2025 IRP TAG #1 Meeting

Date & time: 9/12/2024, 9:00 AM to 11:40 AM

Location: Microsoft Teams Meeting

Presenters: Brian Robertson, Mason Fried, Bailey Steeves, Eric Wood

In attendance: Alessandra de la Torre, Bailey Steeves, Becky Hodges, Brian Robertson, Bruce Folsom, Byron Harmon, Caleb Reimer, Carolyn Stone, Chris Robbins, Devin McGreal, Eric Shierman, Eric Wood, Jennifer De Boer, Jodie Albert, Jon DeVaney, Kathleen Campbell, Mark Sellers-Vaughn, Mason Fried, Megan Koelzer, Michael Freels, Michael Meyers, Michael Parvinen, Patrick Darras, Patrick Hanks, Quinn Weber, Robert McCloud, Russ Nishikawa, Ryan Denton, Shawna Nieraeth, Tamy Linver, Tom Pardee, Will Gehrke, Zachary Sowards

Brian Robertson, Supervisor of Resource Planning, opened the meeting by welcoming and thanking stakeholders for participating in Cascade's IRP Process. Brian then proceeded to do introductions.

Presentation #1 – Safety Moment (Brian Robertson)

- Brian presented a safety moment, covering pedestrian safety. Topics include tips for both drivers and pedestrians to increase safety for all.

Presentation #2 – About Cascade Natural Gas (Brian Robertson)

- Brian presented a slide covering a brief history of Cascade Natural Gas (hereinafter referred to as the "Company" or just "Cascade"), including its origin and acquisition by MDU.
- Brian then covered the state of the Company today, including customer counts and service territories.

Presentation #3 – Purpose of the Integrated Resource Plan (IRP) (Brian Robertson)

- Brian covers the purpose of the IRP, the guidelines it follows, and the content within the IRP. This purpose is to inform and guide the Company's resource acquisition process consistent with state regulatory requirements.
- The Company plans to use feedback from TAG meetings to improve the IRP.

Presentation #4 – IRP Webpage (Brian Robertson)

- Brian covers the Company's website, giving a brief walkthrough of the IRP webpage and how to navigate it. This also includes changing languages for those that may desire to do so.
- The IRP describes the two- to four-year and 20-year expectation of how the Company expects to safely serve the energy needs of customers at the lowest reasonable and safe cost. He emphasized the importance of public participation during these TAG meetings.
- He also explained how Cascade plans to address the feedback given. The full TAG meeting schedule is available on Cascade's website, as well as links to previous IRPs for anyone to view anytime they wish. Appendices may also be made available upon request.

Presentation #5 – Stakeholder Engagement Document (Brian Robertson)

- Brian covers the stakeholder engagement document, the importance of it, and encourages participation in the IRP process by stakeholders.
- The document is intended to help align perspectives, so the Company maximizes the effectiveness, influence, and amount of contributions from stakeholders.
- It's important to ask methodology and technical questions early in the process to allow Cascade time to make any changes. The desired result is to be confident in the quality of the draft IRP with feedback from external stakeholders to ensure the final draft exceeds expectations.

Presentation #6 – Climate Weather Data (Mason Fried)

- Mason covers various topics that help incorporate climate science into the IRP process so the Company can ensure the highest accuracy in the modeling process.
- Mason starts with a background that explains how climate scientists use "Global Climate Models" (GCMs) in their projections. These are simulations of the Earth's climate and processes. Scientists then use a method known as "downscaling" to allow for projections that can capture local climate characteristics as well as harness probabilistic projects and an ensemble of models to capture a wider range of potential climate conditions.
- Mason then covers the future climate scenarios that were developed using these methods. These scenarios help us understand the uncertainty in future greenhouse gas emissions and responses by the climate to those emissions. These range from "likely' to "highly unlikely".
- Mason explains how the Company is using a particular projection method called "Localized Constructed Analogs Version 2" (LOCA2). This allows for downscaled temperature projections to develop custom heating degree day (HDD) projections for Cascade's service area. This method is peer-reviewed and used in landmark climate assessments, ensuring that the Company is using high quality data and methods for the IRP.
- Cascade also paired these projections with observational time series data to correct and historical biases.
- Mason then covers the HDD projections that are a result of the methods mentioned above. The more likely and less likely scenarios are presented. Graphs are shown to

represent the different quantiles from 0 to 1 in both scenarios for the simulations ran. This allows for a representation of the possible range among the simulations. Both scenarios show significant interannual variability.

- Mason then covers a more qualitative analysis that mentions that, though climate change is projected to drive warmer temperatures in the Pacific Northwest, extreme cold weather days can still occur. Mason mentions how some evidence suggests that climate change could worsen these cold extremes that result from "polar vortex events" in the near to medium term.
- Further, research out of Portland State University suggests that the Pacific Northwest has a "non-Gaussian temperature distribution", meaning cold snaps are relatively rare.

Question (Byron Harmon): Byron asks for clarification on the differences between the SSP2-4.5 and SSP3-7.0 models in terms of the range of possible HDDs forecasted by the models (see slide 16).

Answer (Mason Fried): Mason explains one reason is that the "less likely" SSP3-7.0 model is a higher greenhouse gas emissions (ghg) scenario due to reversed climate policy, which is driving a greater forcing on the climate system relative to the SSP2-4.5 model. As a result of this, the quantiles graphed will have a tighter spread. Mason comments that there may be other macro factors influencing this as well.

Question (Byron Harmon): Byron has a follow up question (see slide 14). Byron asks if the models are taking into account the potential for large greenhouse gas (GHG) emitting entities to move operations to locations that are not as strict in their regulations of GHG emissions.

Answer (Mason Fried): Mason comments on an inability to speak about the source paper at such a level on the top of their head. But does further comment that the paper considered many scenarios, including those asked by Byron.

Question (Byron Harmon): Byron further follows up by asking if it accounts for land-use issues and potential "feedback loops". An example given is how in the summer if it was hotter in northern Canada than it was in Florida and the emission consequences of such situations. Byron is seeking clarification of global fossil fuel emissions (represented in the graph) vs these types of "land-use" changes.

Answer (Mason Fried): Mason talks about how the global emission models consider feedbacks, responses to emissions, and those types of scenarios but that the SSP models may not treat those variables that explicitly. Mason continues, though, to ensure that the higher ghg models (such as SSP3-7.0) do implicitly capture such variables and changes.

Presentation #7 – Demand and Customer Forecast (Brian Robertson)

- Brian briefly covers the overall process of the forecasts before diving into each piece. Brian also mentions there is a more detailed explanation in the targeted TAG #5 meeting for those that are interested in that.
- First covered are some of the inputs. The input data comes from pipeline actuals at a daily/citygate level, Woods & Poole market intelligence economic data at the county level, weather data from Schneider Electric, and customer count/billing from ThoughtSpot.

- Brian covers the process in which they adjust customer billing data to properly reflect the usage of a customer in each month.
- Next covered is the use per customers forecast. Here Brian explains how each zone and rate schedule (residential, commercial, etc) has its own forecast. Then the model incorporates several explanatory variables that help predict the usage per customer for each zone and rate schedule combination. These explanatory variables are as follows:
    - HDD: The lower the average temperature (or the higher the HDD) on a given day, then the higher the demand.
    - I: This is an indicator variable that equals 1 if the day falls on a weekend. We notice lower usage on the weekends, especially for commercial and industrial customers that close on the weekends.
    - WIND: The higher the average wind speed on a given day, the higher the demand.
    - Retail Price: If the price of gas goes up for customers, the demand may go down.
    - Trend: This captures any overall increase or decrease in the data over time.
    - Fourier(k): This helps capture the seasonality of the data. Combinations of sine and cosine are modeled to help capture this trait.
    - ARIMA(p,d,q): This part of the model involves any autoregressive (AR), integrated (I), and/or moving average (MA) components of the data.
- Brian explains the explanatory variables that go into the customer forecast:
    - HH: This stands for "households" and captures household data from Woods & Poole. This is the projected total number of households in the service area. HH is typically statistically significant for residential customers.
    - Emp: This stands for "employment" and captures projected rate of change in employment. Emp is typically statistically significant for commercial and industrial customers.
    - Retail Price: If prices rise there may be a negative effect on customer count. Note that this variable has not been found to be statistically significant.
    - Income: Higher income areas lead to a higher number of customers in an area. Note this value is indeed statistically significant but very low.
    - Fourier(k): Again, this helps capture seasonality.
    - ARIMA(p,d,q): This part of the model involves any autoregressive (AR), integrated (I), and/or moving average (MA) components of the data.

Question (Eric Shierman): How is the retail price lagged?

Answer (Brian Robertson): It is lagged one year using historical data. We take the actual prices customers see on their bill and lag it one year.

- Brian explains that anyone interested in this should also look at IRP associated documents on the Company's webpage so that they can understand the column names in the excel sheet. He also goes over a couple graphical representations of the Company's service areas that also show information, such as zones and pipelines.
- Brian covers how to find the exact rate for each type of customer in both Washington and Oregon, using Cascade's website.
- Brian then covers building codes and how they can impact the model. These codes are implemented to reduce net energy consumption.

- Brian explains how the 2021 Washington State Energy Codes as well as provides some descriptions of jargon used (such as what constitutes a "dwelling"). These new codes appear to make it impractical for new residential and commercial buildings to use natural gas.
- Brian then moves to customer count impacts in Oregon and how Oregon has signed with 8 other states to create a Nine States Pledge Joint Action to transition to "clean buildings".
- Next, he covers the customer growth scenarios and mentions the high level of uncertainty around customer growth. There is a base case, low growth case, and a high growth case.

Question (Patrick Hanks): Patrick notes the plan is created including 2024, but also notes that the situation can change dramatically if voting for things, such as the CCA, go a certain way. Patrick asks if these are covered in the scenarios that Cascade considers or if there is a particular one that is chosen based on likelihood of occurrence.

Answer (Brian Robertson): Brian notes that all scenarios are considered but one is chosen as the base case. Brian further notes that the Company adds low carbon alternative fuels around different climate policies are also considered. Brians mentions the level of uncertainty in forecasting and how Cascade prepares for such scenarios so that there is a plan in place by adding this uncertainty into the process.

Question (Byron Harmon): Byron asks why there appears to be seasonality in the customer count forecasts. Byron adds an example scenario, asking what if the zero-emission buildings goal is met by 2030, and hence no new buildings that use natural gas are built, why would there be seasonality in the number of customers?

Answer (Brian Robertson): Brian comments that this is not necessarily customer growth, rather customer counts. Brian notes that this seasonality exists in the actual data (highlighting the graph of the historical data) and that customers appear to turn off natural gas services when they go on vacation or during the summer months. Those customers will then return services during the winter months, leading to the seasonality seen in the data. Brian also mentions potential other reasons that may contribute to this trait of the data.

Question (Byron Harmon): Byron asks if the Company is willing to share more recent customer count data.

Answer (Brian Robertson): Brian states he will make sure that is okay, and if so, will share that data with Byron.

- Brian then covers the demand forecast results. Shares a graph of the current forecast scenarios as well as previous IRP forecast results as comparison. He notes the significant effect that customer counts have on demand.

Presentation #8 – Non-Core Outlook (Brian Robertson)

- Core customers are those in which Cascade purchases and distributes the gas for and recovers the associated costs.

- Non-core (or "transportation") customers, typically large industrial or electric generation customers, purchase and schedule their own gas. These customers take responsibility of their own gas needs to get it to Cascade's citygate. They then pay Cascade to use our distribution system.
- He then covers the Company's transportation customers and associated forecasts.
- Cascade is emission responsible for about 105 million therms under the CCA and 13 million under CPP for transport customers in 2025.
- Brian explains how it is too early to determine the impact the CCA will have on these customers.

Presentation #9 – Regional Market Outlook (Bailey Steeves)

- Bailey first covers the long-term regional market outlook, using data and insights from the US Energy Information Administration (EIA). Looking at the role of natural gas in electricity generation, we see a decrease by 2050 relative to 2022, contrasting with relatively stable growth over the past decade.
- Natural gas production increases by 15% from 2022 to 2025. In all cases domestic production outpaces domestic consumption.
- Growing international demand encourages growth in domestic natural gas production.
- Next covered is the short-term outlook. Bailey mentions how electric power generation is the main driver for natural gas consumption during summer months.
- A consultant is quoted stating that comfortable storage levels and steady production point to a bearish short-term outlook for natural gas prices, but potential for extreme weather events and increased cooling demand could put upward pressure on prices as the month progresses.

Question (Byron Harmon): Byron asks if the Company has looked at any clean energy implementation plans from any electric utility companies on how much natural gas they intend to use for their electricity generation.

Answer (Brian Robertson): Brian states the Company has looked at this at a high level. He notes that the IRP is mainly focused on the customers in which Cascade is responsible (in terms of planning for emissions and transportation). Noting that we are not responsible for the emissions of electricity generation customers, he concludes by assuring that this is considered and tracked.

Question (Byron Harmon): Byron follows up, seeking clarification on how the change in demand for one of these electric generation companies can affect the Company in areas such as the capacity need of their system and if the Company is factoring this into their analysis.

Answer (Brian Robertson): Brian notes that the Company doesn't plan for the electric generation on the distribution since these customers are "interruptible".

Michael Parvinen jumps in to clarify that this is true for Oregon but not in Washington.

Presentation #10 – Avoided Cost (Bailey Steeves)

- Bailey covers the Company's avoided cost overview and calculation. She explains these are estimated costs to serve another unit of demand with a supply side resource option at a point in time. These represent costs that could be avoided through energy conservation.
- Bailey notes the similar information used in this IRP as in the previous ones, while also noting that the elements of it will be reconsidered with regards to emission reduction goals.
- Bailey then covers the avoided cost formula and the various components that go into it. These components are:
    - $AC_{nominal}$: Nominal avoided cost for a given year
    - TC_v: Variable transportation costs → pulled from major pipelines used by Cascade
    - TC_F: Fixed transportation costs (when it is avoidable)
    - SC_v: Variable storage costs (when it is avoidable)
    - CC: Commodity Costs → taken from the Company's price forecast)
    - E_{Comp}: Environmental compliance cost → as per U-230161 CCA Policy Statement guideline
    - DSC: Distribution system costs → from forecasted capital expenses related to growth only, which is then converted to a per therm measure
    - RP: Risk premium → delta from deterministic and stochastic pricing
    - E_{adder}: Environmental adder → 10% as per NWPCC guidance

Question (Byron Harmon): Byron clarifies that UTC staff does not speak on behalf of the commission. Then asks if Cascade has considered an elevated avoided cost methodology. Wondering if this could be a way to keep customers on the system that may be most likely to leave.

Answer (Bailey Steeves): Bailey mentions that attempting to elevate avoided costs to keep CCA costs down and to retain more customers would lead to an iterative loop. This loop comes from lowering CCA costs while maintaining customers leading to higher customer growth, which leads to higher CCA costs in addition to distribution system costs that leads to customers leaving, which leads to lower CCA costs and lower distribution costs, and so on. Further, the avoided cost is more of a "utility-centric measure", noting that if we switched to an avoided cost calculation being more a "customer-centric" benefit that this would likely need to involve other utilities as well.

Byron then comments his opinion about the potential benefit and recommends the Company keep this idea in mind as a potential tool.

Devin McGreal also comments, noting the careful approach needed in this type of analysis. Further stating that the avoided cost is a cost effectiveness analysis and how going beyond the current methodology too much may itself lead down a path that directly contradicts the goal.

Byron recognized the "balancing act" that the Company must take in such analysis.

Devin reiterates the emphasis on this "balancing act" and the complications that would arise from using such a tool.

- Bailey continues the presentation to cover environmental compliance costs.
- With the passing of the CCA, the Company thinks using the Company's marginal compliance costs that are associated with this rule may be most accurate.
- Bailey notes that since the withdrawal of the U-230161 CCA Policy Statement Guidelines, the Company is going to continue to evaluate the Social Cost of Carbon being included in the avoided cost calculation.

Question (Patrick Hanks): Patrick asks how the Company adjusts for the Social Cost of Carbon. Asking if the value used is adjusted because of the CCA.

Answer (Brian Robertson): Brian states the Company's uncertainty around this, while noting it has been the Company's stance that the CCA compliance cost does capture the Social Cost of Carbon properly.

Question (Patrick Hanks): Patrick follows up by asking if the policy or statute has a typical methodology used or if there is room to calculate the Social Cost of Carbon.

Answer (Brian Robertson): Brian states there is a technical document used for guidance in this regard. Offering to provide it.

Byron Harmon comments that the Social Cost of Carbon is also found on the UTC website.

- Bailey then covers the results of the avoided cost analysis. Here she shares the costs for 2025, 2040, and 2050, while noting an increase of about 30%-40% from the 2023 IRP from an increase in commodity costs and the addition of the Social Cost of Carbon.

Question (Byron Harmon): Byron asks why different zones have the same avoided costs.

Answer (Bailey Steeves): Bailey states that the way prices are distributed involves a blend so that each customers pays the same regardless of zone.

Brian Robertson further comments that Byron has a good point and that he will need to further discuss this internally to provide further information.

Byron Harmon comments how a consisted avoided cost may be more efficient rather than differentiating between each zone.

Presentation #11 – Upstream Pipeline Presentation (Eric Wood)

- Eric first covers the gas supply components. These are transportation, commodity, and storage. Eric notes the contracts the Company has and how it builds its portfolio. For commodity, he explains how the Company purchases gas based on daily need when these types of purchases are required. Storage is used to hedge prices and price arbitrage between summer and winter.
- Eric then briefly covers the Company's system map. Noting how the Company's service areas are scattered, leading to more transportation needed. He then covers the pipeline transport flow and how these help meet demand. Noting the typical flow amounts on these pipelines and how/when they are typically used.

- Eric then shows a simple representation of where the Company's gas comes from. Note that this is a simple diagram for representative purposes only. Brown circles are regions where the Company gets gas, the blue are the markets within those regions, green is storage, and orange are interconnects between pipelines.
- Eric then covers the highlights of the 2024 portfolio design.
- Eric then shows a "hedge calculation table". Here he explains the hedge amounts for each of the 3 years. It also shows information such as forecasted usage, needed supply, hedge target, how much is hedged, and how much is left.
- Eric comments on renewable natural gas and how he deals with the physical molecules on the system. He takes approximately 900 Dth a day on the system into account as well.
- Eric then shows a winter usage sample graph, showing how much more NWP flows than GTN and Enbridge.
- Eric then goes over the Company's storage resources and how the Company desires to harness them.
- With these, at 100% of demand, Cascade can meet about 67% of peak day needs.
- Eric then shows graphs of MIST, Jackson Prairie, and Plymouth storage usage from 04/2024 to 03/2024. These graphs show that the Company's target does not fall far from the actual usage. Further noting that the previous winter did not see as much demand.
- Eric then goes over an example of a peak day stack, using a diagram to show an example representation. Noting that this can change depending on a variety of conditions.

Presentation #12 – Planned Scenarios and Sensitivities (Brian Robertson)

- Brian first covers resource integration scenarios. These scenarios include customer growth, climate regulation, electrification, weather, and low carbon alternative fuels.
- Brian explains the reference case modeling and the variety of stochastic scenarios that will be modeled. Noting how the stochastic modeling will be used to better understand how different scenarios will impact the Company's preferred portfolio. Brian offered running a single climate scenario which would reduce the number of scenarios. Reducing the number of scenarios will allow more monte carlo simulations to be run for each one, while maintaining the number of outcomes from this analysis. These will allow the Company to implement the portfolio that meets system demand with the least cost and least risk mix of fuel options and conservation.

Post Presentations –

There were no post presentation feedback or questions. Brian briefly went over the schedule for the 2025 Washington IRP, the topics to be discussed in TAG #2, and reiterated the willingness of the Company to answer any questions.

The Meeting was Adjourned

Per Cascade Commitment #8 (Stakeholder Engagement Design Document, 2/22,2022: “Provide TAG minutes that include the action items from bullet #7 as well as any upcoming deadlines for feedback on the IRP”), here are additional action items to track, coming out of the TAG meeting:

1. Cascade requests any feedback be given by September 27, 2024 to allow proper time for consideration into the model.
2. Cascade will consider recommendations suggested during the meeting, specifically regarding the avoided cost zones and the impact of the clean energy implementation plans.
3. Cascade will continue to monitor the CCA and CPP and the implications/impact it has on the IRP, adjusting accordingly.