CASCADE NATURAL GAS CORPORATION®

A Subsidiary of MDU Resources Group, Inc.

In the Community to Serve®

CASCADE NATURAL GAS CORPORATION'S 2016 INTEGRATED RESOURCE PLAN QUARTERLY UPDATE 3

Item 1. Demand Forecast: For projecting customer growth, Cascade should use a regression model to more accurately gauge the correlation between demographic and employment growth and Cascade's load growth. The Company should also test the validity of its load forecasting model by conducting a back-cast with actual, observed data. For temperature data, the Commission prefers the use of National Oceanic and Atmospheric Administration (NOAA) data. If Cascade choses to rely on weather data from another source, it should provide detailed justification for doing so and verify the reliability of this data. Further, similar to other regulated utility IRPs, the Company should modify the regression models to account for seasonal differences in customers' weather sensitivity and use an autoregressive model to forecast load, when appropriate.

2017 Q3 Response: Cascade will be running, and has been running for the 2018 OR IRP, ARIMA time series analysis with seasonal indicators to create a customer and demand forecast model. The customer forecast model will use population and employment growth to analyze customer growth. Cascade has chosen Schneider because Schneider has proven to be more reliable and more responsive with data than NOAA. This is because Schneider uses multiple sources to compute weather data for an area, and with Cascade's wide service territory, we feel it gives a better representation of our service territory's. Cascade also uses Schneider data throughout the Company, therefore, Cascade finds having one set of data to use is best for the Company.

2017 Q4 Response: Cascade has continued to implement and test additional statistical software in its modeling to improve the accuracy of its forecasts.

2018 Q1 Response: Cascade has completed preliminary results for the customer forecast. Cascade analyzed ARIMA models with Fourier terms with Population and Employment growth rates as additional explanatory variables. The Company utilized the statistical software called R for the customer forecast.

Item 2. Stochastic Analysis: The Commission requests that Cascade expand its stochastic analysis to include probability distributions of costs, such as system costs and resource mix, for multiple portfolios. The Company should run simulations to "stress test" different resource mix alternatives, including mixes with increased investment in conservation resources, which will provide more data and results for portfolio optimization.

2017 Q3 Response: For its 2018 IRP in Oregon, Cascade has modified its stochastic analysis to incorporate many of these recommendations. The Company first uses SENDOUT® to derive optimal deterministic portfolios using all potential resources. Cascade then derives additional candidate portfolios by allowing SENDOUT® to generate the optimal deterministic mix of resources using only NWP solves, only NWP solves with storage, only GTN solves, only GTN solves with storage, and only storage. These six portfolios are then tested stochastically. The Company records the mean total system cost and the 95th percentile of total system costs to capture an intrinsic and extrinsic value of each portfolio, which is in turn used to rank the portfolios and ultimately create a preferred portfolio. The Company expects to use a similar methodology in its 2018 IRP for Washington.

In a 2017 update to its 2014 IRP in Oregon, Cascade performed an analysis on the impact of accelerated DSM to its anticipated shortfalls. The Company concluded that accelerated DSM would not generate a material impact on the timing or quantity of incremental resources needed. The Company will perform a similar analysis for the 2018 Washington IRP.

2017 Q4 Response: The Company has no additional update from the first quarterly update.

2018 Q1 Response: After receiving feedback from WUTC staff during the Company's TAG 1 meeting, Cascade will be considering incorporating stochastic analysis into its conservation analysis, specifically related to the cost of carbon. The Company will discuss this further in TAG 4.

Item 3. Conservation Potential Assessment (CPA) and Model: In consultation with its advisory group, Cascade should develop a request for proposal for a new CPA and new (or modified) model using the Northwest Power and Conservation Council's methodology for calculating conservation potential. The Company should continue to coordinate with the Northwest Energy Efficiency Alliance to include non-energy benefits in the CPA.

2017 Q3 Response: The Energy Efficiency Department released a Request for Proposal (RFP) to more than twenty qualified independent evaluators of Energy Efficiency programs on behalf of the Company's Washington State Conservation Incentive Programs as of July 11th, 2017. The Company advised we were seeking a comprehensive reassessment of the Company's residential, commercial and industrial energy efficiency potential (Conservation Potential Assessment or CPA) under the methodology currently employed by the Northwest Power and Conservation Council (NWPCC). We also noted we were seeking an executable and dynamic model to support goal setting in future years allowing for annual reassessment to be performed internally by CNGC for Integrated Resource Planning, or alternatively if a model could not be provided then a proposal from a vendor to provide ongoing support to obtain an updated CPA biennially. The RFP was developed in consultation with the Conservation Advisory Group (CAG) which included feedback and recommendations provided by Staff from the WUTC, Public Counsel and Northwest Energy Efficiency Alliance (NEEA). The Company also sought recommendations and insights from Regional Technical Forum (RTF) members and NWPCC representatives while developing the RFP and included elements of cost test evaluation as part of the RFP including the Total Resource Cost (TRC) test non-energy benefits guidance and inclusion of the Resource Value Test (RVT) as one of three ways to evaluate cost-effectiveness of the programs moving forward.

Three vendors responded to the RFP by the August 2nd deadline. The Company evaluated the responses for adherence to the requested elements, developed a matrix and advised our CAG of the results of the RFP evaluation and the vendor which was awarded the project. We are moving forward with Applied Energy Group (AEG) as the CPA evaluator and will be using LoadMAP in the 2018 IRP for potential forecasting. We are on track to meet the February 5th completion date and will have AEG present to the CAG during our quarterly meeting in October about the project timeline, modeling software and current status.

2017 Q4 Response: The Energy Efficiency Department continues its work with Applied Energy Group (AEG) on the 2018 Conservation Potential Assessment and is currently aligned to have it completed in February to discuss with the Conservation Advisory Group (CAG) during the first quarterly meeting of the year. The CAG stakeholders, including the Northwest Energy Efficiency Alliance, have been consistently informed of the progress of the CPA and LoadMAP modeling tool and were provided an opportunity to provide feedback and comments on the measure lists and any requested elements to be included in the final CPA and report. AEG and the Company are referencing multiple regional sources as part of the evaluation, including NEEA's Residential Building Stock Assessment and Commercial Building Stock Assessment and ramp rate guidance from the Northwest Power and Conservation Council. The final potential will be available for the following cost tests run under the NW Power and Conservation Council's methodology – Utility Cost Test, Total Resource Cost Test and Resource Value Test.

2018 Q1 Response: The 2018 Conservation Potential Assessment is in the midst of finalization. The final iteration will be available shortly for incorporation into the 2018 IRP and a draft has been provided to the Company for review. The draft potential goals were provided to the Conservation Advisory Group as was the training on the new LoadMAP software during the Q1 CAG meeting held on March 8th in Bellingham.

Item 4. Clean Air Rule (CAR): While we acknowledge that the CAR is currently the subject of litigation by Cascade and others, WAC 173-441 and 173-442 are in force in Washington state unless and until a court decides otherwise. In its 2018 IRP expected case, Cascade should model specific CAR impacts. Moreover, Cascade should consider the costs and risks of additional environmental regulations, including a possible carbon tax ($/ton of carbon dioxide equivalent).

2017 Q3 Response: Cascade is researching potential emission reduction unit (ERU) options for CAR compliance which include, but are not limited to, livestock projects, wastewater projects, renewable energy projects, renewable energy credits, transportation, natural gas system, and energy efficiency. We will evaluate the ERU options and costs, as well as any future carbon tax, and apply these costs in 2018 IRP cost modeling.

2017 Q4 Response: The Company has no additional update from the first quarterly update.

2018 Q1 Response: The Clean Air Rule was found to be invalid by Thurston County Superior Court Judge Hames J. Dixon, on December 15, 2017. Therefore, Cascade will not explicitly include the impacts of CAR in IRP cost modeling. Cascade has discussed its plans for modeling the costs and risks of environmental regulations during TAG 1, and received feedback from Staff that will be incorporated into carbon scenario modeling. Cascade will include discussion of carbon regulation and tax scenarios during TAG 4 which would be applied in 2018 IRP cost modeling.

Item 5. Avoided Costs: The Company should expand its analysis of avoided energy and capacity costs (on and off peak), by year and end use, quantifying the following cost streams: carbon-inclusive price and transport, capacity (supply resource), capacity (distribution system), emissions with expected case adder of incremental carbon policy (CAR analysis), and a ten percent conservation adder. The Commission recommends the Company provide additional information with regard to its avoided cost calculation methodology, clearly delineating carbon costs included in the price of natural gas and external costs related to state-specific carbon policies, including but not limited to Washington's Clean Air Rule.

2017 Q3 Response: Cascade has modified its avoided cost formula to incorporate many of these recommendations.

2017 Q4 Response: The Company has no additional update from the first quarterly update.

2018 Q1 Response: Cascade presented a brief update regarding its new avoided cost formula during TAG 1. The Company will go into further depth regarding how the avoided cost formula will address these concerns in TAG 3.

Item 6. Distribution System Enhancements: As the Commission promulgates new rules related to IRP transmission and distribution system planning, the Company will need to provide more analysis on distribution system enhancements in future IRPs.

2017 Q3 Response: Late last year the WUTC opened Docket U-161024 to consider new, additional guidelines for Integrated Resource Plans (IRPs). These potential new rules impact all the areas of the IRP

such as demand forecasting, price forecasts, DSM, environmental analysis, supply resources, integration modeling scenarios, stress testing of portfolios, and distribution system planning. Cascade has been an active participant in this process and anticipates making changes to its future IRPs to expand discussion of distribution resource planning to include date of resource need, analysis of least cost reasonable resources and alternatives considered. The Company also plans to implement other changes as needed once the WUTC provides final, updated guidelines.

2017 Q4 Response: The Company has no additional update from the first quarterly update.

2018 Q1 Response: The Company has no additional update from the first quarterly update.

Item 7. Resource Cost Assumptions: The Commission strongly reminds the Company to regularly update its analyses based on new information and ensure that resource acquisition decisions are based on updated analyses using the most current data available.

2017 Q3 Response: Cascade agrees with the importance to have the most current, reasonably available information when modeling potential resource decisions. To this end, the Company has sought through its citygate study to confirm upstream pipeline receipt/flow information. Additionally, Cascade requested Northwest Pipeline (NWP) refresh their estimates for potential expansions along the I-5 corridor and the Yakima lateral. The Company is also currently in discussions with NWP about options to address potential concerns with flow on the Shelton lateral. Further updates will be provided in future quarterly updates and at 2018 WA IRP Technical Advisory Group meetings.

2017 Q4 Response: Cascade met with NWP personnel on 12/13/2017 to discuss their latest proposal. Resource Planning anticipates modeling the latest proposal beginning in January 2018. Further updates will be provided in future updates and at 2018 WA IRP TAG meetings.

2018 Q1 Response: Cascade met with NWP and PSE personnel on 3/1/2018 to discuss NWP's latest proposals and consider joint resource options with PSE. Resource Planning anticipates modeling the latest proposal this spring. Further updates will be provided in future updates and at 2018 WA IRP TAG meetings.

Item 8. Quarterly Reports on Action Plan: Cascade should submit quarterly reports, beginning in Quarter 3 of 2017, explaining progress made towards resolution of the issues identified in the 2016 IRP Action Plan and issues identified in this letter and attachment. Each progress report must be received by the Commission no later than the final business day of each fiscal quarter.

2017 Q3 Response: Cascade filed the first Quarterly Update on September 29, 2017.

2017 Q4 Response: Cascade filed the second Quarterly Update on December 22, 2017.

2018 Q1 Response: Cascade filed the third Quarterly Update on March 30th, 2018.

Item 9. Expanding forecasting to test non-linear regression methodology using SAS.

2017 Q3 Response: As mentioned in item #1, Cascade will be running ARIMA time series analysis with seasonal indicators to create a customer and demand forecast model. The customer forecast model will use population and employment growth to analyze customer growth.

2017 Q4 Response: Cascade has continued to implement and test additional statistical software in its modeling to improve the accuracy of its forecasts.

2018 Q1 Response: Cascade will be using R, as mentioned in update #1, to complete the use per customer forecast. As presented at TAG 1, Cascade will be modeling non-linear ARIMA models that include HDD, weekend, trend and other explanatory variables. Cascade plans to present the results of the customer and demand forecast, including all variables that were considered and regressors ultimately selected, at the May 23rd, 2018 WA IRP TAG 2 meeting.

Item 10. Consider the new weather normalization model in the forecast

2017 Q3 Response: The Company filed a new weather normalization methodology using the forecast model in the most recent Rate Case UG-170929.

2017 Q4 Response: The Company has no additional update from the first quarterly update.

2018 Q1 Response: The Company has no additional update from the first quarterly update.

Item 11. Cascade will work on gathering growth information from other locations to compare with Woods & Poole. Also include analysis from State Economist Report

2017 Q3 Response: The Company produces an internal monthly market intelligence report that includes sources such as SNL, Wood Mackenzie, EIA's short and long-term energy outlooks, U.S. Census Bureau's state data center program, as well as regional and national newspapers. These sources are used in conjunction with Woods & Poole's growth data to confirm or challenge the information provided. The Company will consult with our regional LDCs and continue to work with Staff to identify other potential sources of growth information for Cascade to consider.

2017 Q4 Response: The Company has no additional update from the first quarterly update.

2018 Q1 Response: The Company is exploring other data sources used by regional LDC's to determine if more data is available or more accuracy can be obtained.

Item 12. Investigate incorporating distribution system costs into the avoided cost calculation

2017 Q3 Response: The Company has worked with internal stakeholders such as Engineering and Industrial Services to obtain more cost information regarding enhancements to the distribution system so that these may be considered in our avoided costs calculations. Additionally, Cascade has reached out to other utilities to understand how they each developed their methodologies for including distribution system costs into their avoided costs calculations. Cascade has some unique issues regarding allocation of distribution system costs due to the Company's wide geographical area. In addition, unlike many LDCs, Cascade's system is largely non-contiguous. The Company will continue to develop potential methodologies for inclusion of distribution cost into the avoided cost calculation for the 2018 WA IRP.

2017 Q4 Response: The Company has no additional update from the first quarterly update.

2018 Q1 Response: During TAG 1, the Company outlined its intentions to incorporate distribution system costs into the 2018 WA IRP. While no formal technique has been settled on yet, Cascade is working on finalizing how this component will be entered to the avoided cost equation. Cascade will present its proposed methodology during TAG 3.

Item 13. As specific carbon legislation is passed, the Company will update its avoided cost calculations, conservation potential and make modifications to its DSM incentive programs as necessary.

2017 Q3 Response: While no specific carbon legislation has yet passed during the time this update was written, the Company monitored all proposed carbon bills that emerged during the legislative session, and is actively monitoring the development of policy in this area. Cascade has also begun to communicate with environmental stakeholders interested in putting a price on carbon, petroleum, natural gas, electricity, and stationary sources in WA. This engagement will help us be proactive in updating avoided cost calculations, conservation potential and other DSM modifications if/when legislation is passed.

2017 Q4 Response: The Company has no additional update from the first quarterly update.

2018 Q1 Response: While no specific carbon legislation has yet passed during the time this update was written, the Company monitored all proposed carbon bills that emerged during the legislative session, and is actively monitoring the development of policy in this area. Cascade continues to communicate with stakeholders interested in putting a price on carbon, petroleum, natural gas, electricity, and stationary sources in WA. This engagement will help us be proactive in updating avoided cost calculations, conservation potential and other DSM modifications if/when legislation is passed.

Item 14. The Washington State Dept. of Ecology issued a new carbon rule. Cascade will need to consider IRP implications

2017 Q3 Response: Cascade continues to evaluate IRP implications of CAR, such as increasing costs and any potential changes with gas supply and delivery. Cascade will provide another update prior to the first 2018 IRP TAG meeting.

2017 Q4 Response: The Company has no additional update from the first quarterly update.

2018 Q1 Response: Per the Company's update to question four, the Clean Air Rule was found to be invalid by the Thurston County Superior Court on December 15, 2017. Therefore, Cascade will not explicitly include the impacts of CAR in IRP cost modeling.

Item 15. Expand Monte Carlo methodology to include analyses of a variety of potential portfolio scenarios (e.g., high growth, low pricing, etc.)

2017 Q3 Response: For its 2018 IRP in Oregon, Cascade has modified its stochastic analysis to incorporate many of these recommendations. The Company first uses SENDOUT® to derive optimal deterministic portfolios using all potential resources. Cascade then derives additional candidate portfolios by allowing SENDOUT® to generate the optimal deterministic mix of resources using only NWP solves, only NWP solves with storage, only GTN solves, only GTN solves with storage, and only storage. These six portfolios are then tested stochastically. The Company records the mean total system cost and the 95th percentile of total system costs to capture an intrinsic and extrinsic value of each portfolio, which is in turn used to rank the portfolios and ultimately create a preferred portfolio. The Company expects to use a similar methodology in its 2018 IRP for Washington.

2017 Q4 Response: The Company has no additional update from the first quarterly update.

2018 Q1 Response: After receiving feedback from WUTC staff during the Company's TAG 1 meeting, Cascade will be considering incorporating stochastic analysis into its conservation analysis, specifically related to the cost of carbon. The Company will discuss this further in TAG 4.

Item 16. Negotiate with TransCanada for the needed incremental GTN capacity for November 2017

2017 Q3 Response: On August 30, 2017, Cascade's Gas Supply Oversight Committee authorized the Company to secure an incremental amount of GTN capacity. The path is Kingsgate to Malin. The volume is 10,000 dths/day. The effective date is December 1, 2017, terminating October 31, 2032. The principle reason for the acquisition of this capacity is to address potential capacity shortfalls in central Oregon through 2029. This incremental capacity may also provide some additional flexibility to move more AECO gas to Washington. The Company will use the interim period to consider potential DSM, capacity or changes in demand to address any suspected Oregon deficiencies beyond 2029.

2017 Q4 Response: The Company has no additional update from the first quarterly update.

2018 Q1 Response: The Company has no additional update from the first quarterly update.

Item 17. Work with NWP to define what delivery rights can be modified to meet potential shortfalls

2017 Q3 Response: Over the course of summer 2017, Cascade and NWP have had on-going discussions regarding potential re-alignments. NWP has provided several proposals with are currently under review. It is expected that these modeling results will be presented to Cascade's Gas Supply Oversight Committee (GSOC) by year end.

2017 Q4 Response: Cascade met with NWP personnel on 12/13/2017 to discuss their latest proposal. Resource Planning anticipates modeling the latest proposal beginning in January 2018, and provide an update to GSOC during the first quarter 2018.

2018 Q1 Response: See update item 7 above. Also, the Company has asked NWP to provide a delivery rights overview at the 2018 WA IRP TAG 2 in May 2018.

Item 18. Work with NWP and potentially other regional LDCs to determine if a combination of I-5, Wenatchee, etc. expansion or segmentation can address shortfalls and regional infrastructure concerns.

2017 Q3 Response: The Company has had informal discussions with several regional LDCs and NWP regarding potential expansions at a joint level. Options at this time for a joint undertaking faces several hurdles currently (e.g., lack of common pathways, and shortfalls or potential anchor tenants). Consequently, while Cascade will continue to reach out to the parties regarding a joint effort, at this time it appears that the LDCs will likely work separately with NWP to address specific infrastructure needs.

2017 Q4 Response: The Company has no additional update from the first quarterly update.

2018 Q1 Response: See update item 7 above.

Item 19. Incorporate the citygate study into the IRP.

2017 Q3 Response: The Cascade Resource Planning team has completed the citygate study. Currently, the Company's engineering team has the study to confirm the accuracy of the physical capability numbers at each citygate.

2017 Q4 Response: The engineering team has confirmed the accuracy of the physical capability numbers at each citygate. Engineering has incorporated the citygate study to help determine areas where a citygate upgrade may be needed. The resource planning team will look at implementing this study into the SENDOUT model.

2018 Q1 Response: Once the customer and demand forecasts are completed, Cascade will begin modeling SENDOUT for the 2018 WA IRP. The goal is to implement the citygate study in SENDOUT to help determine area's where a citygate upgrade may be needed.

Item 20. Use the results of the Study to confirm aligning of alternative resources, specifically satellite LNG

2017 Q3 Response: This will be updated in the third Quarterly update report, which will be filed in the first quarter of 2018.

2017 Q4 Response: Similar to #19, Cascade will look at implementing this study into the SENDOUT model.

2018 Q1 Response: Similar to update #19, Cascade will be implementing the citygate study into SENDOUT.

Item 21. Upon confirmation of need for satellite LNG, proceed with implementation of facility

2017 Q3 Response: No determination has been made at this time regarding the need for satellite LNG. The Company continues to gather information about the need, costs and risks associated with satellite LNG as a viable alternative resource. In addition, the Company continues to review other alternatives such as trucked-in LNG, pipeline expansions, DSM, etc. to address potential shortfalls.

2017 Q4 Response: The Company continues to gather information on LNG possibilities. Recently, the Company began discussions with PSE about their experience with LNG studies as well as an overview of services provided by their LNG affiliate. Further discussions are planned for early 2018.

2018 Q1 Response: The Company continues to gather information on LNG possibilities. On 3/1/2018 Cascade held separate discussions with PSE about an updated proposal to secure of their LNG affiliate. Further discussions are planned for early 2018.