

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

Docket No. LC 71

In the Matter of

NW Natural's 2018 Integrated Resource Plan

Opening Comments

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Introduction

The Public Utility Commission of Oregon Staff (Staff) files these Opening Comments on Northwest Natural Gas Company's (NW Natural or Company) 2018 Integrated Resource Plan (IRP or Plan), filed on August 24, 2018. Staff's comments are organized according to subject and address Staff's primary areas of initial focus. Staff continues to evaluate the Company's Plan and gain additional information from the Company through discovery. Staff will review the stakeholders' comments prior to submitting its Final Comments on December 31, 2018. A final order is expected to follow the Commission Public Meeting on February 26, 2019.

Background

Staff participated in the series of informal technical working group meetings offered by NW Natural starting in December 2017. The informal process provided an opportunity for dialogue among participants as NW Natural made decisions leading to the final draft of the 2018 IRP. Participants included Staff, Washington Utilities and Transportation Commission, Oregon Citizens' Utility Board, Northwest Industrial Gas Users, Northwest Gas Association, Energy Trust of Oregon, Northwest Energy Efficiency Alliance, Columbia Riverkeeper, BARK, Cascade Natural Gas, Alliance of Western Energy Consumers, TransCanada –GTW, FORTIS B.C., Washington Attorney General's Office, North Western Energy Coalition, Avista, Northwest Gas Association, and Northwest Pipeline Corporation.

Applicable Rule or Law

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 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 satisfy the IRP Guidelines and Commission rules for analyzing long-term resource needs, the expected costs and associated risks of the alternatives reviewed to meet future resource needs, and the near-term Action Plan to achieve the 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 often referred to as the "least cost, least risk portfolio."

¹ Order No. 89-507.

² Orders 07-002 and 07-047. Additional refinements to the process have been adopted since 2007: 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.

⁵ Order No. 07-002 at 1-2.

The Commission recently reiterated key components that it expects to see in an IRP:

- 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;
- 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 IRP for adherence to the procedural and substantive IRP Guidelines, and examines the resource activities proposed in the Action Plan to determine whether to acknowledge them based on the reasonableness of those actions, given the information available at the time.⁷ The Commission may decline to acknowledge a specific action item if it questions whether the utility's proposed resource decision presents the least cost, least risk option for its customers.⁸ Further, the Commission has made clear that its "decision to acknowledge or not acknowledge an action item does not constitute ratemaking. The question of whether a specific investment made by a utility in its planning process was prudent will be fairly examined in the subsequent rate proceeding."⁹

Planning Environment

NW Natural's IRP describes an expected operating environment over the planning horizon of slow but continuing economic growth and slowly rising gas prices. NW Natural also notes the growing likelihood of regulation of greenhouse gas emissions in Washington and Oregon.

In response to the potential for carbon prices in Washington and Oregon in the near future, NW Natural has included a carbon price in its resource optimization modeling in the 2018 IRP to value the differences between resources with different carbon intensities.

Additionally, in the Company's risk analysis, four separate carbon prices were analyzed in Chapter 7 of the IRP:

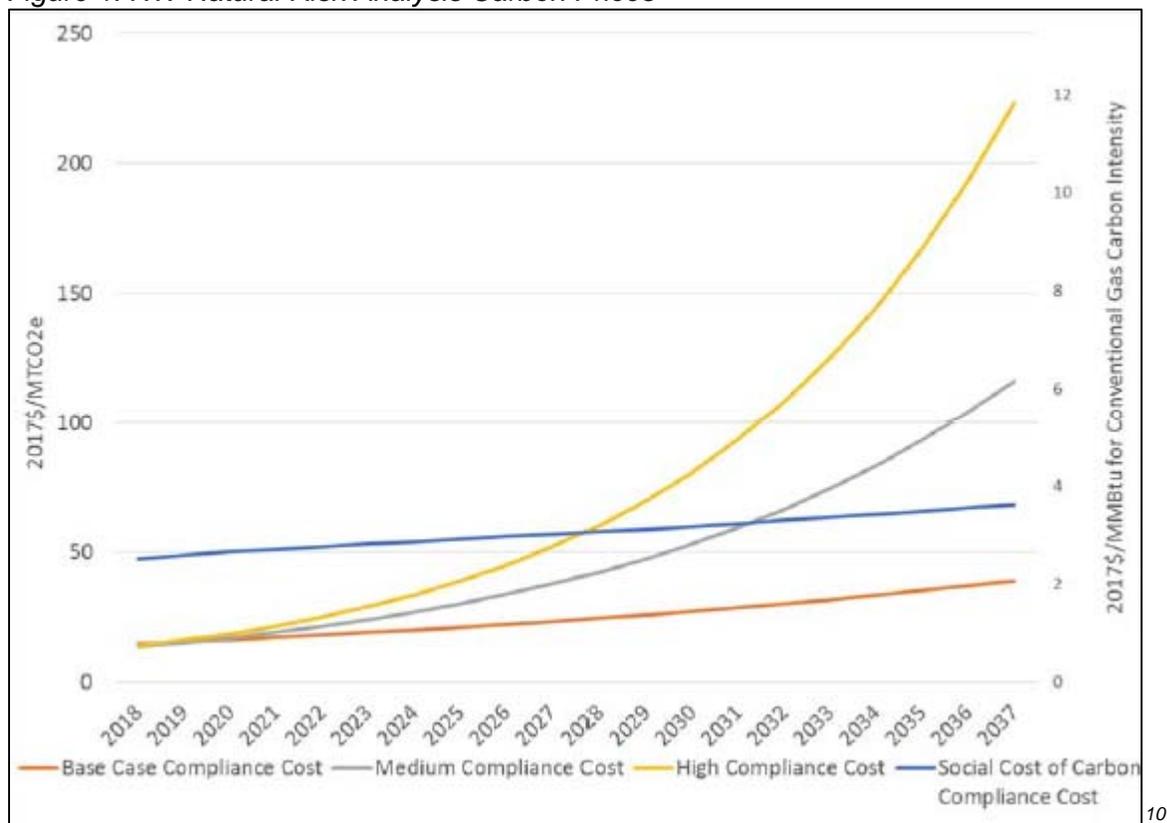
⁶ Order No. 17-386 at 3-4.

⁷ Docket No. LC 66, Order No. 17-386 at 4 (Oct. 9, 2017).

⁸ *Id.*

⁹ Docket No. LC 66, Order No. 17-386 at 4 (Oct. 9, 2017).

Figure 1: NW Natural Risk Analysis Carbon Prices



NW Natural describes several actions that are being taken by the Company to reduce emissions and prepare NW Natural for future carbon pricing policy. These include:

- Creating the Smart Energy program for customers;
- Working with the Energy Trust to achieve energy efficiency;
- Joining the Environmental Protection Agency’s Methane Challenge in 2016 and adopting less-emitting best practices into standard operating procedures; and
- Working on a pathway to manage the Company’s supply chain with greater transparency and detail about the production of the gas procured for customers.

New Technologies

Additionally, NW Natural describes its work in partnership with natural gas utilities in Oregon and Washington and Northwest Energy Efficiency Alliance (NEEA) to “create a long-term market transformation strategy to ultimately increase consumer choices and efficiency of natural gas use in the Northwest.”

NW Natural’s current IRP differs from its previous IRP by providing an overview of the energy savings potential of five new technologies:

1. Efficient Gas Water Heaters,
2. Combination Space and Water Heating Systems,
3. Hearth Products,

¹⁰ NW Natural 2018 Integrated Resource Plan at 2.25.

4. Condensing Rooftop Units, and
5. Efficient Gas Dryers.

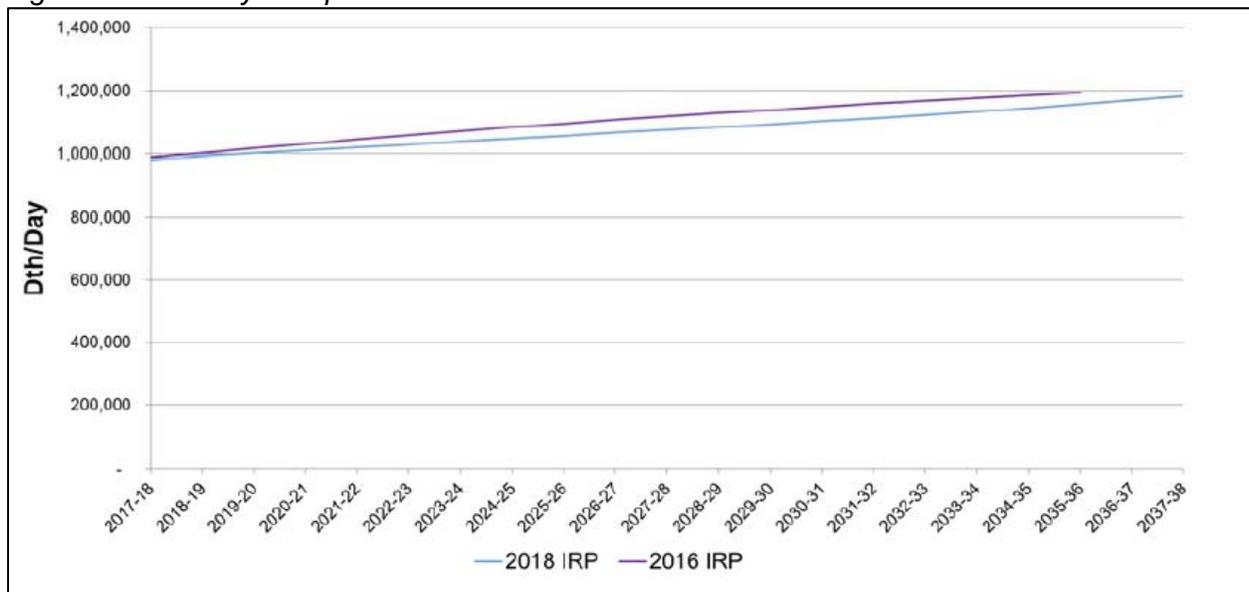
According to NEEA the first three new technologies listed above represent “a long-term energy-savings resource capable of delivering over 280 million therms annually to the Northwest region at a weighted average total resource cost (TRC) of \$0.28/Therm.”

Staff Request(s) for NW Natural: In future IRP’s, Staff would like NW Natural to provide an update for current energy-savings analysis for each new technology by including the total resource cost and the utility cost test for each new technology initiative, the estimated savings contribution to near- and long- term savings potential, along with the criteria used to gauge success and failure of new technology.

Load Forecast

NW Natural’s forecast of peak day load is increasing 0.92 percent per year on average over the next twenty years. In the 2018 IRP, the peak day forecast has decreased 3 percent from the 2016 IRP forecast by 2035, as shown in Figure 3 below.¹¹

Figure 2: Peak Day Comparison 2016 IRP to 2018 IRP

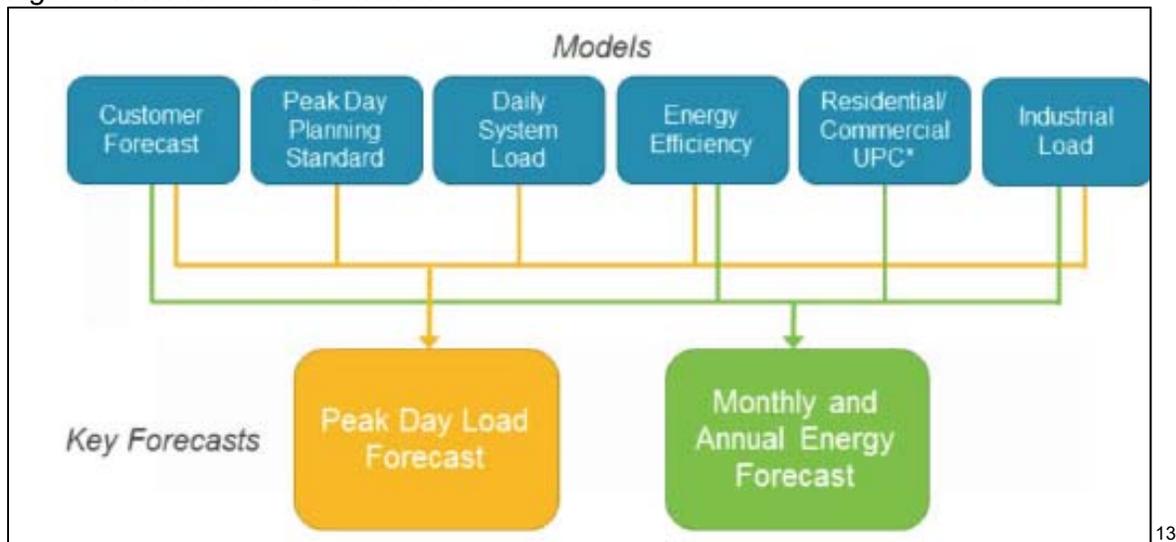


NW Natural’s 2018 IRP includes six separate forecasts: Customer Forecast, Peak Day Planning Standard, Daily System Load, Energy Efficiency, Residential/Commercial Use Per Customer, and Industrial Load. These forecasts are combined to obtain a prediction of the two key forecasts in planning to meet future demand: “Peak Day Load” and “Monthly and Annual Energy”. These forecasts represent the capacity and energy needs of NW Natural’s customers, respectively.¹²

¹¹ NW Natural 2018 Integrated Resource Plan at 3.46.

¹² NW Natural 2018 Integrated Resource Plan at 3.2.

Figure 3: NW Natural's Demand Forecast Process



Staff has performed a preliminary review of the load forecasting methodology utilized in NW Natural's 2018 IRP. Information requests were submitted to facilitate a comprehensive review of the forecasting methodology and its performance. Below is a primary list of topics that Staff is examining, with a brief description of the analysis.

- Expert Forecasts

The forecast of the number of customers on NW Natural's system is a key input into both the Peak Day Load Forecast and the Annual Energy Forecast. NW Natural's customer forecasts are a blend of two different kinds of forecast: forecasts developed using a panel of internal subject matter experts (SME panel) and forecasts developed using econometric forecasts. In the 2016 IRP, NW Natural referenced the SME panel for the first two years of the forecast, a blend of the SME panel and econometric forecast in the third year, with a full transition to the econometric forecast in the fourth year of the forecast out to 2038. In the 2018 IRP, NW Natural follows the same methodology, except the SME panel and econometric model are blended in the fourth year. As part of Staff's review of this blending update, Staff will take into consideration NW Natural's analysis comparing out-of-sample econometric forecasts with analogous SME panel forecasts.¹⁴

- Commercial load growth forecast

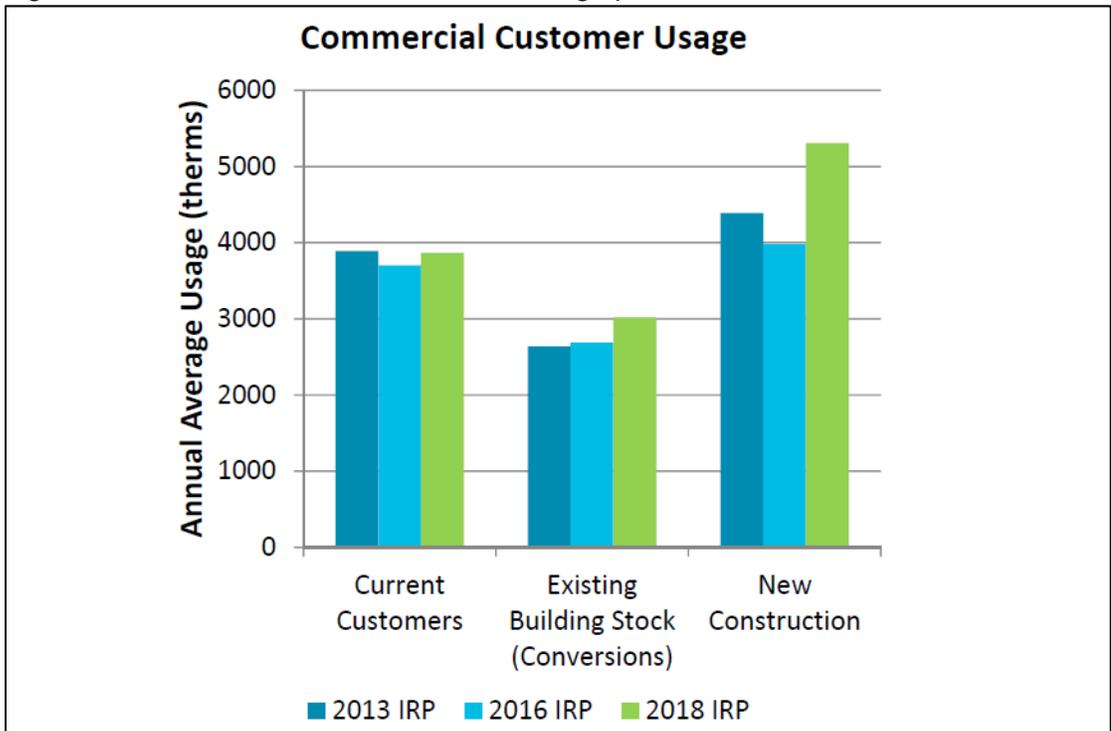
The Company is projecting higher future commercial customer usage as compared to the 2016 IRP.¹⁵ The largest increase is forecasted in new construction. Staff will work with NW Natural to understand and verify the assumptions and analysis behind this result.

¹³ NW Natural 2018 Integrated Resource Plan at 1.5.

¹⁴ NW Natural 2018 Integrated Resource Plan at 3.9.

¹⁵ Ibid at 3.21.

Figure 4: First Year Commercial Annual Usage per Customer



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- Interaction effects utilized in the daily system load model

For the 2018 IRP, the Company has incorporated nine interaction effects between variables in the daily system load model.¹⁷ An interaction effect is captured by an interaction term in forecasting. An interaction term should be included when the forecaster believes that the impact of one variable on demand varies depending on the value of another variable. For example, a change in wind speed may not have much of an impact on demand for natural gas when temperatures are warm, but when it is cold, the same change in wind speed may have a significant effect on how much natural gas is used for heating. Staff understands that interaction effects may have value in energy forecasting. However, model overfitting and other issues can be caused by regression models having too many terms for the given number of observations. Staff is working to verify that the inclusion of each interaction term in the daily system load model is a reasonable and meaningful addition to the model.

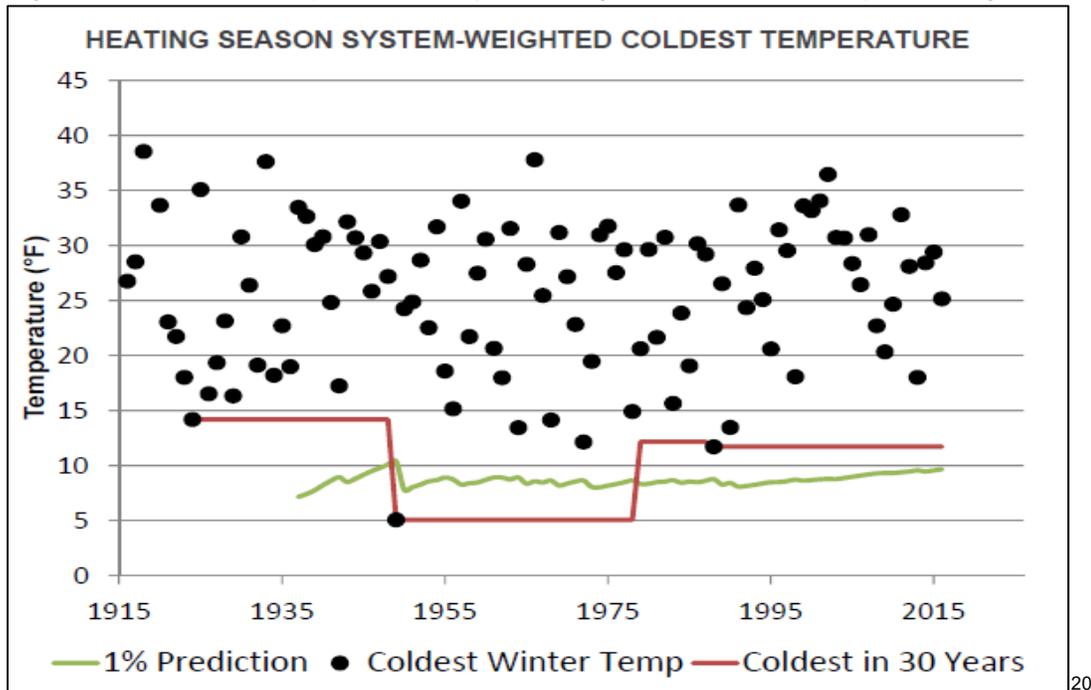
¹⁶ Ibid at 3.21.

¹⁷ Ibid at Appendix C.7.

- Capacity Planning Standard

In the 2018 IRP, NW Natural is changing how it approaches its capacity planning standard. The Company has transitioned to a statistical planning methodology to “...serve the highest firm sales demand day in each gas year with 99% certainty”.¹⁸ Previous IRPs used a standard based on a rolling 30 years of weather and non-weather variables. However, NW Natural has proposed a new methodology in order to reduce instability in planning resulting from the introduction of new record cold days into the rolling 30-year time period or from record-cold days falling off of the rolling 30-year time period.¹⁹

Figure 5: Coldest-in-30-year Capacity Planning versus 1% Capacity Planning



Although Staff has some reservations about NW Natural’s proposed changes to the Capacity Planning Standard, Staff concurs with the Company that dramatic shifts in capacity planning standard are likely not optimal for the Company or for ratepayers. To demonstrate this issue, if NW Natural continued to use the “coldest-in-30-years” planning standard, then the coldest day in 30 years would increase from about 11 degrees in 2016 to about 18 degrees in 2020. A plan that seemed reasonable in 2014 would, in 2020, appear to completely over-estimate the amount of needed capacity, just because the two coldest days in recent history are no longer part of the 30-year planning standard.

NW Natural’s new approach to Capacity Standard Planning in this IRP would prepare the Company to meet demand during 99 percent of the highest demand days in each year beginning in 1916.

¹⁸ Ibid at 3.38.

¹⁹ NW Natural 2018 Integrated Resource Plan at 3.39.

²⁰ NW Natural 2018 Integrated Resource Plan at 3.40.

Staff supports the Company's goal of reducing large shifts in capacity planning standards from one IRP to the next. However, Staff believes that the Company should consistently use a planning standard based on the last 50 or fewer years of data on a rolling basis. Staff does not oppose using a percentile-based planning standard, as proposed by NW Natural. To address similar concerns in the Cascade Natural Gas (Cascade) 2018 IRP filing, Staff suggested that Cascade consider a statistical method such that the annual peak usage is predicted through a 99 percent chance that firm resources can meet the peak usage day requirements in a given year.²¹ However, Staff proposes that the standard should utilize historical data beginning in 1966 or later, instead of 1916 because 50 years of data is enough to establish a stable planning standard. By contrast, using data from more than one hundred years ago on an accumulating basis, as proposed by NW Natural, would represent a failure to consider the potential for changes in weather patterns over time. The planning standard should allow for the possibility that the weather patterns of the next quarter century may not be accurately represented by the statistical distribution of weather from over one hundred years ago. Using data on a 50-year, rolling basis solves the issue of large shifts in the standard from one IRP to the next, while providing more relevant estimates if weather patterns change over time. NW Natural addressed some of Staff's concerns on this topic in Appendix K. Staff will continue to work with the Company to evaluate and suggest refinements to the Capacity Planning Standard.

- Allocation of annual customer forecasts to monthly values to facilitate peak load forecasting

NW Natural's residential and commercial customer forecasts utilize annual data since a longer history of customer counts are available on an annual basis than on a monthly or quarterly basis. However, the Company's peak load forecast require monthly forecasts of customers. The statistical models used to transform the annual customer forecasts to monthly forecasts are provided in appendix C of the 2018 IRP.²² Staff will work with NW Natural to explore whether alternative historical data sources exist that could improve the Company's annual to monthly transformation.

- Econometric modeling approach

NW Natural developed econometric models to forecast customer counts and usage per customer in the 2018 IRP. Staff appreciates the effort the Company put forth in developing and analyzing four approaches to forecasting total number of customers, including one approach following Staff's recommendation to explore the use of load center-specific data²³. Before Staff files its final comments in this docket, Staff will confirm that the models ultimately chosen include appropriate key variables, do not exclude key variables, and appropriately specify the empirical model's error structure. Additionally, with regard to forecast performance, Staff will check that the Company's forecast is not outperformed by other models that include appropriate explanatory variables and specifications of the error structure.

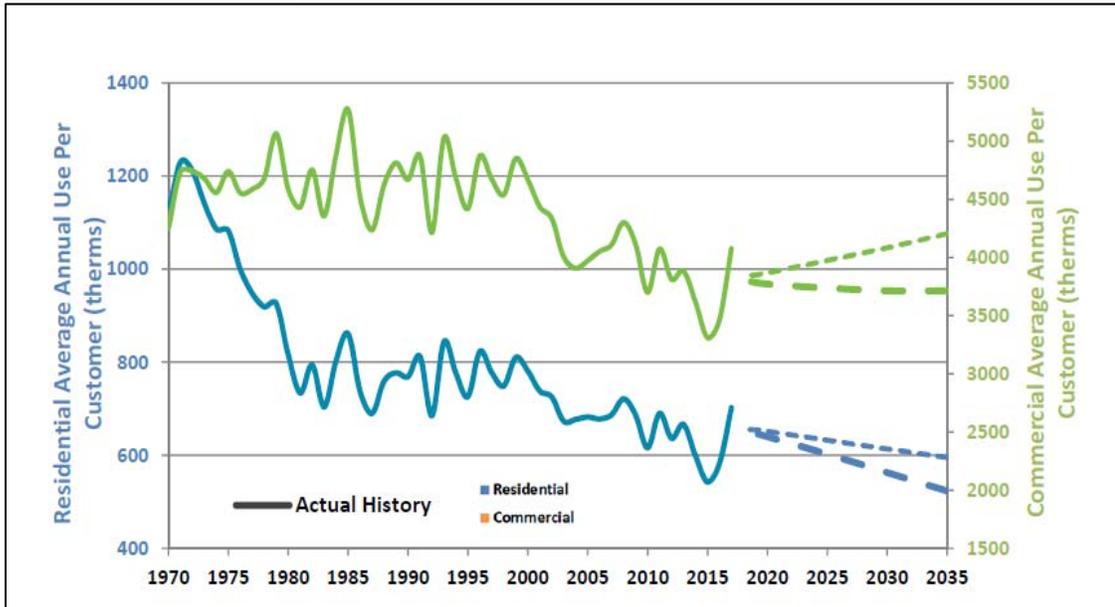
²¹ LC 69, Cascade Natural Gas. Staff's Opening Comments, Page 4. (April 6, 2018).

²² NW Natural 2018 Integrated Resource Plan at C.3.

²³ See Appendix A in Order No. 17-059 in LC 64 at 4.

- Annual Use per Customer Trend
NW Natural's 2018 IRP gives a view of NW Natural's residential and commercial average use per customer before and after incentivized demand-side management (DSM) savings:

Figure 6: Trend in Use per Customer With and Without DSM



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Staff will review the Company's methodology in applying both 1) the incentivized DSM savings to the forecasted average use per customer and 2) the non-incentivized annual use per customer trend added as a time variable to the regressions for both the base load and the heat load.

Staff Request(s) for NW Natural: In future IRPs, the Company should utilize a statistical approach to the Capacity Planning Standard based on serving the first percentile of highest use days over 50 years on a rolling basis, instead of over 100 years on an accumulating basis.

Avoided Costs

Description

NW Natural's 2018 IRP includes a 20-year avoided cost forecast. Avoided Cost represents the cost that would be avoided if the utility was not required to serve the next marginal unit of gas to customers. Avoided Costs are used by NW Natural to help set the cost-effectiveness threshold for energy efficiency. In the 2018 IRP, NW Natural made changes to its avoided cost calculations. Currently, the company uses six elements to calculate the total avoided cost.

These elements are:

- natural gas purchases;
- greenhouse gas compliance costs;
- commodity price risk reduction value;

²⁴ NW Natural 2018 Integrated Resource Plan at 3.22.

- supply capacity costs;
- distribution system costs; and
- 10 percent credit for energy efficiency.

In the 2018 IRP, the Company made a few changes to the avoided cost elements and how these avoided costs were applied. These methodology changes are as follows:

- Applying hourly peak load impacts on distribution costs.
 - The Company worked with Energy Trust to incorporate a peak contribution value for energy efficiency.
- Adding three additional end uses for individual cost analysis.
 - This provides additional granularity and planning capability by considering more distinct categories of natural gas use.
- Applying avoided costs not just to demand-side resources, but also to on-system resources and low carbon supply-side resources to represent their relative avoided cost value against other supply-side resources.
 - This is a strategy to compare unconventional resource options with conventional ones.
- Using different assumptions about greenhouse gas emissions regulations.
 - The Company updated its predictions on likely regulatory outcomes and separated GHG compliance costs from other costs.

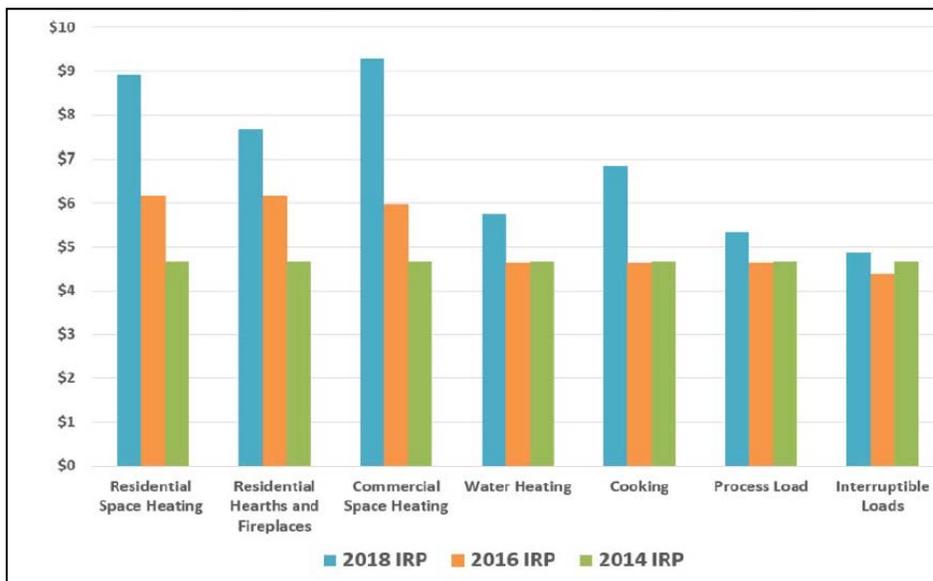
Analysis

Staff appreciates the following important considerations regarding Avoided Costs that are included in NW Natural's 2018 IRP:

- NW Natural's work with Energy Trust that led to incorporating peak hour load impacts into the avoided cost analysis.
- The additional breakout of avoided cost by end use. Such information could be used to target certain end uses for more cost-effective impacts, namely, space heating.
- NW Natural's approach to establishing its distribution capacity costs, which uses capital expenditures on reinforcements.
- The thoughtful question NW Natural raises about the applicability of the 10 percent Power Council Credit to supply side resources and looks forward to future discussions on this topic.

After updating costs and methodology, NW Natural's avoided costs are higher in the 2018 IRP. As avoided costs have a direct impact on what is considered cost-effective, an increase in avoided costs will cause more energy efficiency options to be considered cost-effective, increase energy efficiency targets, and allow higher incentives to be paid for an energy efficiency measure. The graph below illustrates the magnitude of the avoided cost increase over previous IRPs.

Figure 7: NW Natural Avoided Costs in 2018, 2016, and 2014²⁵



Avoided Cost Drivers and Impacts: Topics for Further Investigation in the 2018 IRP

While many elements are well described in the 2018 IRP, other elements are not as clear. Staff will work to understand the drivers and impacts of the following aspects of the avoided cost methodology and the resulting avoided costs, and will report on any findings in its final comments:

First, Staff notes quite a number of differences in how avoided costs are summarized in the 2018 IRP as compared to the 2016 IRP. These changes make it difficult to directly compare avoided costs between IRPs. Staff will look further into any major changes from the 2016 IRP, including:

- The lack of a “base load” estimate of avoided costs;
- Carbon policy assumptions that are broken out differently between IRPs; and
- The change in hedge value from 7 cents to zero cents.

Second, Staff wishes to better understand NW Natural’s methodology for peak load incorporation. NW Natural provided to Energy Trust a peak-day coincidence factor to value supply capacity based on contracts to supply gas on a daily basis and a peak-hour coincidence factor to value distribution system capacity based on quantified hourly load. Staff will work with NW Natural and Energy Trust to understand this methodology in more detail.

Third, NW Natural’s methodology on infrastructure avoided costs appears to discount the infrastructure avoided cost benefits of industrial energy savings. In Figure 7 above, the industrial end uses (Process and Interruptible Loads) appear to have the lowest avoided cost. Staff wishes to better understand the value of these in relation to other end uses.

Fourth, Staff notes major increases to the Distribution System Resource values. The past values ranged from \$0.04-\$0.28/Dth in 2015 dollars for Oregon. This IRP estimates up to \$2.74/Dth in 2017 dollars.

²⁵ NW Natural 2018 Integrated Resource Plan at 4.13.

Fifth, Staff is interested in the impact of breaking out three additional end uses. How were the new end uses developed? What were the differences in peak load impacts between the new end uses and the old end uses? How will this new breakout of costs be used in the future?

Finally, Staff wishes to understand more about the application of avoided costs to supply-side resources. Is this a matter of rearranging resource costs that were used in the past, or are additional costs applied to these resources?

Staff Request for NW Natural:

Staff requests that NW Natural provide work papers detailing the Company's methodology for peak load incorporation, new end uses, and changes to distribution system resource values.

Demand Side Resources

Description

NW Natural worked with Energy Trust to refine the forecast of Demand Side Management (DSM) potential from that used in previous IRPs. The methodology was updated to include an adder representing hard-to-predict large energy efficiency projects, the development and incorporation of peak-hour savings, and updates to the list of energy efficiency measures, including new technologies. These, in combination with increased avoided costs, resulted in a 59 percent increase in NW Natural's predicted DSM resource potential from the 2016 IRP. NW Natural also performed a sensitivity analysis on different carbon price and deployment ramp rate scenarios.

Staff appreciates NW Natural's collaboration with Energy Trust that resulted in better and more granular forecasts of DSM potential.

Staff would note that there was no mention of the "Targeted DSM" pilot, an action item from NW Natural's 2016 IRP. The pilot has seen delays and the workshop is behind schedule.

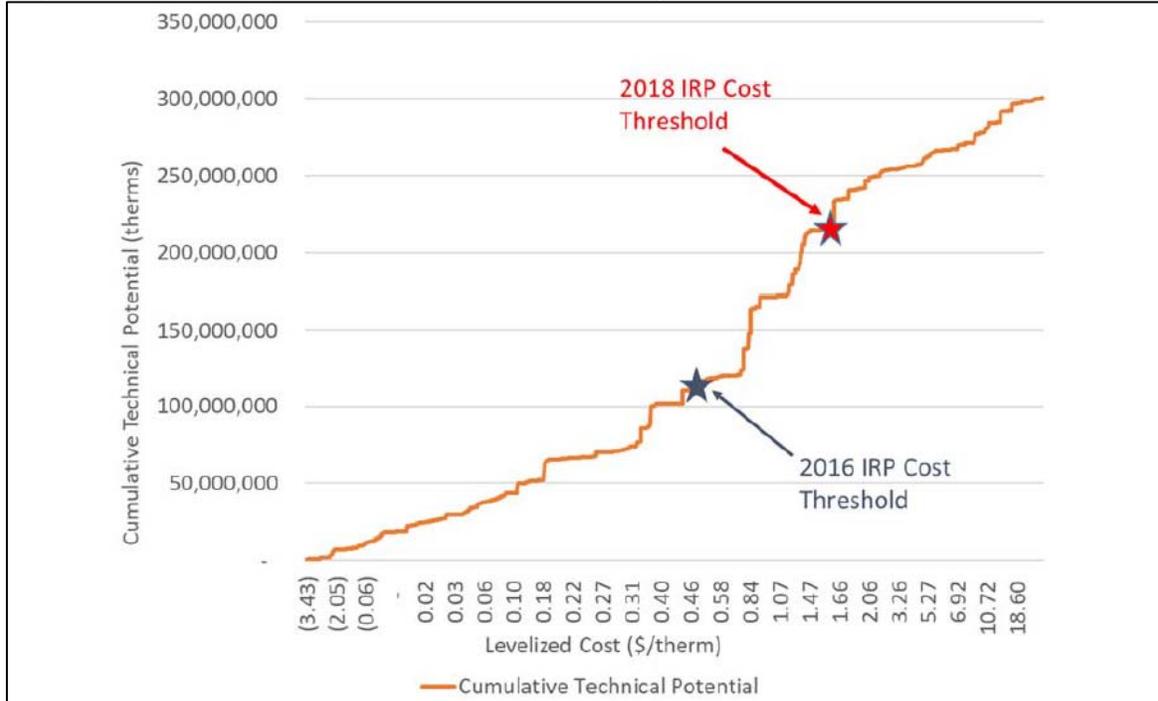
NW Natural used five scenarios in a sensitivity analysis for DSM potential, testing the impacts of changing the CO2 cost and the "ramp rate" for energy efficiency—how quickly energy efficiency measures can be deployed. The five scenarios are:

- Base case with base CO2 and base ramp rates,
- Low CO2 adder with base ramp rates,
- High CO2 adder with base ramp rates,
- Low ramp rates with base CO2 adder, and
- High ramp rates with base CO2 adder.

However, because NW Natural did not conduct a complete matrix of carbon scenarios between the two variables, it is difficult to compare the represented cases.

Finally, as illustrated in Figure 8 below, the increase in proposed avoided cost results in a significant impact on how much DSM can be acquired and what measures can be incented.

Figure 8: NW Natural Technical Achievable Savings Potential Supply Curve



Analysis

Staff has questions about a number of topics that affect DSM potential:

Staff must gain to learn more information from the Company about the role of new technologies in the DSM forecast, for example: to what extent do the ten emerging technologies in Section 5²⁶ overlap with the new technologies listed in Chapter 2?²⁷ Further, how much of the increased savings seen in the 2018 IRP reflect market transformation activities?

Staff is also interested in the mix of energy efficiency end uses for the newly cost-effective technologies. Figure 8 shows the impact of an increased avoided cost on the quantity of savings and how many measures will become cost-effective as a result of the change in avoided cost. Staff will look further into what kinds of measures are affected and at what costs.

Staff appreciates the inclusion of gas megaprojects and must learn more. Staff is concerned that these megaprojects may be undervalued using the Company’s updated avoided cost methodology. Large-scale and permanent reductions of industrial gas use leave capacity available at all times, including at peak times. Staff would like to see a list of the past five megaprojects and their corresponding annual reduction in gas use.

Regarding the scenarios for sensitivity analysis, Staff would like to know what led to the choices of these scenarios for energy efficiency sensitivities. Staff would have expected to see the ramp rate scenarios and carbon scenarios to be combined, but they are not. Staff also notes that low ramp rates appear unlikely given Energy Trust’s past performance, which led the Company to request changes to mitigate the underestimation of savings acquisition in the 2018 IRP.

²⁶ NW Natural 2018 Integrated Resource Plan at 5.15.

²⁷ NW Natural 2018 Integrated Resource Plan at 2.30.

Staff Request(s) for NW Natural: The Company submit a list of past megaprojects and their corresponding annual reduction in gas use.

Staff also notes that the end uses in Figure 5.5²⁸ do not correspond to the end uses in the Avoided Cost chapter and therefore requires additional Company discussions about how the end use information in Chapter 4 will be used to direct DSM acquisitions.

Supply Side Resources

Supply-side resources include both the gas NW Natural provides to customers and the pipeline capacity, storage options, and other infrastructure that help deliver the gas to customers. In the 2018 IRP, NW Natural considers traditional supply side resources, as well as Renewable Natural Gas (RNG) and Power to Gas (P2G) options.

There are minimal supply-side resource investments for which NW Natural is seeking acknowledgement in the Action Plan. Staff recommends NW Natural use this as an opportunity to continue to develop discussion around the potential future supply-side resource investments presented in Chapter 6 of the 2018 IRP. This could be both in providing more detail for the options presented, but also providing detailed reasoning for why these options are the best path forward. Staff wants to ensure that NW Natural considers all available options and selects that which is the best combination of least-cost and least-risk.

Staff submitted information requests (IRs) relevant to the following topics in order to gain further insight and background into the potential future supply-side investments the Company explores in the 2018 IRP. NW Natural has responded to Staff's requests, and Staff looks forward to continuing to work with the Company on these topics.

Staff commends NW Natural's consideration of a variety of resources to serve customers and mitigate risks over the long-term. Staff has identified a few potential areas of concern and further inquiry regarding Supply Side Resources presented in the IRP.

Storage Projects

First, as shown in Table 1 below, firm storage resource rates are reported in Dth/day.

Table 1: Firm Storage Resources as of November 2017

Facility	Maximum Daily Rate (Dth/day)	Maximum Seasonal Capacity (Dth)
Mist (reserved for Core)	305,000	11,382,120*
Newport LNG ⁵	65,280 *	761,600 *
Portland LNG ⁶	131,880 *	371,902 *
Jackson Prairie	46,030	1,120,288

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²⁸ NW Natural 2018 Integrated Resource Plan at Page 5.14.

²⁹ NW Natural 2018 Integrated Resource Plan at Page 6.7.

Staff notes that the values marked with an asterisk in Table 1 have been converted to Dth/day from volumetric units using heat content conversion factors for the facilities. Heat content for each the facilities will vary based on the quality of gas. However, NW Natural is apparently using different heat content conversion factors for the same facilities in different parts of the IRP.³⁰ For example, Facility A might have a value of 1,119 Dth/day in NW Natural's supply side analysis, but a value of 1,009 in the demand analysis. If the factor used is lower in supply side models but higher in demand side, then a significant asymmetry could result. If the actual heat content is higher than modeled heat content, the result could be overbuilding of the system. Conversely if it's lower, NW Natural might be undershooting their resource needs. Because the differences in heat content conversion factors could have a considerable effect on modeling results, Staff is continuing to investigate this issue. Staff has submitted an Information Request for the heat content conversion factors used throughout the IRP and will provide more information in final comments. Staff may ultimately request that either the dollar conversions and/or supply calculations be adjusted, or at least evaluated as a range rather than a single value.

Staff would like to better understand why Jackson Prairie storage was modeled as a firm resource for the full IRP period, providing up to 13,525 Dth/day, given the Company's reasoning that its cost effectiveness is based on offsetting other supply purchases.

Staff is continuing to evaluate the replacement costs for the existing liquefaction and pretreatment systems at Gasco, the Portland LNG plant.³¹ Staff recommends NW Natural provide further detail on other potential future supply-side investments mentioned, such as further explanation behind the "several mechanical and operational issues"³² identified within the Portland LNG Plant (Gasco) in addition to the liquefaction system and cold box heat exchangers detailed in the 2019 IRP, and also what alternatives might be considered besides the replacements mentioned, which currently have a total cost of roughly \$40 million. NW Natural responded to Staff's IR on this topic with a list of other mechanical and operational issues, however, Staff recommends NW Natural provide the additional detail requested in order to be more transparent and allow Staff to complete its analysis. Staff requests that the Company provide detail not just on all issues found, but also on what it would take to resolve each issue, including costs, and finally, how the Company ultimately selected the actions that would cost roughly \$40 million as the preferred solution. Additionally, if these costs are expected to be incurred in the next four years, Staff requests that the Company file an updated Action Plan with these costs included.

In Chapter 6 Section 6, the Company notes that it is planning to conduct a study to determine the best solutions to address the issue with inefficiently sized reciprocating compressors at Miller Station to serve current flow conditions and operations at Mist. The study is expected to be completed in 2019 and would have a total cost of \$600,000. The first phase of compressor replacement, if necessary, could start as early as 2020. Staff requests that NW Natural re-file its Action Plan with the Miller Station study included as an action item.

Renewable Natural Gas

Staff commends NW Natural for beginning to evaluate RNG resources as part of the IRP process. RNG is presented as a potential future low carbon resource through the consideration of five RNG scenarios mentioned in Chapter 6 Section 7.³³ Consideration of the potential cost

³⁰ NW Natural 2018 Integrated Resource Plan at Page 6.7. Footnote 4.

³¹ NW Natural 2018 Integrated Resource Plan at 6.24.

³² NW Natural 2018 Integrated Resource Plan at 6.24.

³³ NW Natural 2018 Integrated Resource Plan at 6.27-6.29.

savings and compliance benefits of low-carbon and on-system resources will likely remain important in resource planning going forward. NW Natural ran several model scenarios, including purchasing RNG from existing projects; purchasing RNG via future long term contract from existing off-system projects; and developing RNG production at existing wastewater treatment plants. Staff appreciates NW Natural's proactive consideration of cost and risk with respect to these resources.

The five scenarios presented in the IRP are based on the Company's "understanding of the regional RNG market," and Staff is interested in obtaining further detail and background for why each of the five RNG scenarios were selected for evaluation in the 2018 IRP. Additional detail may also help in developing a greater number of or alternative RNG resource options that could be evaluated in future IRPs.

NW Natural provided a response to Staff's IR on this topic, explaining that the reason the five scenarios were selected was that they mirror the real and potential RNG projects that the Company is aware of in the region. The Company also detailed that these projects reflect project cost information from project developers and digester owners, while information about the market value of RNG purchases by the Company are derived from quotes and conversations gathered from RNG producers and RNG marketers, as well as federal and state data on trading values and volumes of federal and state credits. While Staff agrees with the Company acquiring information from these sources, Staff also points out that NW Natural itself notes in the IRP that the current RNG market and associated credit prices are volatile and change daily.³⁴ Staff encourages NW Natural to continue to investigate RNG as a potential supply-side resource, but given the current regulations (or lack thereof), as well as the infancy of the RNG market, Staff agrees with NW Natural's decision not to necessarily procure this resource as of yet. Staff addresses NW Natural's request for acknowledgement of a RNG evaluation and procurement methodology later in these comments.

Power to Gas

Staff also commends the consideration of Power-to-Gas (P2G) as a resource and finds that NW Natural's estimated costs to construct P2G projects are in line with other industry estimates. In general, NW Natural's consideration of the cost effectiveness of P2G is appropriate, and demonstrates the Company's commitment to evaluating all available resource options.

Staff would like to ensure the Company is evaluating all options in a robust way and therefore seeks some further information regarding assumptions on how power to gas is evaluated. For example, the Company details in Chapter 6 Section 8.4 that "the availability of low-cost (or no-cost) electricity directly affects a [power to gas facility's] utilization factor and overall economics."³⁵ In its analysis of this resource, the Company assumes that electricity "feedstock" prices are zero with the reasoning that prices can fall low in the Pacific Northwest in springtime as snowmelt increases to replenish hydro and electricity demand decreases with warmer weather. However, no clear explanation is given as to why the price is assumed to be zero, an assumption which would make power to gas a more viable option. NW Natural also does not indicate how much zero-priced energy it assumes to be available or why the assumed amount is a reasonable estimate.

The Company has responded to Staff's IR on the topic of zero-priced energy, noting that no specific renewable resource is implied by these assumptions, and if purchased on the electricity spot market, the generation source would not be identifiable either. Power purchasing contracts

³⁴ NW Natural 2018 Integrated Resource Plan at H.7.

³⁵ NW Natural 2018 Integrated Resource Plan at 6.35.

are also noted as an option and would be considered once power-to-gas is a practical supply option. Staff is interested in continuing to work with the Company and gain further detail behind the zero-price electricity assumption and how it may impact the viability of power to gas in future IRPs. Staff is concerned about the actual availability of this low-cost power to a non-electric utility and potential future competition for this power from quickly proliferating energy storage devices, such as Lithium-Ion batteries. NW Natural's IR response also notes that "low and negative electricity prices are likely to occur more often in the future as more renewable generation comes onto the grid, particularly non-dispatchable generation." Moving forward, Staff is interested how the Company plans to continue to investigate this. Staff's objective is simply to ensure that the IRP Guidelines are followed and that all resources are evaluated on a consistent and comparable basis. Staff would like to better understand the zero-price electricity assumption for whether or not this is realistic. Staff is concerned that this assumption could result in an IRP that unfairly favors the power to gas technology in this IRP, or in future IRPs.

Future Resource Alternatives

In the 2018 IRP, NW Natural continues its discussion from past IRPs around potentially improving the Newport LNG storage facility to enhance its capacity in the future if there is need. NW Natural states that the improvements to the Newport plant to deliver an additional 40 MMcf/day have historically been modeled in a single increment, referred to as the Christensen Compressor project (CCP) in the 2016 IRP. However, in the 2018 IRP it is broken into three phases. Both cases have the same desired outcome of reaching 100 MMcf/day capability through infrastructure additions to the Newport to Salem pipeline (Central Coast feeder). The cost to complete the three phases in the 2018 IRP appears to be a significant increase compared to the cost of the CCP, which was estimated at \$30 million in the 2016 IRP on page 119. Comparatively, the completed cost of the three phases of the 2018 IRP total \$71-86 million. Staff uses this as an additional example of a place where NW Natural must provide more detail and explain the reasoning for both this new method for phasing in the improvements, and what changed to cause the cost estimate to nearly triple compared to the last IRP. NW Natural responded to Staff's IR on this topic, stating that additional design and updated estimation based on more recent knowledge is what caused the cost estimate for the pipeline takeaway capacity from the Newport LNG facility to increase substantially. Staff recommends that the Company include more detail in the future within an IRP Initial Filing to better explain changes from one IRP to the next.

Conclusion

At this stage of the investigation into NWN's 2018 IRP, Staff will continue to work with the Company to gain further insight into the changes between this IRP and the last, and the possibility of supply-side resource investments to be part of an Action Plan in a future IRP cycle. Staff will discuss this topic further in final comments.

Staff Request(s) for NW Natural: Staff requests that if NW Natural expects it will probably incur significant expenses at the Portland Gasco LNG Plant in the next four years, the Company file an updated Action Plan detailing the expenses that NW Natural sees as likely or as likely contingent on the results of third-party analysis.

Staff requests that NW Natural re-file its Action Plan with the Miller Station study included as an action item.

Portfolio Selection

Staff is appreciative of the variety of potential future events considered in the 2018 IRP. Staff generally considers the portfolio selection methodology in the 2018 IRP to be sound, but will continue to assess the specific underlying modeling assumptions used throughout the analysis. Staff is specifically looking into the Capacity Limitations assumptions for RNG utilized in portfolio modeling. The Company states that on-system diary renewable natural gas (RNG) resources are limited to 3,000 Dth/Day for the purposes of portfolio selection modeling.³⁶ The capacity limitations are based on NW Natural's estimated availability for each RNG resource. The Company explained to Staff during a phone conference that the recent Oregon Department of Energy (ODOE) report on the technical potential of RNG is unlikely to change the modeling of RNG in the 2018 IRP, but updates to the ODOE report may inform the Company's modeling in future IRPs. Staff will continue to inquire into the Company's current estimation process for RNG resources.

Given significant uncertainty, the Company's portfolio selection process has assessed a variety of assumptions about policy, markets, and other difficult-to-predict events in a rigorous analysis that provides a broad perspective on cost and risk.

Staff Request(s) for NW Natural: A workshop on SENDOUT capacity expansion modeling and Monte Carlo stochastic analysis would be helpful for Staff in evaluating the assumptions as inputs to the 2018 IRP.

Distribution System Planning

Introduction

NW Natural's chapter on distribution system planning (DSP) includes an overview of DSP in the context of NW Natural's gas system. It is well written and very descriptive. The Company includes engineering and computer modeling methods, along with the criteria the Company uses to determine priorities to its system. At the end of the chapter, the Company presents a list of projects it intends to take on, all of which are included in the Action Plan. Together, the cost of the projects total up to over \$65 million.³⁷ The table of projects is represented below:

³⁶ Ibid at 7.9.

³⁷ NW Natural 2018 Integrated Resource Plan at 8.24, all upper-end estimates added together.

Table 2: NW Natural's DSP Proposals

Project	Schedule	Estimated Cost (Millions of \$2017)	Estimated PVRR (Millions of \$2017)
Hood River Reinforcement	2019	\$3.5–\$7.1	\$3.6–\$7.2
Happy Valley Reinforcement	2019	\$2.9–\$4.7	\$3.0–\$4.8
Sandy Feeder Reinforcement	2020	\$15.2–\$21.1	\$14.3–\$19.7
North Eugene Reinforcement	2020	\$5.3–\$10.6	\$5.0–\$9.9
South Oregon City Reinforcement	2020	\$4.1–\$6.2	\$3.9–\$5.8
Kuebler Road Reinforcement	2020–2021	\$14.1– \$19.7	\$13.2–\$18.4
Total		\$45.1–\$69.4	\$43.0–\$65.8

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The Company's justification for each of the projects above varies. Through additional discovery the Company indicated that "each of the distribution projects listed in the Action Plan are required to meet current (as opposed to forecasted) system standards, in response to an observed (as opposed to forecasted) need for reinforcement."³⁹ In other words, each of the projects in the Action Plan are for *current* distribution needs as opposed to forecasted needs.

Additional Justification Needed

For several of the projects in the Action Plan, the Company references extreme weather events in January 2017, which the Company implies triggered a variety of system investment needs. The Company references January 2017 as a key contributing factor for four of the six items in the Action Plan: the Hood River Enforcement project, the Happy Valley Reinforcement project, the North Eugene Reinforcement project, and the Kuebler Road Reinforcement project. The Company does not mention the weather events of January 2017 as a factor influencing the decision to move forward with the Sandy Feeder Reinforcement or the South Oregon City Reinforcement projects.

Upon reviewing the IRP and discovery responses, Staff has initial concerns about these projects. Staff will need additional information and analysis from the Company on the justification for these distribution system projects. Staff inquired into the causes of the outages, particularly under non-peak conditions for the Hood River enforcement. For example, Staff requested that the Company explain why firm service customers in the Hood River area experienced outages in January 2017, under non-peak conditions. The Company was unable to provide a thorough answer, stating that it was still "gathering information about this event to ensure that [it] can provide the details staff has requested."⁴⁰ In a follow-up request, Staff requested that the Company provide this information as soon as possible.

³⁸ NW Natural 2018 Integrated Resource Plan at Page 8.14.

³⁹ See Staff Attachment 01, NW Natural Response to Staff DR 6.

⁴⁰ See Staff Attachment 02, NW Natural Response to Staff DR 9.

While Hood River was the only area cited to have non-peak outages, Staff's need for additional information applies to all other projects listed in the IRP. The IRP should include sufficient data revealing why and how the planned investments are necessary to service customers.

The Company has indicated that the distribution proposals for the Action Plan are for current system needs.⁴¹ Staff requests that the Company provide further clarity around non-peak conditions and peak conditions, provide current data demonstrating the present inefficiencies of its system, demonstrate how it maximized the current capacity of its system, and provide an explanation of why the projects included in the IRP are the least-cost, least-risk option. Staff is certainly not opposed to necessary distribution system upgrades, but the Company has not sufficiently clarified why these upgrades are the best options for customers.

Staff has submitted additional discovery in an attempt to obtain the necessary information. Specifically, Staff has requested that the Company provide pressure recording charts and outage data, with a narrative and references explaining why and how the Company has reached maximum capacity and how all other alternatives were exhausted.

The Company briefly discusses peak resource alternatives to the distribution system investments in its Action Plan: liquefied natural gas (LNG), compressed natural gas (CNG) delivered by trucks, underground storage, and propane air facilities. The Company also mentions that on-system RNG can potentially be used to offset the need for distribution system investments.⁴² The Company reports rejecting all of these alternatives to the proposed distribution system upgrades for various reasons, including cost, safety risk, and "not represent[ing] an adequate alternative for most system reinforcement issues."⁴³ Staff submitted discovery requests for more information on the analysis done by NW Natural on these alternatives. The Company provided spreadsheets with analysis on interruptibility agreements and satellite LNG alternatives, the former of which was determined to provide inadequate therm savings, and the latter of which was determined to be less cost effective than the projects proposed in the Action Plan.⁴⁴ Further, the Company indicated that CNG as an alternative resource was insufficient because mobile solutions "cannot deliver adequate volumes of gas" to serve the Company's current distribution system needs.⁴⁵

Staff also notes that the Company included an item in its 2016 IRP Action Plan to work with the Energy Trust of Oregon to "further scope a geographically targeted DSM pilot via accelerated and/or enhanced offerings ("Targeted DSM" pilot) to measure and quantify the potential of demand-side resources to cost-effectively avoid/delay gas distribution system reinforcement projects in a timely manner and make a Targeted DSM pilot filing with the Oregon Public Utility Commission (OPUC) in late 2017 or early 2018."⁴⁶ However, the pilot has seen delays and the workshop is behind schedule.

Staff can appreciate the complexity in determining the right balance between appropriate alternatives that provide safe and reliable service while balancing cost and risk. However, additional information supporting the items in the Action Plan must be provided for Staff to verify whether the proposed Action Plan is indeed a least-cost, least-risk path forward for the Company.

⁴¹ See Staff Attachment 03, NW Natural Response to Staff DR 8.

⁴² NW Natural 2018 Integrated Resource Plan at 6.28.

⁴³ NW Natural 2018 Integrated Resource Plan at 8.9.

⁴⁴ See Staff Attachment 03, NW Natural Response to Staff DR 8.

⁴⁵ See Staff Attachment 04, NW Natural Response to Staff DR 4.

⁴⁶ NW Natural 2016 Integrated Resource Plan at 1.18.

In an Information Request, Staff asked the Company what assumptions it used to determine the necessity of the projects and whether the Action Items it proposes represent the best, least-cost/least-risk options. The Company responded that “[t]he Company’s distribution system planning methodology does not attempt to forecast the likelihood that customer outages may occur...[Its] system reinforcement standards (see IRP pages 8.5 and 8.6) indicate when it is appropriate to initiate a project and none of the indicators rely on an assumption of customer outages.”⁴⁷ This does not really answer Staff’s question and the Company should provide additional support for this portion of its Action Plan in its reply comments.

Overall, Staff does appreciate the work the Company has done to respond to Staff’s Information Requests regarding the distribution system investments. The Company has also reached out to Staff and offered an additional workshop to walk through its distribution system planning. The workshop was held on Wednesday, October 10. Staff appreciates the further clarity on distribution system planning and investment provided at the October 10th workshop. However, to date, the Company’s IRP still lacks a strong enough case for Staff to recommend acknowledgement of \$65 million in distribution projects. None of the projects or needs presented in the Action Plan have been referenced in prior IRPs. Staff can recognize that extreme weather events may reveal needs or weaknesses previously unknown, but needs more compelling evidence for why a significant investment is warranted. Staff awaits the Company’s further responses to Staff through discovery and Reply Comments. Staff is particularly looking for additional support for the Action Plan, explanation and data showing how the Company determined that its system has reached maximum capacity, and a description of how all alternatives were considered and ruled out.

Staff’s Request(s) for NW Natural:

The Company should, in its Reply Comments, provide additional detail explaining the deficiencies in its system that result in the need for substantial distribution system investments, referencing documentation and filing information as necessary for Staff to verify that any other options have been thoroughly assessed. As the Company reports that its distribution system investment plans are based on current need, the Company should be able to readily provide additional empirical information beyond the Synergi results presented in the IRP.

Additionally, Staff requests that the Company provide further clarity around the capabilities of the distribution system in the areas where the Company is requesting acknowledgement of distribution system investments. Specifically, Staff requests further information on non-peak conditions and peak conditions, current data demonstrating the need for investment to improve the distribution system, a demonstration of how the Company maximized the current capacity of its system, and continued explanation and verification of what makes the projects included in the 2018 IRP the least-cost, least-risk option.

Renewable Gas Supply Resource Evaluation Methodology

NW Natural is seeking acknowledgment in the Action Plan to use the methodology detailed in Appendix H to evaluate renewable natural gas (RNG) resources against conventional sources based on all-in costs, where all-in costs are defined as:

All-in costs = Net Present Value ([cost for delivered gas] + [net GHG emissions

⁴⁷ See Staff Attachment 03, NW Natural Response to DR 8.

intensity*Cost of GHG Emissions Compliance] – [avoided supply capacity costs] – [avoided distribution capacity costs]).

Discussion

Staff appreciates NWN's leadership in presenting "an application of the existing least cost and least risk resource planning framework to evaluate low carbon gas resources on an apples-to-apples basis against conventional gas resources."⁴⁸ While Staff is open to NW Natural's proposed RNG evaluation methodology, Staff believes more time is needed to fully understand the proposed method and evaluation process that the Company notes could potentially take place outside of the IRP process.

Staff is seeking further explanation from NW Natural regarding its proposed RNG evaluation methodology. The Company has not provided sufficient explanation of why it seeks to acquire RNG when there are currently no regulations in place or proposed that mandate such a requirement, or how the Company plans to account for any risks associated with the timeframe of actual greenhouse gas regulation versus the predicted date of such regulation. Relatedly, Staff is interested in further explanation of how the Company's proposed methodology will be included in the Purchased Gas Adjustment filings, where the costs of gas purchases are included into NW Natural rates.

This specific Action Plan item was not discussed during any of the technical workshops. Staff is concerned that acknowledgement of the RNG methodology and procurement process might lead NW Natural to believe it has pre-approval for procuring a resource at potentially high costs, and assume a guaranteed return on any capital investment. While the Company can and should make purchases as it finds necessary, it is well-established at this Commission that acknowledgement of an action item in an IRP docket is not a ratemaking decision. The Commission has explained that a "decision to acknowledge or not acknowledge an action item does not constitute ratemaking. The question of whether a specific investment made by a utility in its planning process was prudent will be fairly examined in the subsequent rate proceeding. Acknowledgment, or non-acknowledgment, of an IRP is a relevant but not exclusive consideration in our subsequent examination of whether the utility's resource investment is prudent and should be recovered from customers."⁴⁹

NW Natural's 2018 IRP notes that project developers can command ten times (or greater) the price of conventional gas in the current RNG market and the Company is looking to use their proposed evaluation methodology in order to offer more competitive prices. These prices would be above what the Company currently pays for conventional gas resources in order to secure RNG.⁵⁰ Staff plans to work with the Company in verifying whether this plan fits within the IRP guidelines of least-cost, least-risk planning before considering a recommendation for acknowledgement. As there are currently no regulations in place requiring any low carbon fuels on NW Natural's system, Staff will need to ascertain that the RNG resources are highly likely to be a least cost resource in a variety of realistic futures.

Staff is also has further questions about the potential for NW Natural to propose RNG projects through the process laid out in Senate Bill 844 as a means to test new methods to enter into this market with potentially fewer long-term risks to ratepayers. This bill was specifically enacted to incentivize voluntary emission reduction measures by public utilities that furnish natural gas.

⁴⁸ NW Natural 2018 Integrated Resource Plan at H.1.

⁴⁹ Docket No. LC 66, Order No. 17-386 at 4 (Oct. 9, 2017).

⁵⁰ NW Natural 2018 Integrated Resource Plan at H.9.

Noted in Appendix H of the IRP is the rapid growth of the RNG market and the Company's statement on page H.7 that the value of selling RNG into the market is significant but that the markets are highly volatile and subject to significant and potentially daily swings in credit value. Given that the market is highly volatile and NW Natural has no need to procure a more expensive resource, Staff believes there is more work to do to ensure that any procurement of RNG is a least cost, least risk resource for customers. Staff is particularly interested in gaining further insight into the Company's reasoning for approaching the assessment of RNG through this methodology, especially in context of SB 844.

Staff would also like to better understand how potential RNG projects are evaluated compared to the method used for other supply-side investments considered in the IRP. The IRP guidelines state that "all resources must be evaluated on a consistent and comparable basis."⁵¹ Staff would like to understand if there are similar or equivalent variables shared between the Company's avoided cost calculations and the proposed formula for assessing RNG projects.

In addition to the evaluation method and procurement process, the Company is also seeking acknowledgement of the criteria involved in the calculation and the component descriptions, as well as a component definition fill-in sheet. Staff submitted information requests (IRs) to gain further insight into the assumptions and definitions of variables used by the Company in the RNG evaluation methodology, and also requested an example case where RNG proves to be cost-effective. While the Company has responded to Staff's requests, it is unclear how each variable is impacting the cost-effectiveness of RNG as Staff did not find information in NW Natural's response on the value assumed for each variable, nor a working example including formulas of the calculation. Staff appreciates NW Natural's work responding to Staff Information Requests and providing more detail on the RNG methodology at the October 10 Staff workshop. Staff believes an additional RNG methodology workshop may be a helpful format for the Company to walk through the calculation and how it intends to use it for decision-making in the future. Staff looks forward to continuing to work with NW Natural on this topic.

In sum, Staff is uncertain if applying the methodology in Appendix H to evaluate resources outside of the IRP is the appropriate way in which to evaluate this resource. At this stage of the investigation into NW Natural's 2018 IRP, Staff is continuing to work with the Company to gain further insight into the reasonableness of the assumptions in the all-in cost methodology and the appropriateness of its application for evaluating RNG resources outside of the IRP process. In any case, Staff emphasizes that acknowledgement in an IRP of a methodology is not a pre-approval nor a determination of prudence, but would only indicate whether the Commission sees the proposed methodology as a reasonable way to proceed. Staff will discuss this topic further in Final Comments.

Staff Request(s) for NW Natural: Staff believes an additional RNG methodology workshop may be a helpful format for the Company to walk through the calculation and how it intends to use it for decision-making in the future.

Conclusion

Staff appreciates the Company's work on the 2018 IRP and its continuing willingness to work with stakeholders. To summarize Staff's requests for NW Natural at this point in the process:

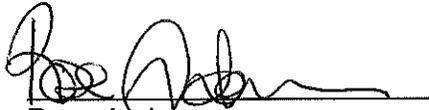
⁵¹ Order No. 07-002.

- In future IRP's, Staff would like NW Natural to provide an update for current energy-savings analysis for each new technology by including the total resource cost and the utility cost test for each new technology initiative, the estimated savings contribution to near- and long- term savings potential, along with the criteria used to gauge success and failure of new technology.
- In future IRPs, the Company should utilize a statistical approach to the Capacity Planning Standard based on serving the first percentile of highest use days over 50 years on a rolling basis, instead of over 100 years on an accumulating basis.
- Staff requests that NW Natural provide work papers detailing the Company's methodology for peak load incorporation, new end uses, and changes to distribution system resource values.
- The Company submit a list of the past five megaprojects and their corresponding annual reduction in gas use.
- Staff also notes that the end uses in Figure 5.5⁵² do not correspond to the end uses in the Avoided Cost chapter and therefore requires additional Company discussions about how the end use information in Chapter 4 will be used to direct DSM acquisitions.
- Staff requests that if NW Natural expects it will probably incur significant expenses at the Portland Gasco LNG Plant in the next four years, the Company file an updated Action Plan detailing the expenses that NW Natural sees as likely or as likely contingent on the results of third-party analysis.
- Staff requests that NW Natural re-file its Action Plan with the Miller Station study included as an action item.
- A workshop on SENDOUT capacity expansion modeling and Monte Carlo stochastic analysis would be helpful for Staff in evaluating the assumptions as inputs to the 2018 IRP.
- The Company should, in its Reply Comments, provide additional detail explaining the deficiencies in its system that result in the need for substantial distribution system investments, referencing documentation and filing information as necessary for Staff to verify that any other options have been thoroughly assessed. As the Company reports that its distribution system investment plans are based on current need, the Company should be able to readily provide additional empirical information beyond the Synergi results presented in the IRP.
- Additionally, Staff requests that the Company provide further clarity around the capabilities of the distribution system in the areas where the Company is requesting acknowledgement of distribution system investments. Specifically, Staff requests further information on non-peak conditions and peak conditions, current data demonstrating the need for investment to improve the distribution system, a demonstration of how the Company maximized the current capacity of its system, and continued explanation and verification of what makes the projects included in the 2018 IRP the least-cost, least-risk option.
- Staff believes an additional RNG methodology workshop may be a helpful format for the Company to walk through the calculation and how it intends to use it for decision-making in the future.

⁵² NW Natural 2018 Integrated Resource Plan at Page 5.14.

This concludes Staff's Opening Comments.

Dated at Salem, Oregon, this 15th day of October, 2018.

A handwritten signature in black ink, appearing to read 'Rose Anderson', written over a horizontal line.

Rose Anderson
Senior Utility Analyst
Energy Resources and Planning Division

**Rates & Regulatory Affairs**

LC 71

Integrated Resource Planning

Data Request Response**Request No.:** LC 71 OPUC DR 6

6. See pages 8.12 and 8.13 of the IRP, Peak Hour Loads.

a. See Table 8.1. Is this an exhaustive list of areas where the Company calculates peak hour load forecasts? Are the projects in the Action Plan located within these areas?

b. How does the Company determine a future system need if it does not have the data granularity to forecast peak hour load? Does this apply to any of the items in the Action Plan?

c. In the case of a situation where NW Natural has not been able to forecast peak hour loads, how does the Company justify investment in these distribution system needs?

Response:

- a. As noted on page 8.12 of the IRP, this table summarizes the “broad areas for which econometric peak hour forecasting is currently feasible; smaller exceptions are omitted.” An example of a “smaller exception” is the subsequently discussed area of Hood River, OR. All of the distribution system projects in the Action Plan will be located within the broad areas listed in Table 8.1.
- b. As noted in bulleted lists on page 8.5 and 8.6 of the IRP, system reinforcement needs are identified by several parameters, many of which do not require econometric forecasts. These include, for example, observed pressure drop along system facilities as compared with the Company’s reinforcement standards. Note that all of the distribution projects identified in the Action Plan are the result of observed (as opposed to forecasted) weaknesses or needs in the affected areas, as indicated in each project’s synopsis on pages 8.14 to 8.23.
- c. As noted above, each of the distribution projects listed in the Action Plan are required to meet current (as opposed to forecasted) system standards, in response to an observed (as opposed to forecasted) need for reinforcement. That is, the justification for these investments is to preserve reliable service to existing firm customers in those areas where such reliability is already observed to be in some jeopardy according to the Company’s system standards. See the synopsis for each project on pages 8.14 to 8.23 for discussion of each observed issue. Additionally, please refer to the presentation materials included with the Fifth TWG as well as the Sixth TWG which not only revisited reinforcement standards but also presented the Kuebler Road Reinforcement materials as well.



Rates & Regulatory Affairs

LC 71

Integrated Resource Planning

Data Request Response

Request No.: LC 71 OPUC DR 9

9. See page 8.14 of the IRP.

a. The Company states, "Hood River[']s]...existing gas system configuration is unable to supply customer needs on very cold days." Please elaborate.

b. The Company states, "Firm service customers experienced outages in January 2017, under non-peak conditions." Please elaborate, including the causes of the outages.

c. Has the Company experienced problems in its Hood River area in the past? Was this brought up in prior IRPs?

d. How are customers able to get gas if they are experiencing outages on- and off-peak?

Response:

(a.) NW Natural has witnessed low pressures (below 10 psig) in the Hood River area during several recent winters. As the customer base in Hood River continues to grow, we experience lower system pressures from year to year under similar weather.

(b.) On January 6, 2017 a cold weather event resulted in customer outages in Hood River. The Company is gathering information about this event to ensure that we can provide the details staff has requested, and will supplement this response as soon as possible.

(c.) NW Natural has experienced sub-standard pressures (below 10 psig) under cold weather conditions in Hood River during past cold weather events. Small system reinforcement projects were implemented over time to make minor improvements in system capacity but gradual demand growth continues to exceed cold weather system capacity. The Hood River system has reached the point where a larger system reinforcement is required to increase capacity to address firm customer demands. As only the largest system reinforcement projects are in an IRP, no Hood River issues were mentioned in prior IRPs.

(d.) In short, if customers are experiencing an outage, regardless of on- or off-peak, they are not receiving gas. Customers in the weakest areas will experience "no heat" situations due to low pressure. The appliances simply stop working. When this happens, there may only be a few houses in a neighborhood which

experience the outage. This situation is not only inconsistent with our planning standard but also indicative that unless addressed a more significant outage may occur.



Rates & Regulatory Affairs
LC 71
Integrated Resource Planning
Data Request Response

Request No.: LC 71 OPUC DR 8

8. Please see Table 8.2. For each project, please provide:

- a. A line-item breakdown of all costs, including any equipment needed (e.g, regulators or compressors, etc.);
 - b. The Synergi model inputs and outputs. If applicable, please provide the spreadsheets in electronic form with cell formulae intact;
 - c. An explanation of whether an analysis done to determine the avoided cost of deferral under different (or relaxed) assumptions. What were the assumptions behind the analysis selected to justify the projects?;
 - d. Alternative project studies that were considered to meet resource need instead of traditional pipeline expansion, copies of those studies, and explanations of why those alternatives were rejected;
 - e. An explanation of whether the Company analyzed a range of likelihoods for customer outages—that is, are the graphs presented in the IRP worst case scenarios? What were the assumptions behind these low pressure points (see subpart b.)?;
 - f. What is the likelihood that customers will suffer outages this year if the projects are deferred? How is this likelihood calculated?;
 - g. The likelihood that customers will suffer outages if the projects are deferred by two years; and
 - h. The likelihood that customers will suffer outages if the projects are deferred by five years.
8. Please see Table 8.2. For each project, please provide:
- a. A line-item breakdown of all costs, including any equipment needed (e.g, regulators or compressors, etc.);
 - b. The Synergi model inputs and outputs. If applicable, please provide the spreadsheets in electronic form with cell formulae intact;
 - c. An explanation of whether an analysis done to determine the avoided cost of deferral under different (or relaxed) assumptions. What were the assumptions behind the analysis selected to justify the projects?;
 - d. Alternative project studies that were considered to meet resource need instead of traditional pipeline expansion, copies of those studies, and explanations of why those alternatives were rejected;
 - e. An explanation of whether the Company analyzed a range of likelihoods for customer outages—that is, are the graphs presented in the IRP worst case scenarios? What were the assumptions behind these low pressure points (see subpart b.)?;
 - f. What is the likelihood that customers will suffer outages this year if the projects are deferred? How is this likelihood calculated?;
 - g. The likelihood that customers will suffer outages if the projects are deferred by two years; and
 - h. The likelihood that customers will suffer outages if the projects are deferred by five years.

Response:

a. The following is a cost breakdown for each 2018 IRP Distribution System Project as it was initially estimated for IRP usage. The initial IRP project costs are based on historic project costs per mile construction and estimated project length based on general requirements for start and end point of the pipeline. IRP project estimates are created years in advance of actual Engineering Design and may be two to three years in advance of construction. Costs are presented in ranges because of the uncertainty of making cost estimates in the future and without the field validation of the Engineering Design process. Factors such as permitting, final pipeline alignment, traffic impact, restoration including paving, river and road crossings, urban vs. rural work zones, and construction bid costs all contribute to the final project cost.

Project	Schedule	Est. Cost
<u>Hood River Reinforcement</u>	<u>2019</u>	<u>\$3.5m-\$7.1m</u>
Pipeline- Approximately 2 miles 4" HP @ \$1.7-3.5m / mile		\$3.4m-\$7.1m
Stations- 2 regulators @ \$50k each		\$100k
Project	Schedule	Est. Cost
<u>Happy Valley Reinforcement</u>	<u>2019</u>	<u>\$2.9m-\$4.7m</u>
Pipeline- Approximately 1.2 miles 6" HP @ \$2.4-3.9m /mile		\$2m-\$3.5m
Stations- 1 regulators @ \$50k each		\$50k
Project	Schedule	Est. Cost
<u>Sandy Feeder Reinforcement</u>	<u>2020</u>	<u>\$15.2m-\$21.1m</u>
Pipeline- Approximately 5 miles 8" HP @ \$3.0-4.2m /mile		\$12.5m-\$17m
Stations- 2 new regulators @ \$50k each		\$100k
Stations- 4 regulator rebuild @ \$20k each		\$80k
Project	Schedule	Est. Cost
<u>North Eugene Reinforcement</u>	<u>2020</u>	<u>\$5.3m-\$10.6m</u>
Pipeline- Approximately 2 miles 6" HP @ \$2.4-4.8m /mile		\$3.4m-\$6m
Pipeline- Approximately 1 miles 6" B @ \$500k - \$1m /mile		\$500k-\$1m
Stations- 1 new regulators @ \$50k each		\$50k
Project	Schedule	Est. Cost
<u>South Oregon City Reinf.</u>	<u>2020</u>	<u>\$4.1m-\$6.2m</u>
Pipeline- Approximately 1.5 miles 6" HP @ \$2.7-4.2 /mile		\$2.6m-\$4m
Stations- 1 new regulators @ \$50k each		\$50k
Project	Schedule	Est. Cost
<u>Kuebler Rd. Reinforcement</u>	<u>2020-2021</u>	<u>\$14.1m-\$19.7m</u>

Pipeline- Approximately 4 miles 8" HP @ \$3.5m-4.9 /mile	\$10m-\$15m
Stations- 2 new regulators @ \$50k each	\$100k

b. Spreadsheets are attached as LC 71 OPUC Attachments 1-16 that contain extracted input and output data files for the Synergi models used to analyze each Distribution System Project. These spreadsheets contain information regarding the Supplies, Demands, Pipes, and Regulators that are configured for each model. Models that are included are Portland (3 projects), Salem, Eugene, and Hood River. The Synergi model file for each project is available upon request.

c. The distribution projects included in the IRP Action Plan address current, observed weaknesses in the distribution system that must be addressed to meet system reliability standards under current (rather than assumed or forecasted) conditions. As such, it would be inappropriate to consider deferral of a solution.

As described in Chapter 8, Sections 3.3 and 3.4, the Company undertakes an alternatives analysis to determine viable, cost-effective demand-side or supply-side alternatives to address distribution system issues. These analyses are largely based on current data, rather than assumption. For instance, in identifying feasible demand-side alternatives (i.e. targeted interruptibility agreements), the Company analyzes geocoded billing data for customers in the affected area(s). In identifying supply-side alternatives (i.e., satellite LNG), the Company utilizes capital and operating cost estimates as well as assumptions regarding interest and discount rates, depreciation schedules, and inflation.

d. For each of the distribution projects listed in Table 8.2, the Company analyzed the potential of targeted interruptibility agreements and satellite LNG as alternatives to the projects, in addition to the traditional alternatives (e.g., pipeline routes, facility combinations) that always lead the project design process.

For each case listed on Table 8.2, it was determined that targeted interruptibility agreements would not provide adequate therm savings to defer the project. Satellite LNG alternatives were found to be less cost effective than traditional pipeline solutions, as summarized in Table 8.3.

Confidential copies of these studies are attached to this response, in several spreadsheets, see Confidential LC 71 OPUC Attachments 17-28. Analysis of targeted interruptibility potential for each project location are contained in LC 71 OPUC Confidential Attachments 17 through 22 for this data request. Each contains a Summary spreadsheet detailing the identified need for therm savings, and the estimated potential therm savings from the customer data provided in separate sheets. Cost analysis for satellite LNG alternatives is contained in Confidential Attachments 23 through 28 for this data request. Each contains a worksheet tab ('Satellite LNG Investment + O&M') detailing the line-item capital Investment and O&M outlay estimates

for the resource, and a summary spreadsheet tab ('PVRR Detail') with detailed present-value revenue requirement estimates for the resource.

e. through h. The Company's distribution system planning methodology does not attempt to forecast the likelihood that customer outages may occur. Our system reinforcement standards (see IRP pages 8.5 and 8.6) indicate when it is appropriate to initiate a project and none of the indicators rely on an assumption of customer outages.



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4. See page 8.9 of the IRP. The Company states, “While 90 minutes is a period longer than a peak hour, the CNG trailer does not represent an adequate alternative for most system reinforcement issues.” Please elaborate.

Response:

The discussion around CNG trailer limitations was intended to point out a shortcoming of relying on mobile CNG or LNG for firm customer service. Mobile solutions cannot deliver adequate volumes of gas to address customer demand gaps of the size that would be met by a larger pipeline system reinforcement solution. The small delivery volumes, availability risk and extensive logistics of mobile solutions limit their viability in many cases.