Appendix J

Methodological Changes

2023 WA IRP

Introduction

The Methodological Changes Appendix outlines the key changes in methodologies that occurred since the 2020 WA IRP. Cascade will identify each change with a brief analysis of pros and cons of the new approach.

Chapter 3: Demand Forecast

As mentioned on page 3-25, Cascade has made a slight change to the forecast methodology this IRP by shifting billing cycles and using price as a regressor. For certain billing cycles, Cascade noticed that billed data aligned better with actual pipeline flow data when the billed data was lagged a month. Cascade included price as a regressor to determine if it can be used as an explanatory variable to demand.

Pros:

- Shifting billing cycles allows the Company to accurately line up historical usage to heating degree days (HDDs), which is the main explanatory factor to usage.
- Including price as an explanatory variable can give the Company some predictive value when there are significant price changes.

Cons:

- Shifting billing cycles is an estimate, which requires an allocation. However, the pros heavily outweigh the cons when shifting billing cycles.
- Including price as a variable can create cross-correlation issues. Cross-correlation can be caused by two explanatory variables being correlated, which HDDs and price are significantly correlated. However, Cascade does test for cross-correlation and adjust the model as needed if cross-correlation is found.

Chapter 4: Supply Side Resources

Cascade has moved Renewable Natural Gas (RNG) information from its own chapter to Chapter 4. When purchasing gas, Cascade considers RNG and Hydrogen as a supply resource to serve customers and meet emission reduction goals.

Pros:

- Analyzing traditional supply resources while analyzing RNG and hydrogen allows the company to consider costs while also considering reducing carbon emissions.

Cons:

- Cascade only sees this as a pro.

Chapter 5: Avoided Costs

Cascade has made a change to how distribution system costs and risk premium are calculated for the avoided cost. As mentioned on page 5-5, the Company projects what investments it may need to make related to growth of the distribution system, and divides that by the projected peak day load growth from Cascade's load forecast. Cascade now defines risk premium as the difference between the impacts of a potential extreme upward price movement versus that of an extreme downward price movement. Due to the lognormal nature of gas prices, the risk presented from rising prices will typically exceed that of falling prices. Cascade calculates distribution system costs for both peak day and peak hour, as distribution system analysis is most concerned about system capabilities during a peak hour scenario.

Pros:

- While energy efficiency may not be able to fully eliminate the need for a distribution system enhancement, it can defer the need for these enhancements to a later year. Because of the economic principle of the time value of money, this deferral has value, and that value is the avoided distribution system cost for the 2023 IRP.
- Past risk premium efforts relied on a theoretical fully hedged portfolio that would never exist in practice. This calculation uses the true nature of gas pricing to derive an actual risk premium for the 2023 IRP

Cons:

- Cascade only sees this as a pro.

Chapter 6: Environmental Policy

In this IRP, Cascade has increased modeling around the Climate Commitment Act (CCA) in Washington and the Climate Protection Plan (CPP) in Oregon. This has created the biggest methodological change to this IRP process. Instead of least-cost, least-risk modeling, Cascade now models least-cost, least-risk while hitting carbon emission reduction goals.

Pros:

- By modeling CCA and CPP, Cascade will provide a roadmap to reduce carbon emissions while continuing to offer an additional energy service to customers.

Cons:

- Traditional natural gas is a clean fuel source that is relatively inexpensive compared to RNG and Hydrogen. The CCA and CPP will effectively reduce traditional natural gas and customers will be required to purchase the higher cost fuel sources.

Chapter 7: Demand Side Management (DSM)

The DSM tool and modeling methodology for this iteration of the IRP is Applied Energy Group's (AEG's) modeling framework tool LoadMAP. LoadMAP was developed as an end-use load forecasting model to allow estimation of conservation potential, built in Microsoft Excel, and tailored to meet the needs of the client. Due to the scalable nature of the model, it allows utilities to analyze potential for a combination of market sectors, segments, climate zones, end uses, technologies and measures under the Utility Cost Test (UCT), Total Resource Cost (TRC) and Resource Value Test (RVT) concurrently.

Pros:

- LoadMAP is built to reflect the latest Northwest Power and Conservation Council's (NWPCC's) methodology, calculating the Company's Achievable Technical Potential similarly to others within the region.
- LoadMAP has been improved to allow for an update in the baseline year.
- LoadMAP allows all three climate zones in the Company's service territory to be run concurrently, with individual customer counts, baseline forecasting and avoided costs to be incorporated.
- Segmentation of the residential customer base can now be executed by impact level. This provides improved malleability in savings data for agencies who serve subsets of the customer base.
- LoadMAP has been designed to model rapidly changing assumptions, such as those involving the social cost of carbon.

Cons:

- While the LoadMAP model can be rapidly re-run with minor input adjustments, major assumptions centered around a new Conservation Potential Assessment (CPA) are unable to be made on a short-term basis and require a more significant monetary investment.
- Limited ability to decrement saving assumptions by specific service territories. This weakens modeling options based upon region or city specific greenhouse gas emission rules which are rapidly changing.
- Adjustments to LoadMAP may require data entry of the same input multiple times, which requires diligence to avoid entry errors. For example, when updating the base or starting year, every table on every tab of every spreadsheet needs to be diligently checked, and exceptions exist for certain tables whose years must not be updated.

Chapter 9: Resource Integration

Cascade has enhanced its resource integration process by moving from SENDOUT® to PLEXOS®. PLEXOS® software supports emissions reduction modeling, which is a crucial element of deriving Cascade's Preferred Portfolio in the 2023 IRP. The Company has also changed its Supply Resource Optimization Process by changing its philosophy regarding the type of portfolios evaluated and by modeling significantly less scenarios in the 2023 IRP. In its stochastic process, Cascade has gone back to generating 200 draws versus 10,000 draws but running portfolios through all 200 draws instead of just identifying the nth percentile and running that draw only.

Pros:

- PLEXOS® is capable of modeling emissions, which SENDOUT® was not able to do.
- PLEXOS® has a robust support team and software that is continually being update, which SENDOUT® was lacking.
- Portfolios better reflect the diversity of options presented to Cascade by including options such as renewables only portfolios, versus past modeling that only evaluated traditional gas-based options.
- Focusing on a smaller number of scenarios allows the Company to provide a more robust qualitative and quantitative analysis of those portfolios, including bill impacts, cost impacts, projected emissions compliance pathways, and deep dives into key takeaways from the results
- Running portfolios through 200 stochastic draws allows Cascade to generate new stochastic metrics such as loss of load probabilities and success rates for complying with emission reduction goals under varying weather and pricing profiles.

Cons:

- Moving to PLEXOS® required the Company to rebuild its system model in a new software, which is very time consuming and can prove challenging to troubleshoot errors when learning new software.
- Evaluating a wider breadth of scenarios allows Cascade to generate results for a larger range of externalities, even if the analysis of those results is limited
- There is some concern about whether 200 draws is a large enough sample size to create a full distribution when running Monte Carlo simulations. The Company had to weigh this against its computational constraints when determining how to perform its stochastic analysis.