STATE OF WASHINGTON
UTILITIES AND TRANSPORTATION COMMISSION
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December 19, 2016

David Anderson
Chief Executive Officer
President and Chief Executive Officer
Northwest Natural Gas Company
220 NW Second Avenue
Portland, Oregon 97202

Re: Northwest Natural Gas Company
2016 Natural Gas Integrated Resource Plan
Docket UG-151776

Dear Mr. Anderson:

The Washington Utilities and Transportation Commission (Commission) has reviewed the 2016 Natural Gas Integrated Resource Plan (IRP or Plan) filed by Northwest Natural Gas Company (NW Natural or company) on August 26, 2016, and finds that it meets the requirements of Washington Administrative Code (WAC) 480-90-238.

By acknowledging compliance with WAC 480-90-238, the Commission does not signal pre-approval for ratemaking purposes of any course of action identified in the IRP. The Commission will review the prudence of the company's actions at the time of any future request to recover costs of resources in customer rates. The Commission will reach a prudence determination after giving due weight to the information, analyses, and strategies contained in the company's IRP along with other relevant evidence.

Because an IRP cannot pinpoint precisely the future actions that will minimize a utility's costs and risks, we expect that the company will regularly update the assumptions that underlie the analysis within the IRP and adjust its operational strategies accordingly.

Overall, the Commission recognizes the substantial improvement the company has made to its integrated resource plans over the last several planning cycles. The Plan is the result of thorough modeling and analysis and is clear in the presentation of its results and the company's future options and strategies for meeting its service obligations in a least-cost manner. The Commission

provides additional, in-depth feedback in the attached document. Generally, the Commission makes the following suggestions and requests:

1. The company should pursue all conservation measures made cost effective by the projected rise in the company's avoided cost.
2. The company must continuously monitor the usage pattern of the interstate pipeline to determine whether the assumptions in its IRP continue to hold true.
3. The company should monitor the conditions that affect the zonal configuration of NW Pipeline's system.

Consistent with the principle that an IRP serves as a planning document, the company's final decision to pursue any specific course of action described within its IRP as a least-cost resource should be informed by the IRP, but made outside of the IRP process.

Commission Staff will continue to provide additional input as NW Natural develops its next IRP. NW Natural should file its next IRP work plan on or before August 31, 2017, and its final 2018 IRP on or before August 31, 2018.

Sincerely,

STEVEN V. KING
Executive Director and Secretary

Attachment

Attachment

Northwest Natural Gas Company's 2016 Integrated Resource Plan Docket UG–151776

Introduction

WAC 480-90-238 directs investor-owned utilities (IOUs) to describe the mix of natural gas supply resources and conservation that will meet current and future needs at the lowest reasonable cost to the utilities and their ratepayers. The planning requirements specified in WAC 480-90-238 are intended to help each natural gas utility develop a strategic approach to navigate marketplace opportunities and risks based on that utility's unique attributes. The rule requires IOUs to conduct a comprehensive analysis of the costs and benefits, including risk mitigation benefits, of various approaches for meeting future resource needs using the best available information.

On August 26, 2016, Northwest Natural Gas Company Corporation (NW Natural or company) filed with the Washington Utilities and Transportation Commission (Commission) its 2016 Integrated Resource Plan (IRP or Plan). The Plan describes the company's analysis and evaluation of potential resource strategies for meeting load over the next 20 years. As such, it is consistent with the Commission's planning regulations. In general, the Commission is pleased with the progress that the company has made in this cycle and the previous IRP in enhancing its staffing, its modelling capabilities, and its responsiveness to the questions and concerns the Commission has raised in previous acknowledgement letters. We hope Northwest Natural continues to sustain this progress and to refine the modelling further in the next planning cycle.

Summary

The company's projected annual average firm customer sales growth rate for Washington declined substantially, from 3.8 percent in the 2014 IRP[1] to 2.6 percent in the current IRP.[2] For the last several IRP cycles, the company has been considering the best database to use for projecting Washington sales growth. In the 2014 IRP, NW Natural used Washington-specific data when projecting sales growth for its Washington service territory. In the current IRP, the company uses Oregon housing starts as the primary explanatory variable, citing a strong correlation between new residential housing starts in its Washington territory and Oregon housing starts. NW Natural also increased the timeframe of historical observations used in its residential and commercial forecast models from six years in the 2014 IRP to 25 years in the

[1] Northwest Natural Gas Company, 2014 Integrated Resource Plan, Page 1.3, Docket UG-131473.
[2] Northwest Natural Gas Company, 2016 Integrated Resource Plan, Page 2.1, Docket UG-151776.

current IRP. These changes contributed substantially to the reduced customer growth forecasts in the current IRP.

At the request of the Commission in its 2014 IRP acknowledgment letter, NW Natural included a very low load growth forecast for evaluating resource portfolio scenarios. This additional forecast strengthens the IRP by accounting for a wider range of load growth scenarios and could help the company in its decision making if growth is lower than expected.

At the Commission's request, NW Natural also reviewed its calculation of use per customer. Overall, both residential and commercial average annual use per customer are declining. Residential average annual use per customer is forecasted to decline at a rate of 0.3 percent per year, despite a 0.1 increase in the average annual residential heat load. Commercial average annual use per customer is declining 1.2 percent per year. However, the system peak demand continues to grow. The differential growth rates in average load verses peak demand result in the system becoming more "peaky" and a shift in the resource mix needed to provide natural gas service. The Plan addresses this shift in resource need by carefully examining peak resource supply options and by seeking an innovative energy efficiency program focused on reducing peak demand on the system in general and in specific distribution pockets where supply is constrained.

Compared to the 2014 IRP, the company's firm sales peak day forecast is slightly higher in this IRP through 2030, but is lower beyond 2030. The size of the resource deficit for the peak day also varies over the 20-year planning horizon.

To meet peak demand growth in the short term, the least-cost resource is the recall of the company's Mist storage rights currently leased to other entities. Mist recall is flexible, and the amount recalled can be determined one year in advance of need. The amount of capacity to recall each year is the only resource decision likely to be required before the completion of the 2018 IRP. In 2022, the Christensen Compressor project, which would support the Salem-Newport lateral pipeline, is projected as the next resource need under the base case scenario. The company's analysis also indicates development of the North Mist IIa storage project around 2028, or, if regional demand propels a pipeline expansion by 2028, adding pipeline capacity to the company's resource portfolio instead.

NW Natural continues to be flexible and employs risk management strategies as regional projects outside of its control are developed. The current IRP includes a stochastic risk analysis to test the sensitivity of expected resource decisions to assumptions about prices, weather, resource costs, and customer growth. In the current IRP, no decisions are expected to be made about resource choices that carry considerable customer risk, such as those that obligate the utility to long-term payments or debt costs. Under the scenarios in the current IRP, the company is not expected to make such resource decisions before the 2018 IRP.

The company's 2014 IRP identified five Vancouver load center distribution projects necessary to reinforce the Vancouver load center. Since 2014, NW Natural has completed two of the projects.

The IRP still projects the company will complete construction of the remaining three projects in the next three years.

Discussion

Peak Day Forecast Estimation

In the 2016 IRP, the company made numerous changes to how it estimates its peak day forecast. In addition to improvements in the system-level use per customer information and firm sales customer count, the company also updated the peak day system firm sales forecast methodology. The update includes changes to the peak day weather standard by incorporating variables in addition to temperature that are predictors of natural gas usage. These variables include wind speed, precipitation, solar radiation, the previous day's temperature, time of day, and day of the week. Each of these variables adds a different degree of predictive capability to the model while also introducing some additional error to the model. Some of the newly introduced variables, such as wind speed, add a greater degree of predictive capability to the model relative to variables such as precipitation.

Collectively, these changes resulted in the model being more accurate at predicting usage on cold days than the model used for the 2014 IRP. The additional variables allow for a wider range of expected firm sales for a single given temperature.

- The Commission encourages NW Natural to revisit the inclusion of so many additional variables in its regression analysis to re-assess whether the additional variables add too much complexity and potential for significant errors in the modelling results.

The peak day forecast is slightly higher than what the 2014 IRP projected through 2029, and is lower thereafter. The factors contributing to this difference include the updated peak day use per customer (UPC) methodology, two years of greater actual customer growth than predicted in the 2014 IRP, the updated customer forecast, and an updated projection of demand side management (DSM) and energy efficiency (EE) deployment.

Demand-Side Management Resources

NW Natural worked with the Energy Trust of Oregon (ETO) to forecast the 20-year DSM potential for the company's service territory, including Washington. The company provides ETO its avoided costs and ETO produces a forecast of cost-effective therm savings. The IRP projects that in its Washington service territory, the company can achieve savings of 6.4 million therms by 2036. This is a significant increase over the projected savings of 3.6 million by 2033 in the previous IRP. The increase is largely due to a change in the calculation of avoided costs that resulted in an increase in avoided costs, which renders additional measures cost effective. The

increase is also due to the inclusion of emerging technologies present in ETO's new resource assessment tool.

- The Commission expects NW Natural to pursue all conservation measures made cost effective by its new avoided cost determination.

NW Natural also achieves conservation through participation in the Washington Low-Income Energy Efficiency (WA-LIEE) program. WA-LIEE installed conservation in 10 homes in 2014 for an estimated savings of 3,050 therms and nine homes in 2015 for an estimated savings of 3,213 therms. To expand the number of participating homes, the company made several changes in its program effective January 15, 2016, including:

- removing the requirement that homes be built prior to 1991 to participate,
- increasing outreach funding, and
- increasing the maximum rebate amount per house.

The Commission supports these changes, but remains concerned with the low number of homes served under the WA-LIEE program.

- The Commission recommends the company continue to develop program changes that will increase the number of homes receiving conservation treatment through the WA-LIEE program.

Avoided Cost Calculation

The avoided cost calculation in the 2016 IRP is an improvement over the calculation in the previous IRP. The 2016 IRP calculation now includes the hedge value of DSM, incremental state carbon policy adders, and supply capacity costs of the distribution and transportation systems. Specifically, NW Natural computed expected avoided capacity costs for four end uses: residential space heating, commercial space heating, base load, and interruptible load.

Adding cost components raised the total avoided cost substantially as compared to the 2014 IRP. Washington space heating avoided costs increased by approximately 50 percent, baseload avoided costs increased 9 percent, and interruptible avoided costs increased 2 percent from the previous IRP. In Washington, avoided costs for space heating are about 40 percent higher than baseload avoided costs and roughly 45 percent higher than interruptible avoided costs.

The company intends to continue to refine the avoided cost methodology, with the goal of evaluating demand side and supply side resources in the same integrated resource choice process and making avoided costs an output of the resource planning process.

- The Commission supports NW Natural's continued refinement of its avoided cost methodology. Specifically, the company should continue to include supply capacity costs in its avoided cost methodology, and take steps towards evaluating demand side and supply side resources on a similar basis in the same modeling analysis.

Geographically Targeted DSM Pilot

In conjunction with the Energy Trust of Oregon (ETO), NW Natural has proposed developing a Geographically-Targeted DSM (Targeted DSM) program. The program would target additional DSM savings from customers contributing to the peak load of an area where the distribution system is reaching capacity and the need for a supply side project has already been identified.

Targeted DSM savings can be achieved by "accelerating" and "enhancing" DSM. "Accelerated" DSM is defined as speeding up the timeline to acquire savings in a local area through location-specific targeted marketing and increased incentives. "Enhanced" DSM savings may not be cost effective on a statewide level, but would be cost effective using local avoided costs.

Analysis is still underway to determine if Targeted DSM programs could be less expensive than the least cost supply side options. NW Natural is actively working with the ETO in evaluating the potential drawbacks and benefits of Targeted DSM. The company and ETO are considering a Targeted DSM pilot to gather more information to compare against supply side solutions in a future IRP. They plan to file a detailed pilot project for review with the Oregon Public Utility Commission in late 2017 or early 2018.

- The Commission encourages NW Natural to share the results of its Oregon Targeted DSM pilot and consider the application of Targeted DSM in Washington should the pilot show promise for wider application.

Supply Resource Portfolio

The IRP resource portfolio reflects the removal of the Plymouth LNG gas supply and changed assumptions about how resources in the company's resource portfolio can be used together to meet peak day demand. The company terminated its share of natural gas supply from the Plymouth LNG facility after it recognized that its TF-2 gas transportation service on NorthWest Pipeline (NWP) from the facility was not a firm transportation service for meeting peak day demand. In a related move, the company negotiated a conversion of 13,524 Dth/day of its non-firm TF-2 gas transportation service for delivery of natural gas from Jackson Prairie storage to firm TF-1 transportation service, ensuring that natural gas supply from Jackson Prairie can be delivered to meet peak day demand. With the conversion from non-firm to firm pipeline service, the company concluded that natural gas pipeline delivery service from Jackson Prairie storage can be considered a firm resource for the full 20-year IRP planning period. All of these changes are reflected in the Plan's resource stack.

The company is also modeling gas supply from its storage facilities as displacing natural gas deliveries to certain gate stations that would otherwise need natural gas delivery under the company's interstate pipeline transportation contracts with NWP. This modeling assumption is possible because the direction of flow from the storage facilities to the gate station on the interstate pipeline does not conflict with the *expected* direction of flow of natural gas on the interstate pipeline during peak events. This would effectively increase the delivery capacity of

the company's combined resource stack during peak events, but is not considered a firm resource in the same way a subscription to firm (TF-1) interstate pipeline capacity would be. Firm interstate pipeline capacity is not dependent on counter flows, whereas the additional capacity from the company's resource stack achieved in its modeling is dependent on flow patterns. Depending on such counter flows to continue to materialize on peak days carries additional risk over serving demand with firm interstate pipeline capacity. Therefore, the performance of the additional delivery capacity created by the assumptions in the company's model require careful and continuous monitoring of actual and projected usage patterns on the interstate pipeline. While the Commission agrees with the company's risk analysis in the IRP, the Commission expects NW Natural to monitor flows closely going forward.

- The company must continuously monitor the usage pattern of the interstate pipelines to serving loads in the Pacific Northwest determine whether assumptions in its IRP continue to hold true.

The segmentation and zonal grouping of gate stations along NWP's system are underlying operational characteristics of the NWP's system that make possible the additional delivery capacity from NW Natural's resource stack. Segmentation and zonal grouping of gate stations treat a collection of gate stations as the same delivery point. This segmentation allows NW Natural to redirect gas to city gates farther south on the I-5 corridor section of NWP's system. However, this delivery ability is constrained by NWP's zonal grouping of gate stations, which in turn is dependent on other capacity holders' pattern of use of the I-5 corridor section of the interstate pipeline. Therefore, the extra delivery capacity of the company's resource stack is dependent on an accurate and up-to-date understanding of other capacity holders' use and the zonal configuration of NWP's system. The Commission agrees with the company's conclusions that the current zonal configuration is sufficiently sound for the analysis of the company's resource stack in the IRP, and that it requires regular review.

- The company should regularly monitor the conditions that affect the zonal configuration of NWP's system.

As a stopgap to the loss of capacity from Plymouth LNG, the company acquired 20,000 Dth/day peak day service for the winter of 2014-2015. The company indicates that the contract is only a year-to-year contract, but that it may be possible to secure the peak day service on a multi-year basis. The Commission considers this a reasonable conclusion in the context of the IRP.

Mist Asset Management Project

The company entered a contract with the engineering firm EN Engineering, LLC (ENE) to assess the condition of their Mist storage facility and provide recommendations regarding changes to the facility over the next 25 years to ensure the reliability and productivity of the facility. ENE's final report, completed in June 2016, contained multiple recommendations for improving

efficiency and flexibility at Mist. Two of their recommendations involve relatively near-term projects:

- Replacing or repairing an existing dehydrator, and
- Replacing the two oldest compressors, which are located at Mist's Miller Station.

As most of the ENE report is confidential, the Commission will not discuss the details of the report here. The Commission supports the company's approach of performing engineering studies and emphasizes that such reports be supported by thorough backup documentation of the analysis supporting the conclusions.

Future Resource Alternatives

The IRP includes multiple supply side resource options in its evaluation of the resource additions that would produce the least-cost resource mix. The breadth of resources the company considered is a much improved feature of the company's 2016 IRP analysis over its 2014 IRP. Assumptions about the price and function of future resources are always subject to different interpretations, but the Commission agrees that the company's assumptions are within reason.

As in the previous IRP, the company anticipates the need for additional interstate pipeline capacity within the planning horizon. The potential pipeline capacity projects depend on actions by third-parties outside of the company's control. However, the company still includes potential projects in its analysis. The following potential acquisitions are considered:

- NWP Sumas expansion local project, designed to serve only NW Natural's load growth needs,
- NWP's Sumas expansion regional project, which would bundle NW Natural's subscription with other regional requests,
- Pacific Connector, which would provide a bundled pipeline service from Malin, Oregon, to the company's gate station, and
- Trail West, which would likely provide a Northwest Market Area Expansion service by bundling Trail West capacity with northbound Grants Pass Lateral capacity.

NW Natural also considers storage additions, including the previously mentioned Mist Recall. Other projects considered in scenario analyses include:

- North Mist II, a Mist expansion project for core customer use;
- The Christensen Compressor project, a 2,000-horsepower compressor to increase deliverability from the Newport LNG plant; and
- Satellite LNG storage.

In all Base Case customer growth scenarios considered, Mist Recall is the primary resource addition to meet growing peak loads, with the addition of the Christensen Compressor after 2020. The timing of a new regional pipeline will determine the expected need for a North Mist II

expansion. NW Natural does not need to make these resource choices before the next integrated resource plan.

The Plan also describes a potential optimization of the value of NW Natural's existing resources through a potential short-term release of its NWP capacity to the proposed Kalama Methanol plant. The company recognizes that the proposal to release short-term capacity to the developer of the Kalama Methanol plant, if it occurs, will not affect its long-term resource choice. The Commission expects its staff to monitor the relationship between the possible short-term capacity release and the possible development of the regional Sumas expansion to NWP's system as identified in the Plan.

Distribution

Since the filing of its 2014 IRP, NW Natural has completed two distribution upgrade projects serving Clark County. The 119th Street project, completed in late 2014, resulted in the installation of approximately 1.5 miles of 8-inch high pressure main at an estimated cost of $5.4 million. Phase 1 of the Vancouver Core Replacement project, completed in June 2016, added approximately 3,700 feet of 8-inch high-pressure main and was completed at an approximate cost of $1.3 million.

The Plan includes two Clark County distribution system upgrades in its two-year action plan. Since the completion of its 2014 IRP, the company deferred the Washougal Extension to prioritize completion of the Phase 1 of the Vancouver Core Replacement project. The 2016 IRP now projects completion of the Washougal Extension in 2018. The second project, the 119th Street to Salmon Creek project, will install approximately 2.4 miles of 8-inch high-pressure main connecting the Salmon Creek gate station to the newly completed 119th project. It has an anticipated completion date of 2017.

Beyond the two-year action plan window, the company plans to complete Phase 2 of the Vancouver Core Replacement project in 2019. During the delay of this project, the company re-examined the use of a new high-pressure distribution pipeline to relieve low service pressure, deciding instead to make a number of small distribution pipe upgrades at a considerable savings over the original project design. This is an example of good utility management that fulfills the least-cost utility service obligation of a utility providing service in Washington state.

- The Commission encourages the company to continuously re-evaluate its planned projects to compare alternatives that may be lower cost.

Conclusion

The Commission acknowledges that NW Natural's 2016 Natural Gas IRP complies with WAC 480-90-238.