. As described in the preceding sections of these comments, Staff raises concerns that the IRP, in its current form, may not presently meet Commission Guidelines for acknowledgment. A predominant omission in CNG's IRP filing concerns two substantive areas: It does not provide planning for a four-year action plan horizon, and does not describe or enumerate the resource investments it plans to undertake over the next four years within its action plan.

Staff has begun to address these issues with the Company in both email communication as well as in information requests. The Company has indicated that it will perform the requisite modeling and analysis, with the key attributes of each resource listed in the revised IRP action plan, across a four year horizon in an amended IRP filing. Staff looks forward to evaluating

CNG's revised action plan and IRP document, and is confident that the Company has the technical staff and resources to address these deficiencies.

Highlights from the Company's current action plan are reported below.

2017-2018 Action Plan

Cascade's 2-year Action Plan outlines activities for study, development and preparation for the 2018 IRP.

Highlights of CNG's Draft 2018 Action Plan

Functional Area	*Anticipated Action*	*Timing*
Demand Forecast	*Expanding forecast to test Auto-ARIMA functionality in R.*	*Beginning in 2018 for inclusion in 2020 IRP*
Supply Side Resources	*Active participation in meetings related to UM-1720 to ensure Cascade engages in best practices related to hedging.*	*Ongoing, for inclusion in 2020 IRP*
DSM	*The Company will acquire cost-effective therm savings by partnering with Energy Trust in Oregon and by delivering programs under the oversight of the Company's Conservation Advisory Group in Washington.*	*Ongoing, for inclusion in 2020 IRP*
DSM	*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 potential.*	*Summary will be provided in the 2019 Annual IRP Update*
DSM	*Cascade will examine how carbon tax scenarios impact which energy conservation measures are undertaken with ETO.*	*Ongoing, for inclusion in 2020 IRP*
Avoided Costs	*Investigate incorporating distribution system costs into the avoided cost calculation.*	*Beginning in 2018 for inclusion in 2020 IRP*
IRP Process	*Active participation in regional LDC IRP processes.*	*Beginning in 2017 for inclusion in 2020 IRP*

Staff Recommendations for Action Plan

- Staff recommends that the Company amend its initial IRP filing to include an action plan with resource activities the utility intends to undertake over the next four years, to bring the IRP filing into compliance with IRP Guideline 4(n).
- Staff recommends that Company revise and resubmit its 2018 Action Plan so that it explicitly lists the proposed four-year resource investments in the Action Plan itself.

Conclusion

Staff appreciates the amount of work that has gone into the completion of CNG's 2018 IRP, the considerable amount of time and effort that has been required throughout the entire process, and the Company's proactive engagement with stakeholders. Staff recognizes CNG for the many improvements it has made between 2014 and the present to improve the technical rigor and content for its Oregon IRP process. Although the Company has made great strides to improve its IRP, Staff raises concerns in these comments regarding two main substantive omissions of the Company's Action Plan:

1) CNG has not planned for the required four-year planning horizon;
2) CNG has not enumerated its proposed resource investments across the four-year horizon in the Action Plan itself.

Staff is also working with the Company to gain access to data and assumptions used by the Company to model supply side investments, as well as the selection and cost of its "high growth and low growth" preferred portfolio. Staff notes that the Company has been responsive in preliminary information requests, and looks forward to independently evaluating the Company's workpapers. Staff notes that the fact that it is requesting these workpapers is not necessarily indicative of its disagreement with the Company's models or results. Staff is requesting these data so it is in a position to reproduce and assess the Company's calculations.

Cascade will file reply comments by May 1, 2018.

This concludes Staff's comments.

Dated at Salem, Oregon, this 6th day of April, 2018.

Deborah Glosser
Senior Utility Analyst
Energy Resources and Planning Division