Northwest **Power** and **Conservation** Council

March 4, 2025

MEMORANDUM

TO: **Council Members**

FROM: **Steven Simmons**

SUBJECT: **Ninth Plan Demand Forecast, Part I**

BACKGROUND:

Presenter: Steven Simmons, Tomás Morrissey

Summary: This presentation will help frame discussion of the Ninth Plan Demand Forecast.

There are three goals we strive to achieve with the forecast:

1. Create an accurate and comprehensive estimate of the demand for electricity in the region across twenty years
2. Deliver an informative set of inputs to the power planning models
3. Produce a spread of potential future demand trajectories and characteristics

Traditionally a forecast is defined as a prediction of a future condition or outcome. In our case, we are working to create an accurate, long-term estimate of future demand in the region. We also work to gain an understanding as to how the region uses electricity, which leads to an end-use modeling approach. As an example, what are consumers and builders choosing for space and water heating for residences and business, and how do specific end-use technologies such as electric heat pumps affect energy consumption?

The demand forecast also acts as a source of actionable inputs for the other power planning decision models and tool sets. In this case, it may differ from the

traditional definition of a forecast. For example, we are careful in our forecasting to not *double-count* the effect of energy efficiency potential. In this case, we *freeze* equipment efficiency levels in the modeling, to allow the power planning resource model to evaluate cost-effective efficiency levels.

Finally, we are building an informative spread of demand futures across the twenty-year power planning horizon. These futures will attempt to capture key demand and temporal characteristics such as

- The magnitude of future demand – higher, lower
- The shape of potential future demand
- The timing of demand growth – such as early, mid or late in the power planning horizon

Relevance: Per the Northwest Power Act, as part of its regional power plan, the Council is required to develop and include "a demand forecast of at least twenty years…". In addition to producing the long-term demand forecast, data from the load forecast is used to inform the energy efficiency and demand response potential assessments, capital expansion modeling, the market price forecast, and the resource adequacy studies.

Workplan: B.2.2. Finalize long-term load forecasts for plan analysis.

Background: For further background, please see the following presentations to the Council:
https://www.nwcouncil.org/fs/18842/2024_0813_8.pdf
https://www.nwcouncil.org/fs/18658/2024_03_p2.pdf
https://www.nwcouncil.org/fs/18575/2024_01_p3.pdf

1

Purpose

- Part I → **Today**
  - Framing of the forecast
    - Create an accurate and comprehensive long-term forecast of demand for the region
    - Deliver an informative set of inputs to the power planning models
    - Develop a spread of potential future demand trajectories and characteristics
- Part II → **April**
  - Discussion of results

2

Forecasting

3

Demand Forecast

- Traditional thinking - a *forecast* is a prediction of a future outcome; it's a way to anticipate future events or conditions from studying historic information and events
- A *forecast* can change the future in a beneficial way – in a sense making the forecast itself inaccurate
- *Forecasts* can also create harmful feedback loops, herding behavior and bubbles

Our goal - create an accurate and comprehensive *forecast* of *demand* for electricity in the region – across twenty years

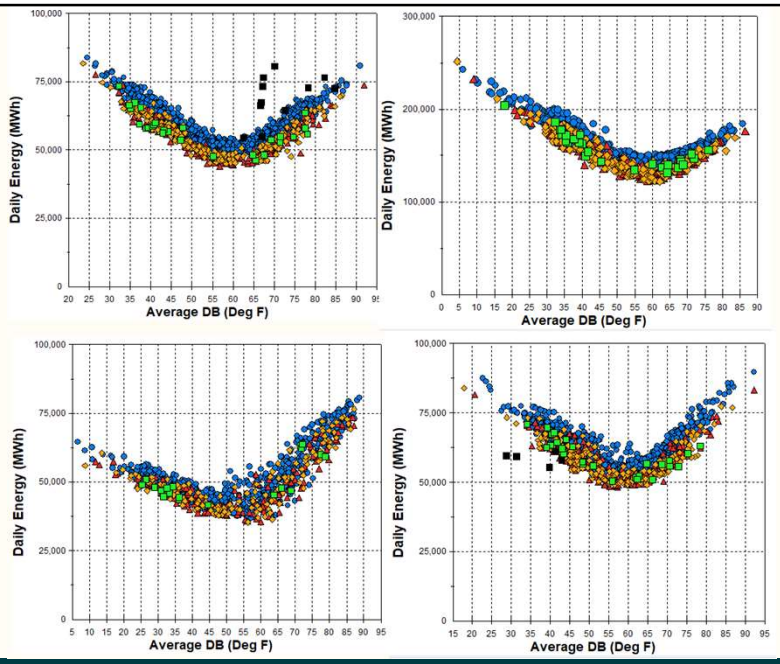
- When we *forecast* – we also want to learn about the region's energy use – to gain an understanding of what might drive changes to future demand
- To do this – we build a *model*
- The demand forecast is an output from the model, which is highly input data driven – and it's getting more complex

4

Two *truths* – past weather and load. Around this – we build up a world

Past – Present – Future

1. Building stock – new and existing by type
   - Units
   - Square feet
2. End use technology
   - Fuel
   - Saturation
   - Efficiency
   - Shape
3. Economic
   - Population
   - Employment
   - Income
4. Industry and dynamic new high tech
   - Quantitative and qualitative
5. Electric Vehicles
   - Registration & Sales
   - Usage
   - Shape
6. Rooftop Solar
   - Installations and shape
7. Future weather – may not be the same as the past



5

Power Planning Inputs

6

Forecast as an input

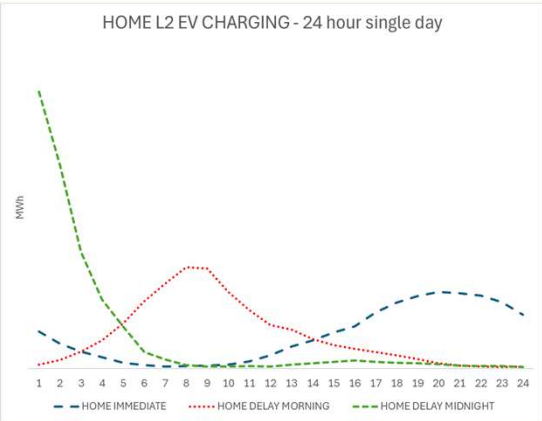
- A *forecast* can also act as an input to a decision-making process
- In this case, it may differ from the tradition concept of a forecast as a prediction tool

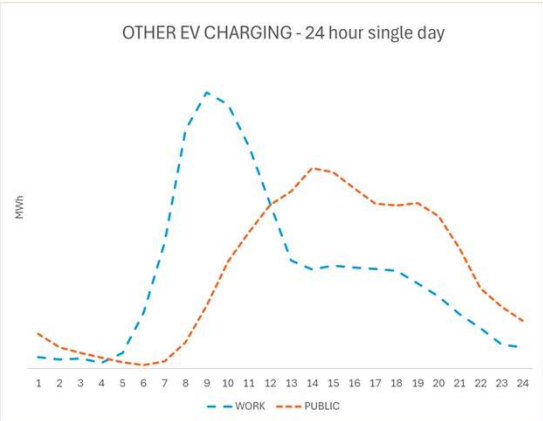
Our goal - create an actionable set of demand inputs for the power planning models and tools

- Avoid double-counting the effect of energy efficiency potential by freezing efficiency/saturation levels in the model
- This allows the power planning resource model to evaluate cost-effective efficiency levels in context with other options
- Model run with a relatively *unmanaged* electric vehicle charging shape
- At the end of the power plan cycle, the decisions reached for resources such as EE, rooftop solar, and EV charging programs will be fed back into the model and a final forecast is generated

7

Input example - EV Charging





8

Future Demand Trajectories

9

Forecast Spread

Our goal - create an informative spread of potential futures – keying on 3 primary demand characteristics

1. Magnitude
2. Timing
3. Shape

Futures – will be created by combining forecast variations of input data sets for

1. Future weather
2. Economic growth or stagnation
3. Electric vehicles
4. Data Centers
5. Building Electrification
6. Hydrogen Production

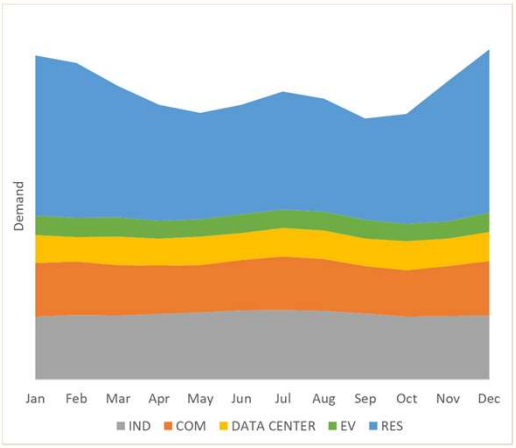
10

Choose the Toppings

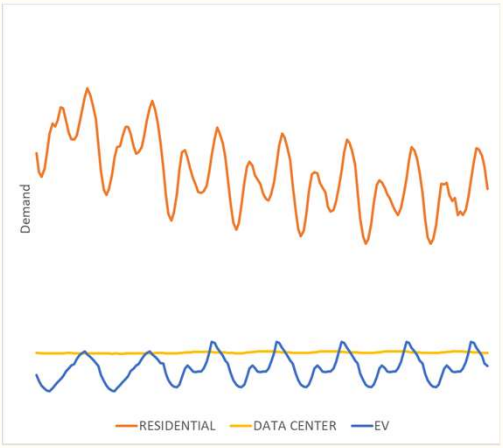
Factor	Magnitude	Shape	Timing	Note
WEATHER	Summer loads	Peaky	Throughout	4 weather outlooks: *typical* + 3 climate model projections
ECONOMIC	Lower across most sectors		Throughout	Investigate running a *low* trajectory Not as impactful on demand unless severe
ELECTRIC VEHICLES	Residential loads	Peaky	Mid horizon	Significant in some zones Uncertainty in other zones along with pace to full fleet electrification
DATA CENTERS	Single large loads	Flat	Early	Significant in some zones and early
BUILDING ELECTRIFICATION	Winter loads	Peaky	Late	Residential and Commercial impacts
HYDROGEN PRODUCTION	Single large loads	Flat	Late	Also depends on level of in-region production

11

Example:
Seasonal Demand Shape for one year



Example:
Hourly Demand Shape for one week



12

A note on the Demand Futures

In order the keep the number of models at both a manageable and useful level - we will be very *intentional* with how we select the futures – to focus on the three key demand characteristics mentioned earlier that inform power planning

- We will run all climate model weather futures and a normal/typical weather pattern
- There will be *reasonable* high and low bounds
- We intend to investigate the effect of running initial combinations of the *toppings to* gauge impacts before selecting final futures

13

Miscellaneous

14

Demand Forecast Advisory Committee

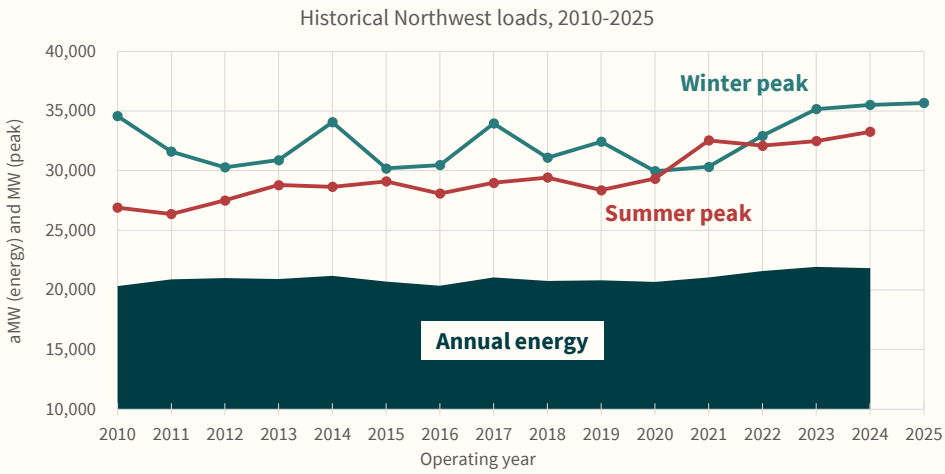
We've held two meetings with stakeholders in 2025

1. January 13
   - Discussion of the re-developed demand forecast model
   - Model structure and methodology
   - Data Centers and other Single Large Loads
2. February 19
   - Residential inputs
   - Rooftop solar
   - Electric Vehicles
3. At least one more to come in March/April as we discuss more results

15

Years are operating years (Oct – Sep) to keep winter months together
Data from EIA Form 930, FERC Form 714, and BPA SCADA
Year 2025 data are preliminary

Historical Northwest loads



16