BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

LC 69

In the Matter of CASCADE NATURAL GAS CORPORATION, 2018 Integrated Resource Plan	Final Comments

Introduction

The Public Utility Commission of Oregon (OPUC or Commission) Staff's Final Comments on the Cascade Natural Gas' (Cascade, CNG or Company) 2018 Integrated Resource Plan (IRP or Plan) are organized according to outstanding topics from Staff's initial comments and the corresponding responses provided by CNG. Staff continues to evaluate the Company's Plan as they make changes and respond to discovery requests. Final comments and acknowledgement recommendations by Staff will be made on July 18, 2018. The Commission is currently scheduled to make an IRP acknowledgement decision at the regular public meeting on July 31, 2018.

Lead-Up to Staff's Final Comments on 2018 IRP

Following non-acknowledgment of its 2014 Oregon IRP, Cascade has worked closely with Commission Staff to take the steps necessary to improve its 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.

Since the initiation of the IRP process in January of 2018, over 60 information requests (IR) were initiated by Staff and addressed by the Company. Roughly 40 IRs were initiated between the initial IRP filing and Staff's opening comments filed on April 2, 2018. Following the filing of Staff's opening comments, an informal, collaborative phone meeting was held between Staff and the Company to clarify Staff's concerns and expectations. Staff and the Company have worked together since to ensure that Staff expectations and Company progress towards addressing them, remains on track.

On May 15, 2018, a Commission Workshop was held in Salem, Oregon to discuss the Company's IRP. Attendees included representatives from CUB, ETO, Staff, and Cascade. Topics addressed at the Workshop included I-5 corridor and GTN resource shortfalls, non-cost efficient energy efficiency projections, and CNG's avoided cost calculations.

Summary of Staff's Opening Comments

In its opening comments, Staff recommended that CNG extend its Action Plan timeframe from a two-year to a four-year horizon, and explicitly include in its four-year Action Plan the Company's planned resource investments, so that Staff could review the near term investments the Company plans to make.[1] Staff also requested access to data the Company used in preparing its forecasts and models due to concerns that least cost-least risk alternatives were not evaluated by the Company.

Demand Forecasts

In its opening comments on Demand Forecasts, Staff recommended the following:

- 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;
- Price data to calculate Price Elasticity of Demand for its customers;
- Provide Staff data and 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.

[1] Staff referred to IRP Guideline 4(n) in Order No. 07-047, which lists the following required element: "An action plan with resource activities the utility intends to undertake over the next two to four years to acquire the identified resources . . . ."

- Provide Staff work-papers showing model inputs and outputs for each forecast in future IRPs during the initial filing.

As discussed in depth in Staff's opening comments, in Cascade's 2018 IRP, the Company anticipates solid load growth across its Oregon service territory, even when projected economic conditions are poor. For this reason, Staff initiated several IRs to better understand the variables and procedures the Company used to model load growth, as these factors could be highly relevant to ensuring that the Company's supply strategies are targeted to meet the anticipated demand.

Weather and Load Forecast Modeling

Staff evaluated the Company's responses to its information requests, and determined that it is using industry-standard weather data from Schneider electric. Because the granularity and precision of the weather data used by the Company influences future projections (and hence load growth, which, for natural gas, depends on weather conditions), it was important for Staff to understand and evaluate the sourcing of the weather data in order to analyze the Company's "coldest day" calculations. With respect to CNG's load growth and demand forecast, Staff was able to obtain the necessary files through IRs to partially replicate the Company's modeling strategy. The Company provided the files used to generate the peak day and monthly demand usage forecasts. The data provided are population and employment (in thousands), usage (dekatherms/customer), separated by citygate and rate schedule. The Company runs a forecast for customers as well as usage per customer using two separate models. The customer forecast is done at the citygate level. Once the customer forecast is finalized, the county data is allocated to citygate level.

Because Cascade's Customer Care and Billing (CCB) system is the source of the customer data, and because the CCB system only has customer data at the citygate level (rather than city or town), Cascade must allocate customers to a citygate, when more than one serves those customers. CNG provided to Staff the raw allocation data, but not the precise procedure used to perform the allocation. Nevertheless, based on these data, as well as ancillary data provided by the Company, Staff is satisfied that the load growth forecast would not change substantially based on allocation strategy. In most cases, the number of customers is high enough that any reasonable change in the allocation method would fall within an acceptable error range for a model. Staff notes that CNG is currently working to incorporate citygate information into CCB to remove the need for its current allocation method in modeling. Staff supports this change.

In terms of the load growth forecast itself, the information provided by the Company was not entirely sufficient for Staff to evaluate the Company's load growth forecasts. It appears based on the data provided in response to Information Requests, that the Company used a stepwise linear forecast to produce the results.

With respect to this linear forecasting strategy, Staff continues to be concerned that Cascade removes non-significant variables from regressions manually instead of using an automated process. For example, when forecasting demand across its service territory, the Company would remove population variables from its forecast in industrial zones. This is a modeling decision made by the Company, most likely for the sake of computational efficiency. Although there is some logic behind this choice, the practice is not standard in econometrics, and may decrease the accuracy of the Company's forecasts. However, without knowing which variables were removed in which zones, Staff cannot replicate the model exactly, and therefore cannot assess forecast error for this process.

As part of its demand forecast, CNG modeled peak day usage. Cascade's peak day forecasting methodology is not transparent and does not appear to be based on standard econometric

techniques. Cascade's method of forecasting peak day demand involves removing a portion of the data from the demand forecast and removing the ARMA terms from the demand forecast equation. These steps are not likely to improve the accuracy of forecasting peak day demand, and they may decrease forecast accuracy. To forecast peak day usage, Staff recommends Cascade utilize an ARIMA-based demand forecast. Staff suggests that after amending its demand forecast to use automated stepwise regression as recommended by Staff above, Cascade should forecast peak demand days by simply applying each of its peak day scenarios (Average, System max, and Citygate max) to the demand forecast without removing data or ARIMA terms. Staff requests that Cascade perform this adjustment for its peak usage forecast and provide the results to Staff in its 2018 IRP update.

Staff Recommendations

- In future IRPs, Cascade amend its forecasts to utilize a process that:
  - Checks for autocorrelation;
  - Uses an automated stepwise regression function available in such software packages as SAS or R.
- The Company provide all input files to replicate the Company's analysis in IRP filings.

Supply Side Resources

In its opening comments, Staff requested that the Company provide data for Staff to evaluate its load growth projections, hedging strategies, and transportation agreements. In short, Staff had concerns with whether the demand side modeling performed by the Company was accurately calibrated with its supply side strategies. Staff also requested that the Company provide data on the resource investments it has proposed to make as part of the IRP, especially during the IRP Action Plan time horizon. The Company provided the requested information, and its responses addressed many of Staff's supply side concerns. Below is a summary of the responses by CNG and Staff's remaining concerns at the time of the filing of these Final Comments.

Natural Gas Price Forecast

The Company provided Staff with the information used for price forecasting in response to an Information Request. Staff initially had concerns that the SMAPE method producing more errors for underestimates than for overestimates. The Company provided Staff with data and a narrative explanation in response to Staff IR 15, which demonstrates that the SMAPE method produces error term combinations closes to equal weights, as compared to other common weighting methods. Staff notes that the differences between SMAPE and the mean arctangent absolute percentage error (MAAPE) strategies are marginal, but is satisfied that the Company's use of SMAPE is acceptable for its natural gas price forecast.

Gas Storage and Supply Resources

Staff expressed an interest/concern in the following "gas storage and supply resource" issues in our first round of comments:

1. 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.
2. Staff also raised concerns 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.
3. Staff also requested that the Company 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.

4. A better explanation as to 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.

With respect to Staff's first concern, the Company, through an IR response, explained that suppliers are selected based on a variety of factors, including the physical location and ability of the suppliers to supply the needed natural gas resources in the volumes and at the time frames needed. Staff finds this response reasonable.

With respect to energy efficiency, Staff's second concern, the Company indicated that it will perform this analysis in future IRPs. Ideally CNG would be poised to do it for the present IRP, especially given the anticipated resource shortfalls. Nevertheless, since this is likely a small factor relative to overall supply side calculations, Staff accepts that this modeling can be performed as part of the Company's 2018 IRP updated.

With respect to resource acquisitions, Staff's third concern, the Company updated their Action Plan and respective appendices to include this information to Staff's satisfaction, and in accordance with Commission guidelines.

Finally, with respect to the high and low growth portfolio, the Company provided updated charts and explanations of its preferred portfolio. Although no changes were made by the Company to the portfolio selection, Staff was able to assess the propriety of the portfolio based on the Company's IR responses. The bulk of Staff's concerns related to the Company's portfolio relate to resource integration, and are discussed in greater depth in that section of these comments.

The Company explains that given low natural gas demand in the summer, it does not foresee a need to purchase additional supplies as base load. Because the Company has no operational limitation in the summer months related to supply availability or transport capacity, Staff agrees that there would be no benefit to accruing additional base load supplies during the summer.

Staff Recommendations

- In future IRPs, the Company provide its load forecasting data with its initial IRP filing.
- The Company model the impact of lower than projected energy efficiency savings on supply availability in its 2018 IRP update.

Avoided Costs

In its initial comments, Staff highlighted serious concerns about the avoided costs presented in Cascades 2018 IRP. Specifically, Staff was concerned about the credibility of various calculations due to the omissions of avoided distribution costs and data about price certainty. Additionally, the justification of Cascade's forecasted price of carbon compliance was seen as problematic. Since then, Cascade has responded to multiple IRs focused on their avoided cost calculation, and responded to the cost of carbon issue in their Reply Comments.

Avoided Distribution Costs

There is a substantial benefit associated with not having to pay for increased distribution upgrades. However, in the Company's 2018 IRP, distribution upgrades are omitted from any avoided cost calculation. Cascade has stated that it has reviewed Commission Order No. 94-590, which mandates that 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. The

Company notes that it is an active participant in the UM 1983 proceedings, and is willing to accept any guidance from the Commission as to how to incorporate distribution costs into their avoided costs. It also stated this at the Commissioner Workshop on May 15, 2018.

Risk Premium

There is a significant risk premium benefit associated with Demand Side Management (DSM) built into avoided cost calculations. However, a risk premium was omitted from Cascade's avoided costs methodology, despite other utilities utilizing this.

Cascade argues that the rebound effect will likely lower the effectiveness of energy efficiency programs: if energy efficiency doesn't reduce consumption as much as it forecasted, then DSM's price per therm would be different, resulting in a lower amount of price certainty.

Staff did not find Cascade's argument very compelling and believes that it is extremely unlikely that indirect rebound has any relevance to DSM's price, as virtually no customers would spend money saved on energy efficiency on a different application of natural gas. Only the direct rebound effect is applicable. Staff also notes that the Energy Trust incorporates neither direct nor indirect rebound, as the demand for space heating is quite inelastic. Similar to avoided distribution costs, the Company understood Staff's position and looks for guidance from the UM 1893 proceedings to determine an appropriate methodology to calculate price certainty. Staff plans to work with the Company through UM 1893 and the lead-up to the next IRP to rectify this and improve the Company's avoided cost elements.

Price of Carbon Compliance

Cascade's estimation of the price of carbon compliance was highlighted as insufficient in Staff's Opening Comments. The Company only used one specific study in an inappropriate fashion to forecast the cost per therm it would pay into the future. In its Response Comments and accompanying supplemental filing, Cascade noted the shortfall in their current approach, and ran a sensitivity analysis using the medium price estimates from California's Integrated Energy Policy Report's (IEPR) carbon price projections. Cascade's results do show divergence, however, this divergence is mainly stacked towards the end of the 20-year analysis. Staff is comfortable that no change in the four-year action plan would be necessary if the different values were used.

For each of the three issues raised above, Cascade has recognized the shortfall of their approach in this current IRP. If Cascade's analysis had pointed towards significant resource acquisition, Staff would have serious concerns about recommending Commission acknowledgement of this 2018 IRP. However, Cascade is not recommending any significant resource acquisition in the next four years. Both Staff and the Company recognize that there is insufficient time in this IRP cycle to rerun avoided cost and energy efficiency models. Given the modesty of Cascade's updated four-year action plan, Staff believes that the most appropriate course of action is to provide Commission direction for the 2020 IRP, with an understanding that the 2018 IRP update will contain information as to how the Company will achieve these requirements.

Staff Recommendation

- In its 2020 IRP, Staff recommends that Cascade:
    - Include unrealized distribution costs in its avoided cost calculation;
    - Include a measure of price certainty (risk premium) in the Company's future avoided cost calculation; and
    - Utilize a realistic and justifiable estimation of the price of carbon compliance.

Demand Side Management

In Staff's Opening Comments regarding Demand Side Management (energy efficiency) planning activities, two recommendations were made:

- CNG work with Energy Trust of Oregon to better describe the calculations, model assumptions, and import of the high level non-cost effective savings in this IRP.
- That distribution costs be better quantified in the Company's avoided cost calculations. [2]

CNG addressed both of these recommendations in the Company's information request responses, in their Reply Comments filed on May 1, 2018, and at the Commissioner Workshop held on May 15, 2018.

With regard to the non-cost effective savings, CNG and the Energy Trust of Oregon (Energy Trust) were able to better explain the causes behind the level of non-cost effective energy efficiency found in this IRP. Nearly two-thirds of all non-cost effective savings are due to a difference between the Company's avoided costs used in Energy Trust forecasting model and those avoided costs used during the actual acquisition of savings in the field. Energy Trust's model uses CNG's actual avoided costs found in the IRP. These avoided costs are lower than those used by Energy Trust to acquire savings in the field. This is due to the Energy Trust operating gas programs statewide and utilizing a "blended" avoided cost representing a weighted average of avoided costs from all three of the natural gas utilities that Energy Trust serves. A blended avoided cost allows Energy Trust to normalize and scale the customer experience statewide. It also minimizes Energy Trust's operational and financial accounting complexities.

All parties agreed that if CNG were to incorporate avoided distribution costs into the Company's avoided cost calculation the discrepancy between modeled and blended avoided costs would be minimized. Depending on the energy efficiency measure, the discrepancy between the Company's avoided cost value and Energy Trust's blended avoided cost value can be as high as 20 percent. CNG has agreed to work with Staff – via UM 1839 – and with Energy Trust and stakeholders to develop an avoided cost value for its distribution system and, if it is ready by the next IRP, incorporate it into the Company's avoided cost calculations.

Resource Integration

In its opening comments, Staff noted that 200 Monte Carlo draws performed in the modeling of candidate portfolios was of questionable value because that number is not necessarily sufficient to fully achieve the randomization possible in a Monte Carlo simulation. Staff therefore recommended that the Company look into more rigorous alternatives for future IRPs. Staff notes that the Company has been working diligently to improve its portfolio evaluation methodology, and is confident that the Company will be able to address the concern in its 2022 IRP. Staff notes that the Company's statistical analysis is on par with that used by other LDCs (although Staff has raised similar concerns in these IRPs as well, e.g. LC 65, Avista's 2017 IRP).

In addition, Staff noted that the Company's explanation of the selected candidate portfolio (i.e. its components and the least-cost least risk rationale) were unclear. Staff recommended in its Opening Comments (as well as contemporaneous information requests) that the Company clarify with data, and in list and tabular form, its candidate portfolio. The Company complied with this request, which put Staff in a position to quantitatively evaluate the Company's candidate portfolio.

[2] LC 69, Staff's Opening Comments, April 6, 2018, pgs. 12 and 13.

Following informal meetings with CNG, Staff notes the Company's cooperation and interest in providing the requested information on its candidate portfolio. Staff's main concern was with potential shortfalls, which were an issue in the Company's 2015 IRP. In terms of resource integration, Staff notes that there are four primary geographic and/or resource areas to evaluate in the candidate portfolio and related data provided by Cascade: Incremental GTN; I-5 expansion; Incremental NOVA; and incremental foothills.

One area where shortfalls are projected is around Bend, where shortfalls of 12,836 dths/day are expected in 2028. The Company provided data to Staff which shows that it acquired incremental GTN of 10,000 dths/day, which offsets the need for additional GTN capacity to serve the area until year 2027. This information was not included in its initial modeling or results. Although 10,000 dths/day will partially meet the anticipated 12,836 dths/day shortfall expected, Staff is concerned that population and demand growth in the Bend area may accelerate the need for additional capacity. Staff also notes that the Company's proposed pipeline reinforcements in this territory will accommodate additional capacity. However, the Company is investing in a pipeline enhancement project to accommodate the anticipated load growth, but has not taken steps to secure resources. That said, Staff notes that this is unlikely to become an issue until the time of Company's 2024 IRP. Staff does recommend that the Company, for the current IRP, evaluate the cost of purchasing incremental GTN capacity now versus in 4 years to ensure that all scenarios are considered in order to lead to the selection of the least cost, least risk portfolio. Particularly since the Company is planning on performing pipeline enhancements in the area during this four year window in order to meet increased demand.

The I-5 and GTN shortfalls were a topic of discussion in the May 15, 2018, Commission Workshop. CNG communicated that securing upstream resources in the Bend area will be tractable given the timeframe of the anticipated shortfall. CNG, at Staff's request, has indicated that it will, in its final Action Plan, include information on when and how it plans to secure resources in these regions.

Staff accepts the Company's rationale regarding incremental NOVA and Incremental Foothills capacity. Staff agrees with the Company's models that the price of gas in the AECO basin will remain favorable, and that purchasing Kingsgate is not least-cost least risk.

In terms of the I-5 expansion, Staff is concerned that the Company has not secured resources to meet the anticipated shortfall in 2022 along the I-5 corridor. This issue is different from the 12,836 dths/day shortfall expected in 2028 that was discussed above. Staff notes that the Company is in talks with Northwest Pipeline, but has reservations about recommending acknowledgement of this portion of the Company's Action Plan until more information is provided by the Company about its plan for acquiring and integrating these resources.

Staff Recommendations

- Evaluate the cost of purchasing incremental GTN capacity now versus in 4 years.
- Consistent with Cascades representations at the Commissioner workshop, the Company will make plans to secure resources to meet the anticipated 2022 shortfall along the I-5 corridor prior to the acknowledgement of this IRP.

Distribution System Planning

In its Opening Comments, Staff recommended 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 also requested that the Company provide more data and detail in its distribution planning section on how the Company evaluates cost-effectiveness and

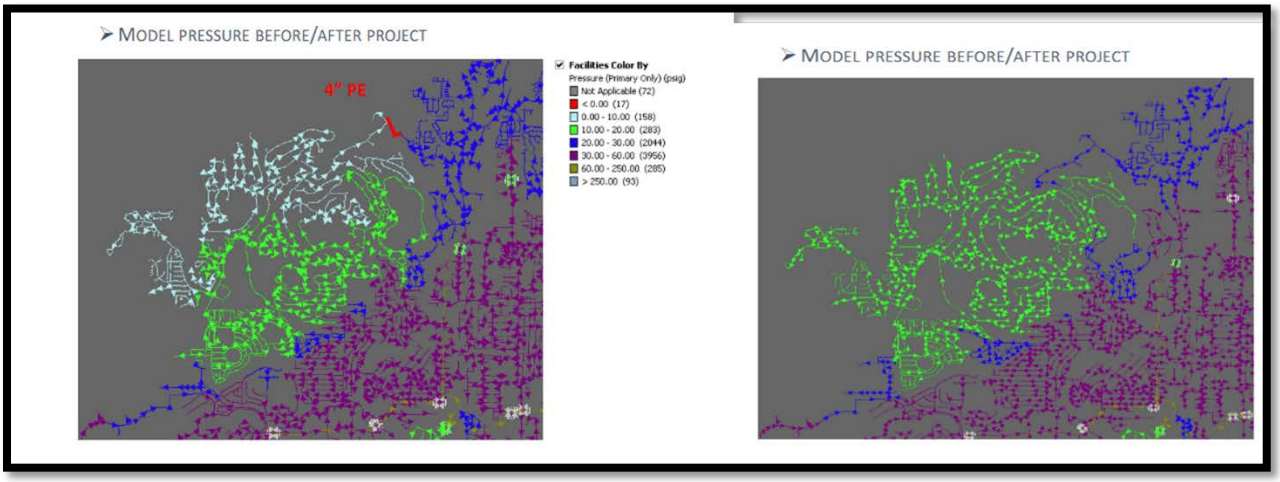
alternatives to the proposed infrastructure repairs/replacement, and requested that the Company include its proposed distribution system costs in its Action Plan.

Following Staff's recommendations and requests, the Company provided Staff with information regarding its cost-effective analysis, as well as its proposed distribution system costs. These items were also addressed in an informal phone meeting between Staff and the Company. Cascade further included this information in its Amended Four Year Action Plan. Staff notes that CNG provided all of the data and information requested for Staff to independently evaluate proposed distribution system upgrades in the IRP.

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

Staff has evaluated the data in support of the proposed enhancement projects. At the outset, Staff notes that Cascade distinguishes between replacement projects and reinforcement projects. Whereas the former are due to integrity and safety rather than capacity, the later are projects that will increase the capacity of the system. Pipeline pressure and flow are used to determine the service needs in an area. Where pressure under a certain pounds per square inch (psi) threshold are identified by modeling, CNG evaluates the area for need of "capacity" upgrade. The threshold depends on many factors, including current pipeline conditions, size, and internal diameter.



CNG Geospatial model of the Bend 4 inch pipeline reinforcement before and after produced by Synergi

The screenshots above shows an example of the Cascade's Synergi model output for the proposed 4'' pipeline reinforcement project. The red line in the left (before) graph shows the proposed pipeline reinforcement. The other lines on the plot represent pipeline location

pressures before (left) and after (right) this enhancement. Based on all available data, Bend is a service territory expecting continual population growth and demand. The Company's models show that after the proposed pipe reinforcement, pressure in the northwestern part of the grid will be increased from 0-10 psi to 10-20 psi. The Company provided similar plots (as well as assumptions and model inputs) to Staff for this and the other proposed distribution system projects. Staff is satisfied that Company's demand growth models align with the proposed reinforcement projects, and accepts the Company's proposed pressure thresholds for when a pipeline must be evaluated for reinforcement to meet demand.

Staff accepts Cascade's conclusion that there would be no financial benefit to delaying the distribution system upgrades in the GTN zone. Staff notes that accelerated DSM programs in this rapidly growing service territory may not be feasible in the time frame necessary to maintain adequate reliable service, hence delaying pipe upgrades to serve increased demand would not be least risk.

In terms of the methodology employed by CNG, Staff notes that CNG is working with Staff in docket UM 1893 to develop methodologies to incorporate distribution system costs into its avoided cost calculations. Staff believes that the outcome of this docket will yield a methodology the Company can include no later than in its next IRP.

Staff notes that the Company has concerns about including the details of its planned distribution system upgrades in its Action Plan due to confidentiality concerns. Staff has advised the Company to discuss (to the level of detail possible) the costs in the Action Plan, and to include as confidential in the record, the details of the plan, to help assist with Staff's recommendation for acknowledgment of this item. The Company has complied with Staff's recommendation.

Staff Recommendations

- Cascade develop a methodology to incorporate distribution system costs into its avoided cost calculation in its next IRP.

The Action Plan

Based on Staff comments and subsequent discussions, CNG made changes to its 2018 Action Plan in its Amended Four-Year Action Plan. In its Amended 2018 IRP Action Plan, Cascade proposed 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 raised concerns that the IRP, in its former format, may not have been able to meet Commission Guidelines for acknowledgment. The changes made by the Company and the assurances to work with Staff to make improvements by the next IRP make this IRP fit for acknowledgement.
Highlights from the Company's current Action Plan are reported below.

Functional Area	Anticipated Action	Timing
Demand Forecast	Expanding forecast to test Auto-ARIMA functionality in R.	Beginning in 2018 for inclusion in 2020 IRP
Demand Forecast	Cascade will examine replacing its peak day methodology with a statistically based peak day analysis.	Beginning in 2019 for inclusion in 2022 IRP
Avoided Cost	Investigate incorporating distribution system costs into the avoided cost calculation, following guidance from UM 1893.	Beginning in 2018 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, and how a variety of potential energy efficiency forecasts impact resource integration decisions.	Ongoing, for inclusion in 2020 IRP
Distribution System Planning	Cascade will expand on the narrative related to the cost-effectiveness evaluation of proposed infrastructure repairs/replacements in the 2020 IRP.	Ongoing, for inclusion in the 2020 IRP
Distribution System Enhancements	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	Ongoing over the next four years
Resource Integration	Cascade will examine modifications to its methodology for producing stochastic analysis, specifically related to Monte Carlo simulations.	Beginning in 2019 for inclusion in 2022 IRP
IRP Process	Active participation in regional LDC IRP processes.	Beginning in 2017 for inclusion in 2020 IRP, with updates during the quarterly PGA meetings

Staff Recommendations for Action Plan

- The Company provide its load forecasting data in its 2020 initial IRP filing;
- Evaluate the cost of purchasing incremental GTN capacity now versus in 4 years;
- The Company update its Action Plan to include a timeline and plan for how it plans to acquire resources to meet the anticipated 2022 shortfall along the I-5 corridor;
- Cascade develop a methodology to incorporate distribution system costs into its avoided cost calculation in its next IRP.

Summary of All Staff Recommendations

- In future IRPs, Cascade amend its forecasts to utilize a process that:
    - Checks for autocorrelation;
    - Uses an automated stepwise regression function available in such software packages as SAS or R.
- The Company provide all input files to replicate the Company's analysis in IRP filings.
- In future IRPs, the Company provide its load forecasting data with its initial IRP filing.
- The Company model the impact of lower than projected energy efficiency savings on supply availability in its 2018 IRP update.
- In its 2020 IRP, Staff recommends that Cascade:
    - Include unrealized distribution costs in its avoided cost calculation;
    - Include a measure of price certainty (risk premium) in the Company's future avoided cost calculation; and
    - Utilize a realistic and justifiable estimation of the price of carbon compliance.
- Evaluate the cost of purchasing incremental GTN capacity now versus in 4 years.
- Consistent with Cascades representations at the Commissioner workshop, the Company will make plans to secure resources to meet the anticipated 2022 shortfall along the I-5 corridor prior to the acknowledgement of this IRP.
- Cascade develop a methodology to incorporate distribution system costs into its avoided cost calculation in its next IRP.
- The Company provide its load forecasting data in its 2022 initial IRP filing;
- The Commission acknowledge the Company's supply side analysis;
- The Company update its Action Plan to include a timeline and plan for how it plans to acquire resources to meet the anticipated 2022 shortfall along the I-5 corridor.

Conclusion

Staff appreciates the amount of work that has gone into the responding to Staff and stakeholders, the changes made, and the commitment to future IRP work from CNG as part of this 2018 IRP process. 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.

This concludes Staff's comments.

Dated at Salem, Oregon, this 1st day of June, 2018.

JP Batmale for Deborah Glosser

Deborah Glosser

Senior Utility Analyst

Energy Resources and Planning Division