

*Attachment*

**Cascade Natural Gas Corporation's 2016 Integrated Resource Plan  
Docket UG-160453**

**I. Introduction**

Every two years, Cascade Natural Gas Corporation (Cascade or Company) is required to prepare a Natural Gas Integrated Resource Plan (IRP or Plan) pursuant to Washington Administrative Code (WAC) 480-90-238. Natural gas utilities must conduct a comprehensive analysis of the costs and benefits of various approaches for meeting future resource needs using the best available information. The Company is required to consider changes and trends in energy markets, resource costs, state and federal regulatory requirements, and changes in the political and natural gas market landscape. The rule is intended to help each regulated utility develop a strategic planning approach to navigate marketplace opportunities, costs, and risks based on its unique attributes and service territory.

Cascade Natural Gas' service territory includes 205,000 customers in western and central Washington, including service in the following counties: Franklin, Benton, Walla Walla, Yakima, Chelan, Douglas, Grant, Adams, Cowlitz, Clark, Grays Harbor, Kitsap, Mason, Snohomish, Skagit, Island, and Whatcom. The Company also serves 68,000 customers in central and eastern Oregon.

After the Commission determined in April 2016 that Cascade's 2014 IRP failed to meet the requirements of WAC 480-90-238 and did not acknowledge the Plan, The Commission directed Cascade to focus its efforts on the 2016 IRP.<sup>1</sup> The Commission directed the Company to complete the following, or incur penalties for violation of Commission rules:

- Submit the 2016 IRP work plan by May 15, 2016;
- Submit the final 2016 IRP by December 14, 2016;
- Meet the requirements set forth in WAC 480-90-238; and
- Remedy significant deficiencies noted in the Commission's letter dated April 14, 2016.

On December 14, 2016, Cascade filed its 2016 Natural Gas IRP with the Commission, describing its potential strategies for meeting resource needs over the next 20 years. In doing so, Cascade has complied with applicable statute, regulations and Commission directives.<sup>2</sup> However, in reviewing the Company's IRP, we believe it is essential that the Company improve its situational awareness of emerging industry best practices and analytics. As shown by questions raised in the Company's presentation at the recessed open meeting on March 29, 2017, the Company must conduct additional analysis related to the calculation of its avoided costs and conservation efforts, particularly in light of growing environmental obligations such as the state's Clean Air Rule (CAR).

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<sup>1</sup> Commission's letter to Cascade Natural Gas Corporation (April 14, 2016), Docket UG-140008.

<sup>2</sup> *Id.*

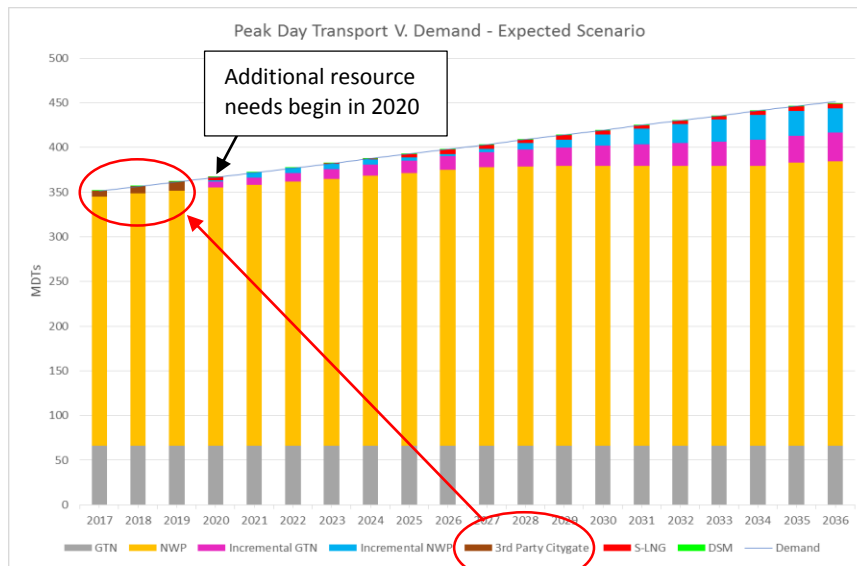
The Commission’s acknowledgment of this Plan is contingent on the Company submitting three (3) quarterly progress reports, beginning in the third quarter of 2017. The reports should provide status updates on progress made towards addressing issues identified in the 2016 IRP Action Plan and this letter and attachment. In particular, the Commission expects the load forecasting issues discussed below to be resolved prior to the first technical advisory group meeting for the 2018 IRP.

The Commission expects Cascade to continue to conduct rigorous analysis in all aspects of the Plan. We encourage Cascade to keep abreast of peer utilities’ modeling tools and to provide more in-depth analysis with regard to current policy and regulations that affect resource planning, such as the CAR. The following sections provide a summary of the 2016 Plan as well as more specific comments and requests for improvement in the next IRP.

**II. Summary of 2016 Integrated Resource Plan**

Cascade projects its system-wide demand to grow 1.25 percent annually. Peak day requirements are projected to grow 1.33 percent per year. Within Washington, Cascade projects increased load growth in the western part of the state, including Bellingham and Bremerton, and on the eastern side of the state in Walla Walla and Tri-Cities. A plot of Cascade’s supply-side resources against projected peak day demand is shown in Figure 1.<sup>3</sup>

**Figure 1: Peak Day Transport vs Demand – Expected Scenario**



**Key:** GTN – Gas Transmission Northwest Pipeline; NWP – Northwest Pipeline; 3rd Party Citygate – Market purchases from other parties at local measuring stations; LNG – Liquefied Natural Gas; DSM – Demand-side Management.

Through its IRP analysis, Cascade predicts that it will not have sufficient resources to meet projected demand growth through 2033 and may need to begin purchasing natural gas delivered

<sup>3</sup> Cascade Natural Gas Corporation, 2016 Natural Gas Integrated Resource Plan (December 14, 2016), at 8-23.

from a third party from 2017-2019, totaling approximately 6,000 decatherms per day (dth/day). The load forecast methodology the Company used in the development of the 2016 IRP was a departure from previous years, in which it built certain models from the district or zonal level. Cascade provided an improved, detailed load forecast for 74 city gates, of which only nine feed non-core customers, and the remaining 65 serve core customers.<sup>4</sup>

After modeling a variety of economic scenarios and considering the alternatives, Cascade selected the following projected daily incremental transport resources for its 20-year portfolio, as illustrated in Table 1.

**Table 1: Projected Daily Incremental Transport and Resources Needed (Decatherms, dth)**

Resource	2017	2020	2030
Incremental GTN	-	20,472	11,814
I-5 Expansion	-	990	9,010
Wenatchee Expansion	-	5,810	1,500
Zone 20 Expansion	-	440	6,120
Incremental Starr Road	-	-	9,327
Eastern OR Expansion	-	3,920	1,170
Yakima LNG Plant	-	5,000	-
3rd Party Citygate Deliveries	6,144	-	-
DSM	279	305	527
Incremental Transport Acquired	6,144	36,632	38,940

In 2020, the Company determined that acquiring incremental GTN capacity will serve expected growth near Bend, Oregon.<sup>5</sup> For Washington, Cascade’s selected portfolio mix includes several NWP expansion projects, including: NWP expansion near the I-5 corridor (Sedro-Woolley area), Wenatchee, and Zone 20 to serve customers in Eastern Washington. In 2030, the Company projects Incremental Starr Road will provide the flexibility to move gas off of GTN and onto NWP through Starr Road, displacing additional need for incremental NWP capacity.

Cascade continues to be flexible and has the ability to realign maximum daily delivery obligations (MDDO), utilizing approximately 300,000 Dth/day of delivery rights and 200,000 Dth/day of receipt rights. Considering potential upgrades at NWP and MDDO realignments, the Company indicated that it may not need the Yakima LNG facility. Cascade and NWP continue to address potential peak day capacity shortfalls through re-alignment of the Company’s contractual rights, which may mitigate the need to acquire incremental capacity.

In the 2016 IRP, the Company identified distribution system pockets where Cascade expects to experience growth-related system constraints and low pressure during winter peak at unpredictable times. Distribution system upgrades are planned for Cascade’s Stanwood, Manchester and South Walla Walla service areas, where supply is constrained. The projects are planned to begin in 2017 and will continue through 2019.

<sup>4</sup> Cascade’s 2016 IRP, Appendix B Demand Forecast.

<sup>5</sup> *Cascade Natural Gas Corporation*, 2016 Natural Gas Integrated Resource Plan (December 14, 2016), at 8-18.

Cascade improved its stakeholder engagement process throughout the development of the 2016 IRP. In the 2016 IRP, the Company described its public participation approach, listed stakeholders in attendance at meetings, and provided the dates of advisory group meetings. To improve the public's access to IRP-related information, Cascade established a dedicated IRP webpage.

As requested by the Commission, the Company addressed specific concerns regarding insufficient analysis and explanation of conservation potential. The Company provided additional explanation in the 2016 IRP, and the Commission is pleased that Cascade has agreed to move towards using the Northwest Power and Conservation Council's (NWPCC's) methodology for calculating conservation potential. On March 10, 2017, the Company filed an addendum to the 2016 IRP Action Plan, detailing intended changes to its conservation assessment and modeling methodology. Commission Staff will continue to provide additional input as the Company develops its request for proposal (RFP) for a new conservation potential assessment (CPA) and modeling software before its next IRP.

### **III. Discussion**

As discussed below, the Commission identifies a number of areas for improvement in the 2018 IRP regarding the Company's analysis of its resource needs over the 20-year planning horizon.

#### **Demand Forecast**

When preparing its load forecast, Cascade assumes that 1 percent population growth at the county level translates to 1 percent residential customer growth at the citygate level. It also assumes that 1 percent employment growth at the county level translates to 1 percent commercial and industrial customer growth at the citygate level. This translation does not necessarily hold true and highlights the need for more analytical rigor in determining correlations between demographic or economic growth and customer growth. While companies are expected to plan for a range of growth scenarios, we caution against overestimating growth in energy consumption, which can lead to the risk of over-investment and unnecessary resource acquisition.

Further, it is concerning that Cascade bases its analysis on only seven weather stations, which are not within close proximity to load centers. For example, the weather in Kalama, Washington, is represented by the Bremerton, Washington, weather location. Also concerning is Cascade's use of third-party weather data, rather than industry-accepted National Oceanic and Atmospheric Administration (NOAA) data.

With regard to weather, Cascade uses a regression model with a single independent variable, heating degree days (HDDs), to develop the sensitivity coefficients used in the demand forecast. This poses a problem because it does not distinguish the seasonal effect. Customers respond to temperature changes differently in the summer than they do in the winter, so the energy needed to make up the heat loss for one Fahrenheit degree also varies in different seasons. Cascade's

data set includes summer usage data that does not correlate with temperature variations, and the summer data in a single HDD model will skew test results.

The Commission encourages the Company to improve its 2018 IRP demand forecasting analysis, and includes the following guidance:

- For customer growth, the Commission recommends that Cascade use a regression model to more accurately gauge the correlation between demographic and employment growth and Cascade's customer growth.
- For temperature data, Cascade should rely either on NOAA data or provide justification for using third-party vendor data and verify the reliability of this data.
- For weather, the Company should specify the regression models to account for seasonal differences in customers' sensitivity and use an autoregressive model to forecast load, when appropriate.
- To limit risk, Cascade should test the validity of its load forecasting model by conducting a back-cast with actual, observed data to compare how the model performs against observed demand growth. The results should be provided in future IRPs as a check for forecast validity and consistency.

### **Stochastic Analysis**

Currently, Cascade does not properly use stochastic analysis to evaluate the risk profile associated with various resource options. Used correctly, a stochastic approach provides information on the expected cost of a given resource mix as well as the spread of cost due to the uncertainty in future conditions, such as the price of natural gas. The graphical output of a stochastic approach can appear as a bell curve, with the width of the bell being a representation of the cost uncertainty (or risk) associated with a given resource mix. A stochastic approach will allow the Company to evaluate resource mix alternatives on the basis of both cost and risk.

In the 2016 IRP, Cascade used a linear programming approach to select a single portfolio mix with the lowest net present value. The Company does not incorporate an assessment of risk into the selection of its preferred resource mix and evaluates its resource mix alternatives on the basis of cost only. The analysis presented in this IRP does not provide the Commission with an adequate demonstration that the preferred resource mix represents an appropriate balance of cost and risk. The Company does use a stochastic approach to "stress test" its preferred resource mix, but because it does not show how alternate resource mixes respond to that stress test, the resulting information is of limited value.

In the 2018 IRP, it is essential that Cascade correctly incorporate a quantitative assessment of risk. Such an assessment requires that Cascade use a stochastic approach to evaluate the cost spread associated with multiple resource mix alternatives, including resource mixes with increased investment in conservation resources. Cascade should refer to the methodologies employed by its peer utilities.

- The Commission requests that Cascade expand its stochastic analysis to include probability distributions of costs, such as system costs and resource mix. The Company should run simulations to “stress test” different resource mix alternatives, including mixes with increased investment in conservation resources, which will provide more data and results for portfolio optimization.

### Conservation Potential Assessment (CPA) and Model

As evidenced by the data and analysis presented in the 2016 IRP, conservation is a resource Cascade should utilize to a greater degree. The Company’s 2016 IRP includes an annual conservation potential of 839,876 therms. Its 2017 Annual Conservation Plan identifies a target of 854,876 therms, which adds 15,000 therms for low-income programs. Cascade projects an overall 13 percent decrease in its projected year-over-year savings acquisition.

The Commission is concerned with the Company’s declining rate of conservation saving and notes the lack of comparative analysis in its 2016 IRP of regional natural gas conservation program offerings for residential and commercial programs, such as those from peer utilities or the Energy Trust of Oregon. In terms of program implementation, Cascade continues to experiment with different approaches to conservation program management, recently bringing its residential rebate program back ‘in house’ from a third-party. In the 2016 IRP, however, the Company may have erred too far on the side of the utility cost test (UCT) in establishing annual targets. The Company should actively work to develop a more fully-balanced total resource cost (TRC) test, as the Commission urged in its Policy Statement on the Cost Effectiveness of Natural Gas Conservation Plans.<sup>6</sup>

To correctly forecast the 20-year Demand Side Management (DSM) potential for the Company’s service territory, it is important that Cascade focus on developing a fully-balanced TRC test for gas programs by incorporating appropriate non-energy benefits. In the 2016 IRP, Cascade utilized only the UCT test and its current modeling tool; this approach does not adequately capture the full conservation available in the service territory. In an effort to improve its conservation forecast, on March 10, 2017, the Company filed an addendum to the 2016 IRP Action Plan, detailing intended changes to its conservation assessment and modeling methodology, as outlined in Table 2.

**Table 2: Addendum to the 2016 IRP Action Plan - Conservation Planning**

<b>Date</b>	<b>Deliverable</b>	<b>Description</b>
Q2-2017	RFP for Conservation Potential Assessment	In consultation with the advisory group and Commission Staff, the Company will finalize the RFP for a new CPA and develop a new RFP for a conservation potential assessment and new (or modified) model, using the NWPCC four-step methodology for calculating conservation potential: <ol style="list-style-type: none"> <li>1. <b>Technical potential.</b> Determine the amount of conservation that is technically feasible, considering the measures and number of these</li> </ol>

<sup>6</sup> *In the Matter of the Commission Investigation into Natural Gas Conservation Programs*, Docket UG-121207, Policy Statement on the Evaluation of the Cost-Effectiveness of Natural Gas Conservation Programs (Oct. 9, 2013).

		<p>measures that could physically be installed or implemented, without regard to achievability or cost.</p> <p>2. <b>Achievable technical potential (use adoption curves).</b> Determine the amount of conservation technical potential that is available within the planning period. This screen will consider barriers to market penetration and the rate at which conservation savings could be acquired. Where appropriate and available, Cascade will apply NWPCC’s adoption curves.</p> <p><i>Note: Steps 3-4 (Economic Potential) will occur in Q2-2018.</i></p>
Q4-2017	2018 IRP Work Plan	The Commission will review the 2018 IRP work plan. The work plan must outline the content of the integrated resource plan to be developed by the utility and the method for assessing potential resources, including conservation.
Q1-2018	Conservation Potential Assessment	The consultant will finalize CPA, which will be included as part of the 2018 IRP.
Q2-2018	Calculate Economic Potential in 2018 IRP	<p>Using NWPCC’s four-step methodology for calculating conservation potential, Cascade should calculate the economic potential within the IRP, but outside of the CPA:</p> <p>3. <b>Economic achievable potential.</b> Remodel Cascade’s existing modeling methodology from the Technical, Economic, Achievable, Potential format currently used to calculate the cost-benefit ratio to establishing the economic achievable potential. This is the conservation potential that is cost-effective, reliable, and feasible, by comparing the total cost of the conservation measures to the cost of other resources available to meet expected demand, using an integrated portfolio approach or the benefit-cost ratio approach.</p> <p>4. <b>Cost-effectiveness tests.</b></p> <ul style="list-style-type: none"> <li>• <b>Total Resource Cost (TRC):</b> In collaboration with the advisory group, the Company will evaluate moving towards using the TRC in its annual conservation plan and report. The Company will incorporate the TRC in its revised or new model and analyze the impacts of the program on both the utility and its ratepayers. The analysis will include, but is not limited to: expected carbon policies, capacity (supply and distribution), monetized non-energy benefits (NEBs), and conservation credit adder.</li> <li>• <b>Utility Cost Test (UCT):</b> As allowed by the Commission’s Policy Statement on Gas Conservation Programs in Docket UG- 121207, and in collaboration with the advisory group, the Company will also use the UCT to adjust economic achievable potential through the revised or new model.</li> </ul>

The Company must continuously evaluate its DSM resources and pursue all cost-effective conservation measures. The Commission requests the following actions pertaining to conservation in the next IRP:

- Cascade should coordinate with the Northwest Energy Efficiency Alliance (NEEA) to include non-energy benefits in the CPA.
- In consultation with its advisory group and Commission Staff, Cascade should develop a request for proposals for a new conservation potential assessment and new (or modified)

model using the Northwest Power and Conservation Council's methodology for calculating conservation potential.

### **Clean Air Rule**

Cascade is a covered party under Washington's recently promulgated Clean Air Rule (CAR). In the 2016 IRP, Cascade's estimate is that carbon legislation or regulation will occur at both the federal level, through the Clean Power Plan, and on the state level. Cascade considered the carbon tax derived from the Northwest Power Council and includes a discussion of the impacts of the CAR—but does not quantify the impacts. Further, the Company's analysis of the CAR in the 2016 Plan is not complete. It says that because of Department of Ecology constraints on emission reduction units (ERUs) for compliance, it is difficult for the Company to project their costs. Cascade's approach was to quantify carbon costs in the Plan using NWPCC's Seventh Power Plan carbon cost risk methodology, which yielded a \$10/ton carbon adder in 2018, rising to \$30/ton in 2035. In the next IRP, the Company should provide a more rigorous, Washington-specific analysis of CAR impacts.

- The Commission recommends that the Company include a section that discusses impacts of the CAR (WAC 173-442 and 173-441). In its 2018 IRP expected case, Cascade should model specific CAR impacts as well as consider the costs and risk of additional environmental regulations, including a possible carbon tax (\$/ton carbon dioxide equivalent).

### **Avoided Cost Calculation**

Cascade's avoided cost ranges from approximately \$.50/therm to approximately \$0.67/therm, beginning with a carbon cost adder starting at \$10/ton and rising to \$30/ton. In the 2016 IRP, the Company did not provide a narrative describing how carbon policy is delineated within and external to its natural gas price forecast. The Company also failed to capture separately the expected avoided capacity costs for end uses, including: residential space heating, commercial space heating, base load, and interruptible load. The impact of excluding these costs is a substantially lower avoided cost calculation, which can impact the number of cost effective conservation measures.

In order to improve its IRP analysis, the Company should continue to include supply capacity costs in its avoided cost methodology and take steps to provide more information with regard to carbon policy and avoided cost calculations.

- The Commission recommends the Company provide additional information with regard to its avoided cost calculation methodology, clearly delineating carbon costs included in the price of natural gas and external costs related to state-specific carbon policies, including but not limited to Washington's Clean Air Rule.
- The Company should expand its analysis of avoided energy and capacity costs (on and off peak), by year and end use, quantifying the following cost streams: carbon-inclusive price and transport, capacity (supply resource), capacity (distribution system), emissions



with expected case adder of incremental carbon policy (CAR analysis), and a 10 percent conservation adder.

In a separate docket, Docket U-161024, the Commission is modifying its Integrated Resource Planning rules for investor-owned natural gas and electric utilities, and seeks comment on ways to improve the transparency of avoided cost values reported in natural gas IRPs. The Commission looks forward to Cascade's participation on this topic.

## **Resource Cost Estimates**

Additional improvement is still needed with regard to the economic valuation of potential resource costs and the analysis of alternative resources selected. To meet projected loads in 2020 and beyond, Cascade evaluated the following incremental capacity resource options (resources in bold are those that are selected in the Plan):

### Demand-side Resources

- **Demand Side Management / Energy Efficiency**

### Pipeline Capacity<sup>7</sup>

- "Trail West" cross cascades pipeline expansion
- **Incremental GTN capacity acquisition**
- **Various NWP expansion scenarios: Oregon, I-5, Wenatchee, Zone 20**
- Pacific connector project (tied to Jordan Cove LNG export in Coos Bay, Oregon)
- Southern-crossing expansion (FortisBC project and NWP expansion)

### Additional Storage<sup>8</sup>

- AECO hub located in Alberta, Canada
- Gill Ranch located near Fresno, California
- Mist (North Mist II) is new underground storage near Kelso, Washington
- Ryckman Creek located near Evanston, Wyoming, near the Opal hub
- Wild Goose located north of Sacramento, California

### Alternative Gas Supply Resources<sup>9</sup>

- **Satellite LNG in Yakima**
- Biogas
- **Re-alignment of Maximum Daily Delivery Obligations.**

In the 2016 IRP, Cascade based the Yakima satellite LNG resource cost estimate on a 2005 study, with the costs simply adjusted for inflation. Reliance on older data is problematic, as it may lead the Company to incorrect analysis and conclusions, particularly where siting and permitting requirements may have changed. In addition, the Williams NWP resource alternatives were based on a presentation for Cascade for additional capacity in May 2014. The Company

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<sup>7</sup> CNGC 2016 IRP, at Pages 4-13 to 4-14.

<sup>8</sup> CNGC 2016 IRP, at Pages 4-14 to 4-15.

<sup>9</sup> CNGC 2016 IRP, at Pages 4-15 to 4-16.

claimed new estimates could not be developed by NWP in the timeframe needed for the 2016 IRP, and indicated that NWP will provide updated costs in 2017 for the next IRP.

- The Commission directs the Company to base any resource acquisition decisions on updated analyses using the most current data available.

### **Distribution System Enhancements**

Cascade's natural gas distribution system consists of 4,744 miles of distribution main pipelines in Washington, and 1,604 miles in Oregon. In its IRP presentation to the Commission on March 29, 2017, the Company provided an overview of its distribution system and how it uses GLE Noble Denton's Synergi software to determine network requirements and assist the Company in addressing growth-related constraints, system integrity issues and the timing of expenditures. As the Commission promulgates new rules related to IRP transmission and distribution system planning, the Company will need to provide more analysis on distribution system enhancements in future IRPs.<sup>10</sup>

- Cascade should discuss with its IRP advisory group the appropriateness of listing and mapping prospective distribution system enhancement projects planned on the 20-year horizon, and comparing actual projects completed to prospective projects listed in previous IRPs.

### **Stakeholder Comments**

Public Counsel was the only stakeholder to provide comments on the final Plan in this docket, and stated that Cascade's current approach does not appropriately identify available conservation.<sup>11</sup> Public Counsel's comments were focused on the Company's conservation efforts, and generally supported the Company's retooling of its conservation program model, utilizing NWPC's conservation potential calculation methodology. Public Counsel argued that the current model and potential assessment do not capture adequately the full conservation available in Cascade's service territory.

### **IV. Quarterly Reporting**

Because of the number of issues raised throughout the process, the Commission's acknowledgement of this Plan is contingent on the Company submitting three quarterly progress reports addressing issues identified in this letter, attachment, and Two-year Action Plan. Each progress report must be received by the Commission no later than the final business day of each fiscal quarter, beginning in Quarter 3 of 2017. The Commission expects the demand forecast issues be resolved prior to the first Technical Advisory Group meeting for the next IRP. Quarterly reports should be submitted online, using the Commission's e-file system.

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<sup>10</sup> Integrated Resource Planning Rulemaking, Docket U-161024.

<sup>11</sup> Cascade Natural Gas Corporation (CNGC), 2016 Integrated Resource Plan (IRP), Table 8-4, Docket UG-160453.

**V. Conclusion**

The content and scope of the 2016 IRP is a significant improvement over the 2014 IRP, though more rigorous analysis will be needed in the future. The Company should move towards resolving the issues identified in the acknowledgment letter and attachment, and in its the 2016 IRP Two-year Action Plan. Although issues remain, the Commission acknowledges that Cascade's 2016 Natural Gas IRP complies with WAC 480-90-238, with the caveat that the acknowledgment is contingent on quarterly reporting, as stated in Section IV.

Commission Staff will continue to provide additional input as Cascade develops its next IRP. Cascade should file its next IRP work plan on or before December 14, 2017, and its final 2018 IRP on or before December 14, 2018.