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2025 Electric Integrated Resource Plan

Technical Advisory Committee Meeting No. 5 Agenda

Tuesday, April 23, 2024

Virtual Meeting – 8:30 am to 10:00 am PTZ

Topic	Staff
Introductions	John Lyons
Long Run Load Forecast	AEG
Load Forecast Comparison	Avista Staff
Review Planned Scenario Analysis	James Gall

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2025 IRP TAC 5 Introductions

John Lyons, Ph.D.
Technical Advisory Committee Meeting No. 5
April 23, 2024

Today's Agenda

Introductions, John Lyons

Long Run Load Forecast, AEG

Load Forecast Comparison, Avista Staff

Review Planned Scenario Analysis, James Gall

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Remaining 2025 Electric IRP TAC Schedule

- **TAC 6: May 7, 2024: 8:30 to 10:00 (PTZ)**
  - Conservation Potential Assessment (AEG)
  - Demand Response Potential Assessment (AEG)

- **TAC 7: May 21, 2024: 8:30 to 10:00 (PTZ)**
  - Variable Energy Resource Study
  - Portfolio/Market Scenarios

- **TAC 8: June 4, 2024: 8:30 to 10:00 (PTZ)**
  - Load & Resource Balance and Methodology
  - Loss of Load Probability Study
  - New Resources Options Costs and Assumptions

- **TAC 9: June 18, 2024: 8:30 to 10:00 (PTZ)**
  - IRP Generation Option Transmission Planning Studies
  - Distribution System Planning within the IRP & DPAG update

- **Technical Modeling Workshop: June 25, 2024: 9:00 am to 12:00pm (PTZ)**
  - PRiSM Model Tour
  - ARAM Model Tour
  - New Resource Cost Model

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Remaining 2025 Electric IRP TAC Schedule

- **TAC 10: July 16, 2024: 8:30 to 10:00 (PTZ)**
  - Preferred Resource Strategy Results
  - Washington Customer Benefit Indicator Impacts
  - Resiliency Metrics

- **TAC 11: July 30, 2024: 8:30 to 10:00 (PTZ)**
  - Preferred Resource Strategy Results
  - Portfolio Scenario Analysis
  - LOLP Study Results

- **TAC 12: August 13, 2024: 8:30 to 10:00 (PTZ)**
  - Preferred Resource Strategy Results (continued)
  - Portfolio Scenario Analysis (continued)
  - LOLP Study Results (continued)
  - QF Avoided Cost

- **September 2, 2024- Draft IRP Released to TAC.**

- **Virtual Public Meeting- Natural Gas & Electric IRP (September 2024)**
  - Recorded presentation
  - Daytime comment and question session (12pm to 1pm- PST)
  - Evening comment and question session (6pm to 7pm- PST)

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Avista Energy Electric Forecasting

Prepared for Avista Energy TAC Meeting 4/23/2024

Background

AEG has worked with Avista for multiple Conservation Potential Assessments going back to 2010

As part of the CPA, AEG creates a baseline projection at the segments and end use level, which provides granular insight on peak impacts and changes in individual technology classes

Now Avista is using AEG's LoadMAP™ end use model directly to inform its official load forecast, including effects of state energy codes, potential electrification and market trends in a clear and direct manner.

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Major Modeling Inputs and Sources

Avista foundational data

- Avista power sales by schedule
- Current and forecasted customer counts
- Retail price forecasts by class

Survey data showing presence of equipment

- Avista: Residential customer survey conducted in 2013
- NEEA: Residential and Commercial Building Stock Assessments (RBSA 2016 and CBSA 2019)
- US Energy Information Administration: Residential, Commercial, and Manufacturing Energy Consumption Surveys (RECS 2020, CBECS 2018, and MECS 2015)

Technical data on end-use equipment costs and energy consumption

- Regional Technical Forum workbooks
- Northwest Power and Conservation Council's 2021 Power Plan workbooks
- US Department of Energy and ENERGY STAR technical data sheets
- Energy Information Administration's Annual Energy Outlook/National Energy Modeling System data files

State and Federal energy codes and standards

- Washington State Energy Code
- Idaho Energy Code
- Federal energy standards by equipment class

Market trends and effects

- RTF market baseline data
- Annual Energy Outlook purchase trends (in base year)

Forecast Process

Market Characterization

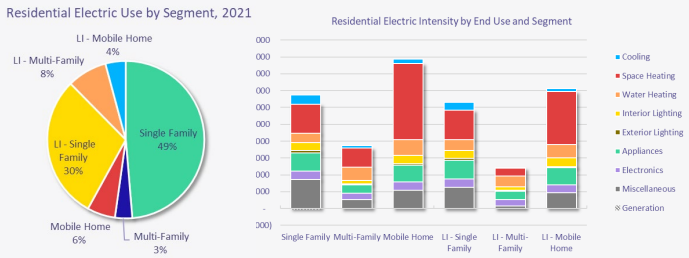
- Segmentation
- End Use and Technology List
- Allocate electric loads & calibrate

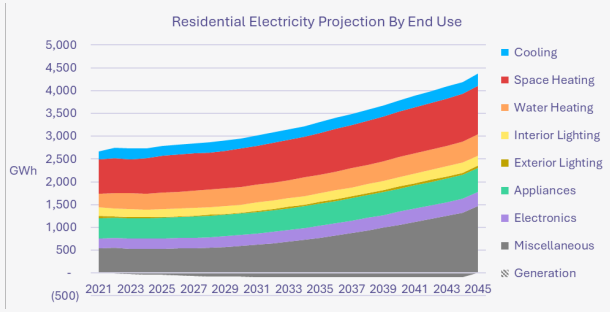
Run Baseline Projection (Annual)

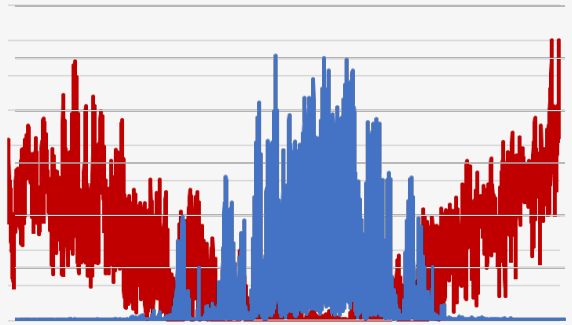
- Customer Forecast
- Stock Turnover
- Purchase Decisions

Create Hourly Forecast

- Assign end use load shapes
- Aggregate energy by shape
- Apply hourly shape throughout forecast period

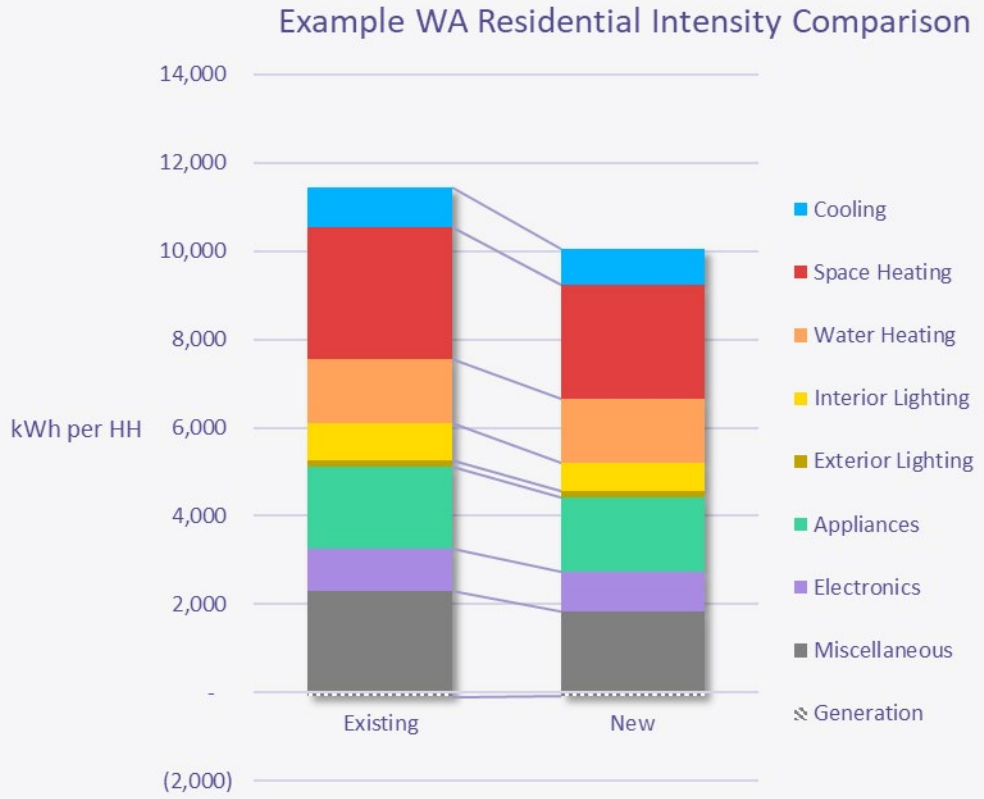






Existing vs New Buildings

- Modeling tracks existing building stock separately from new code-compliant buildings
  - Buildings also undergo renovation at a rate consistent with the DOE's National Energy Modeling System, converting them into code-compliant structures
- Presence of equipment in new buildings is adjusted to comply with energy codes where applicable
  - For example, all new residential structures are assumed to use electric heat pumps for space heating



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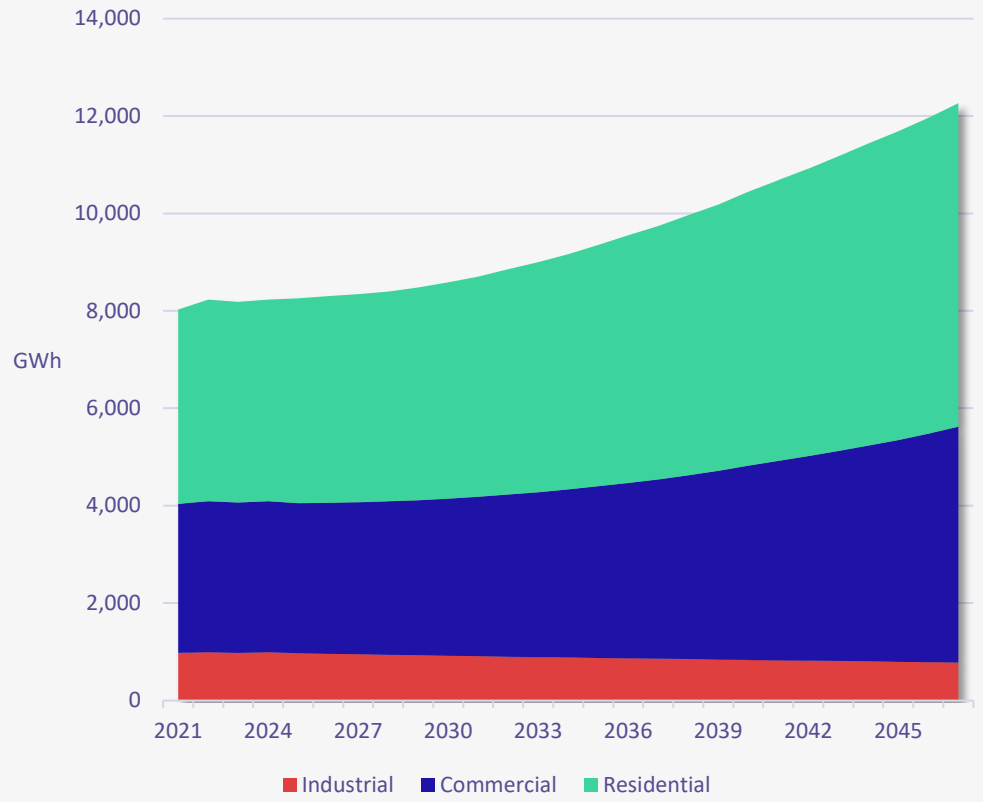
System Total Load Forecast

Washington + Idaho Combined

- Customer growth and electrification from natural gas systems combine for a projected 53% increase in electric loads over the forecast period, or 1.6% annually
- Growth from electrification is roughly equal to growth from customer increases (~2,400 GWh each)
- Includes:
  - Projected cooling and heating degree days according to climate trends in Avista's territory
  - Market efficiency impacts (such as trends toward LED lighting as baseline), which are saving over 1,000 GWh in the forecast period compared to minimum codes & standards
  - Solar and EV projections from the DER study in Washington (Avista projections for Idaho)



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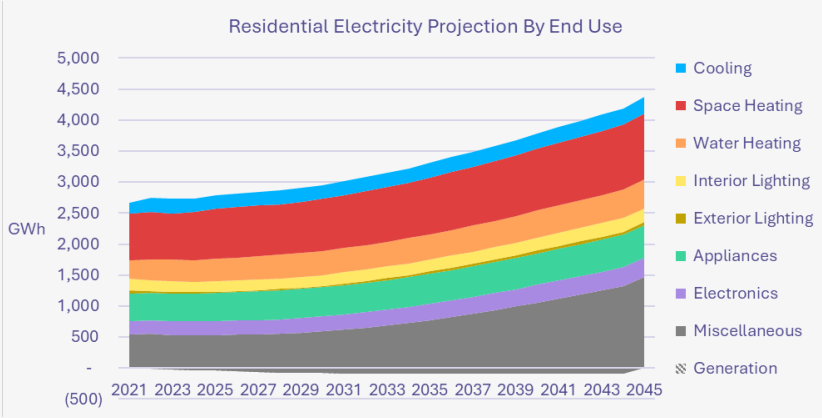
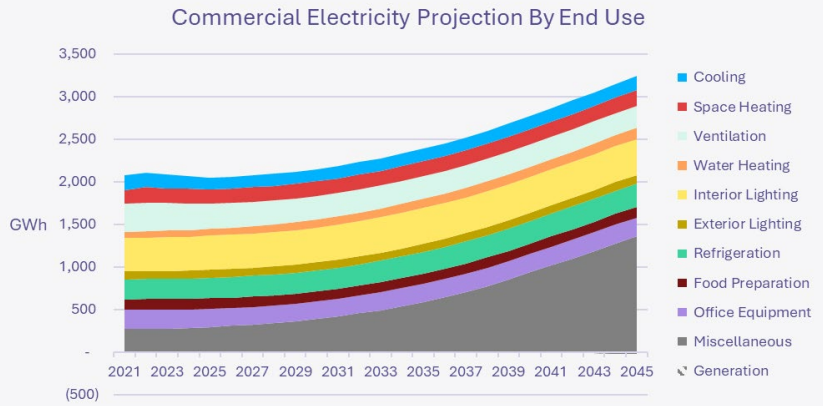
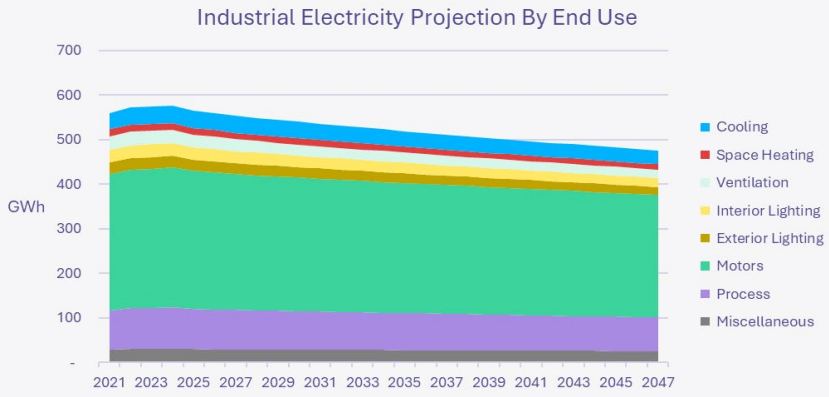
Washington Sector-Level Forecasts

- WA Residential is the fastest growing sector, at 1.97% per year, driven by space heating and EV growth
- Commercial EV charging also adds over 1,000 GWh per year by 2045
- Industrial loads have continued to trend downward and no new load increases are anticipated

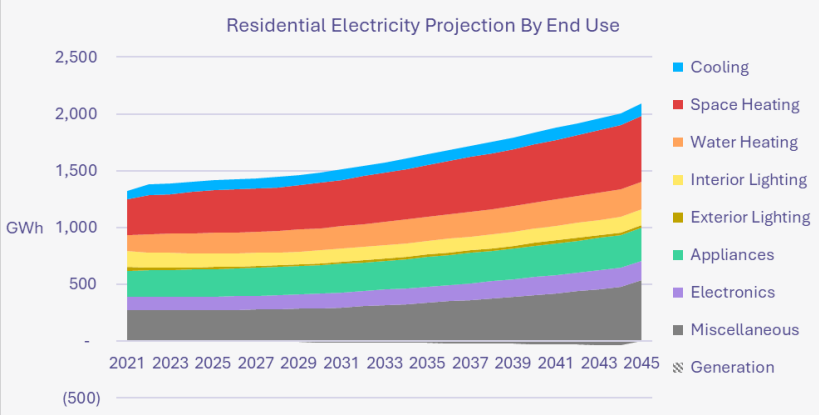


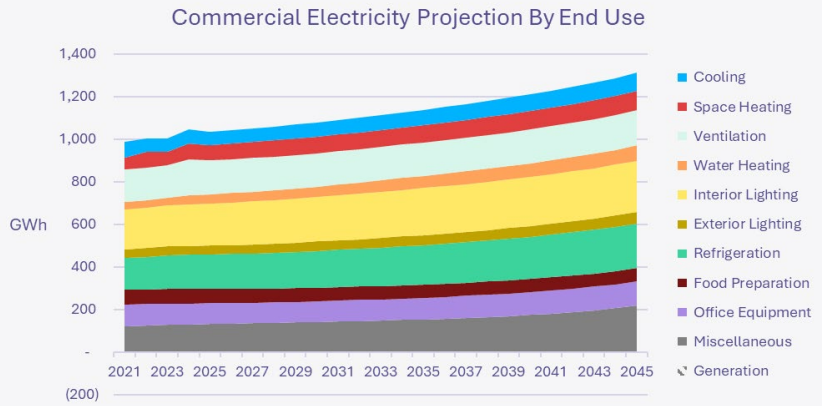


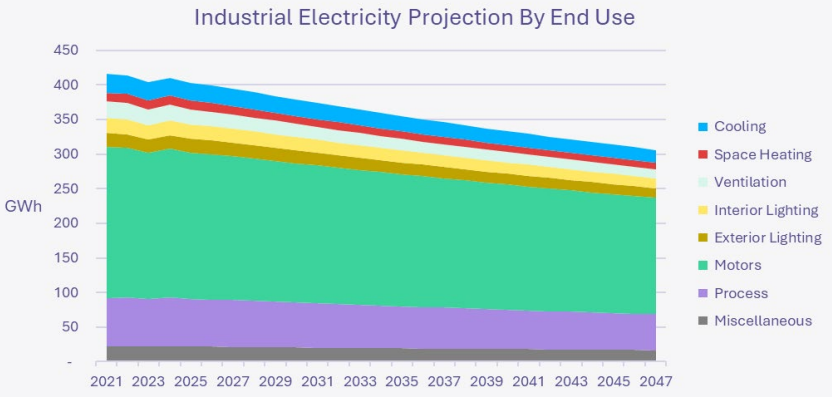


Idaho Sector-Level Forecasts

- ID load growth is not as fast as WA, mainly due to lower electrification and much less EV.
- ID is projected to see greater increase in customers than WA however, so there is still significant growth in both the Residential and Commercial sectors

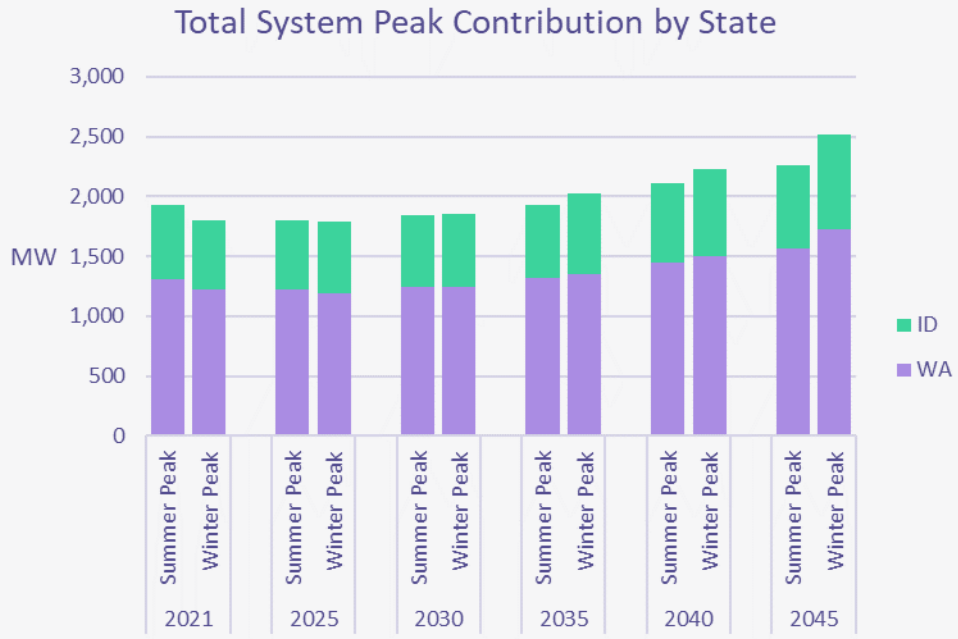


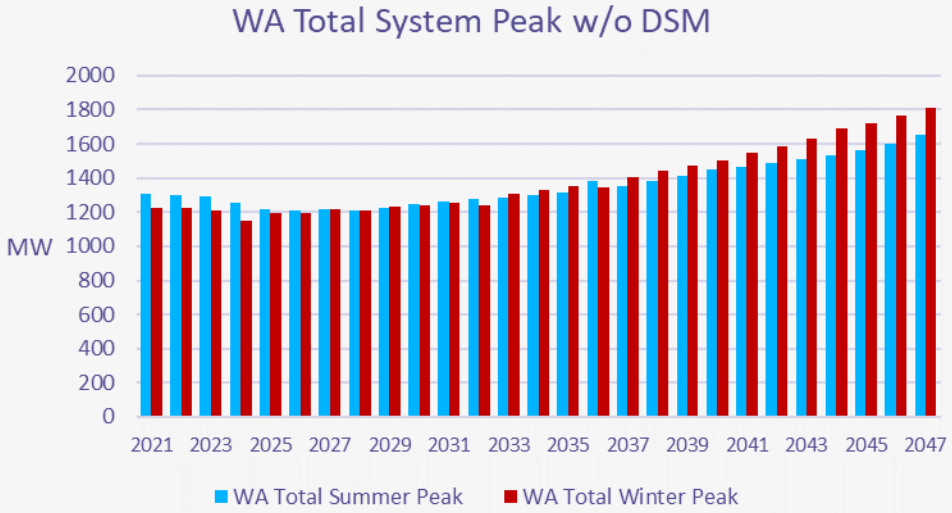


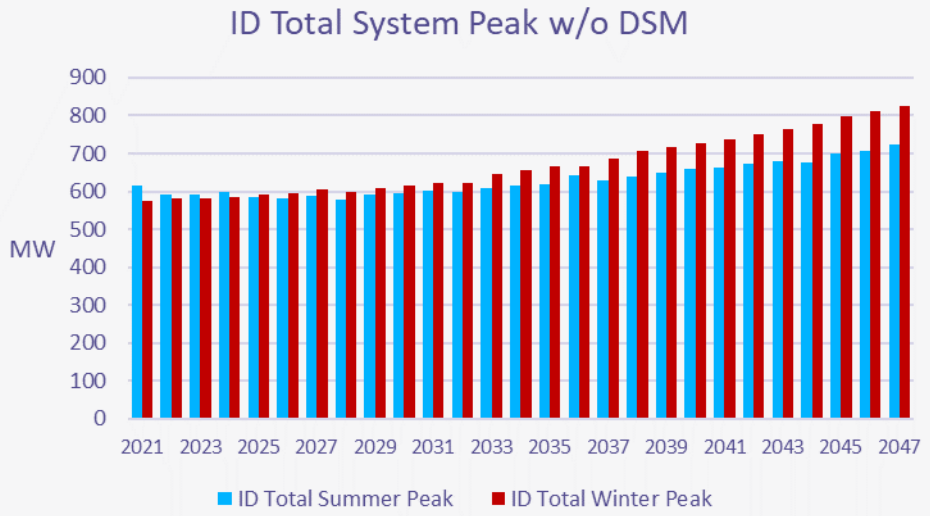


Peak Forecasts

- Winter system peaks are projected to be higher than summer by around 2030+, however this projection is very sensitive to assumptions on when EVs will be charging.
- AEG used an annual charging shape provided by Cadeo and developed in the DER study.







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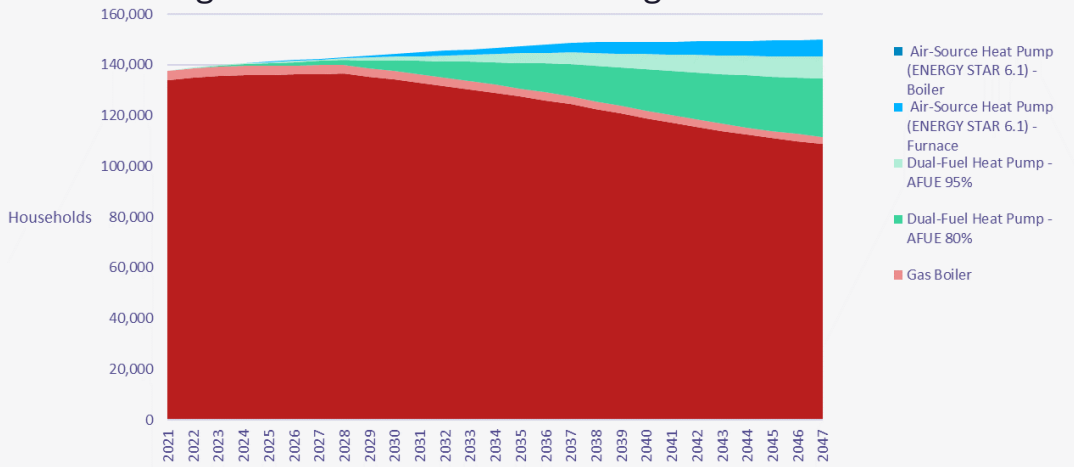
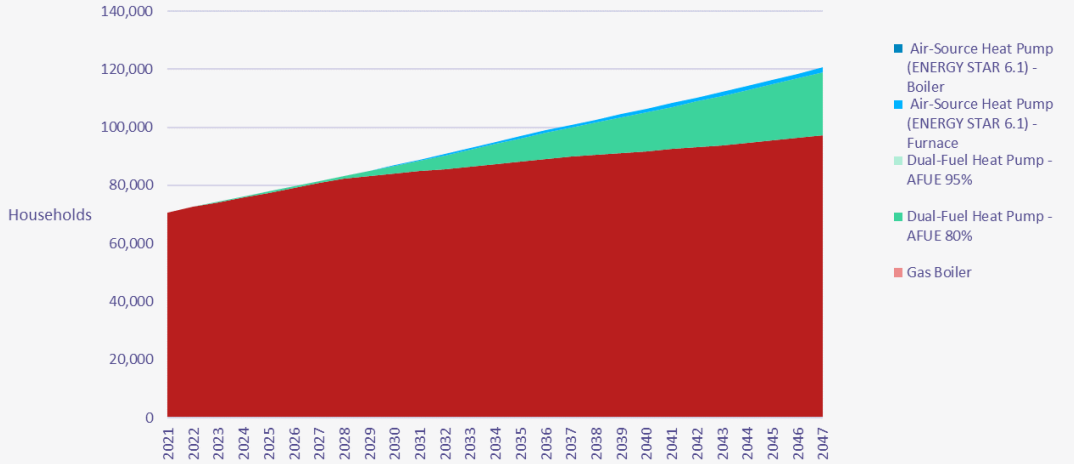
Electrification Decision Modeling

- Gas customers were modeled the same way as the electric market, with the option to replace existing gas space or water heating equipment with electric alternatives, using purchase decision logic copied from the US DOE's National Energy Modeling System.
- Conversion costs include the possibility of a panel upgrade and associated labor. The model compares the lifetime cost of ownership including up front costs and associated lifetime fuel costs.
- As data on customer electrification is not readily available*, electrification purchases were seeded with a value ¼ that of dual-fuel heat pump installations, which do have documented market shares for WA and ID.

Washington Residential Gas Heating Market Transformation



Idaho Residential Gas Heating Market Transformation



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Electrification Projection

Stock share converted by 2045

Residential	Washington	Idaho
Space Heating - Dual-Fuel Heat Pump	29,422 (20.0%)	19,424 (16.7%)
Space Heating – Full Electric ASHP	6,242 (4.3%)	1,578 (1.4%)
Water Heater – HPWH	1,611 (1.7%)	256 (0.4%)

Commercial & Industrial	Washington	Idaho
Space Heating - Dual-Fuel Heat Pump	515 (6.7%)	760 (8.9%)
Space Heating – Full Electric ASHP	134 (1.8%)	46 (0.5%)
Water Heater – HPWH	712 (8.3%)	678 (6.7%)

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Thank You.

Phone: 631-434-1414

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2025 IRP Load Forecast

James Gall & Mike Hermanson
Technical Advisory Committee Meeting No. 5
April 23, 2024

Transition End Use Model to Load Forecast

Energy

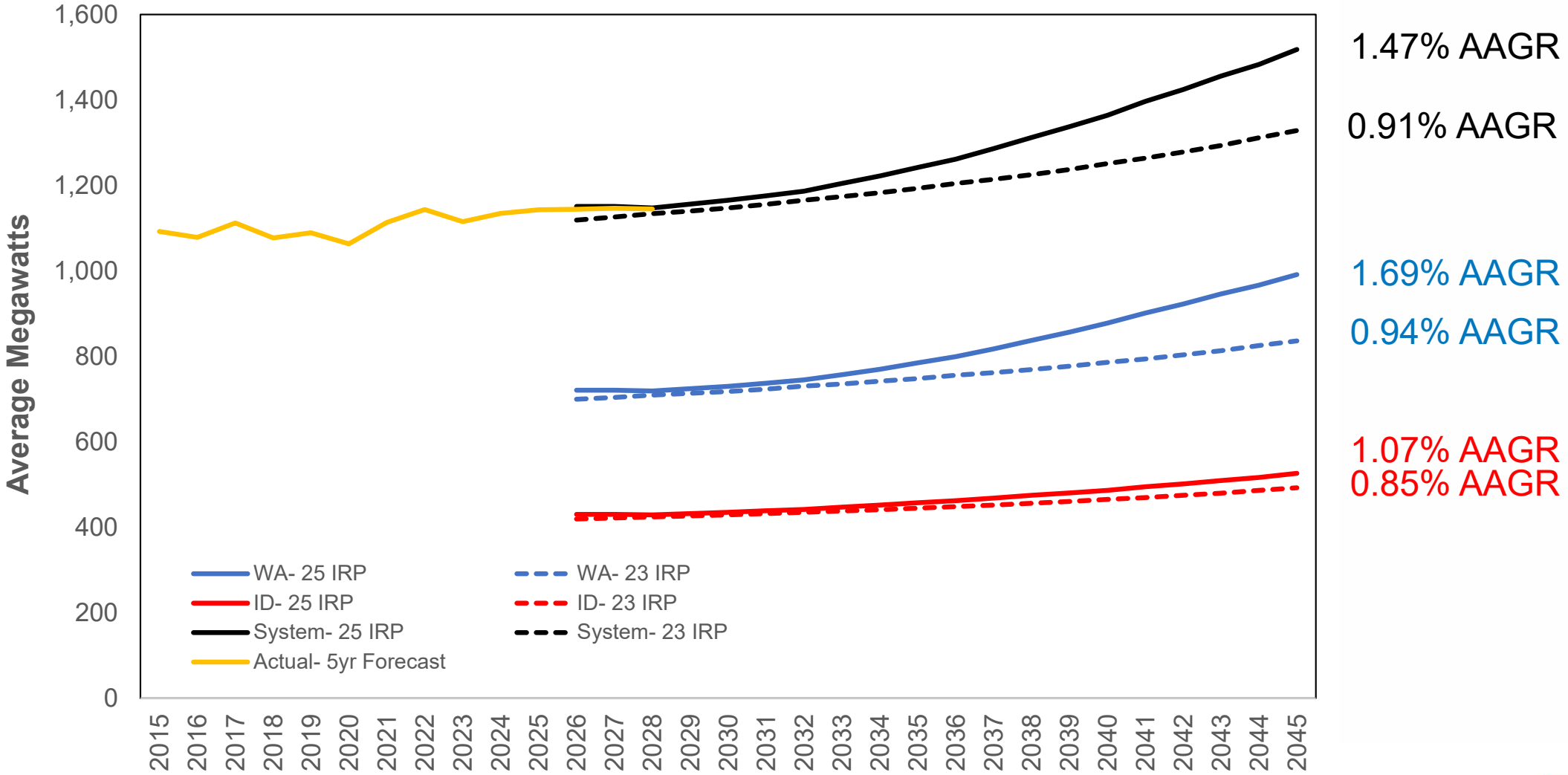
- Starts with AEG's forecast w/ & w/o DSM
- Add energy losses (T&D)
- Add large industrial loads

Peak

- Estimate 2024 weather adjusted peak load using historical and future weather data for each month
- Escalate loads using AEG's end use model's peak growth factors
- Add large industrial loads
- Demand response and/or managed loads not included

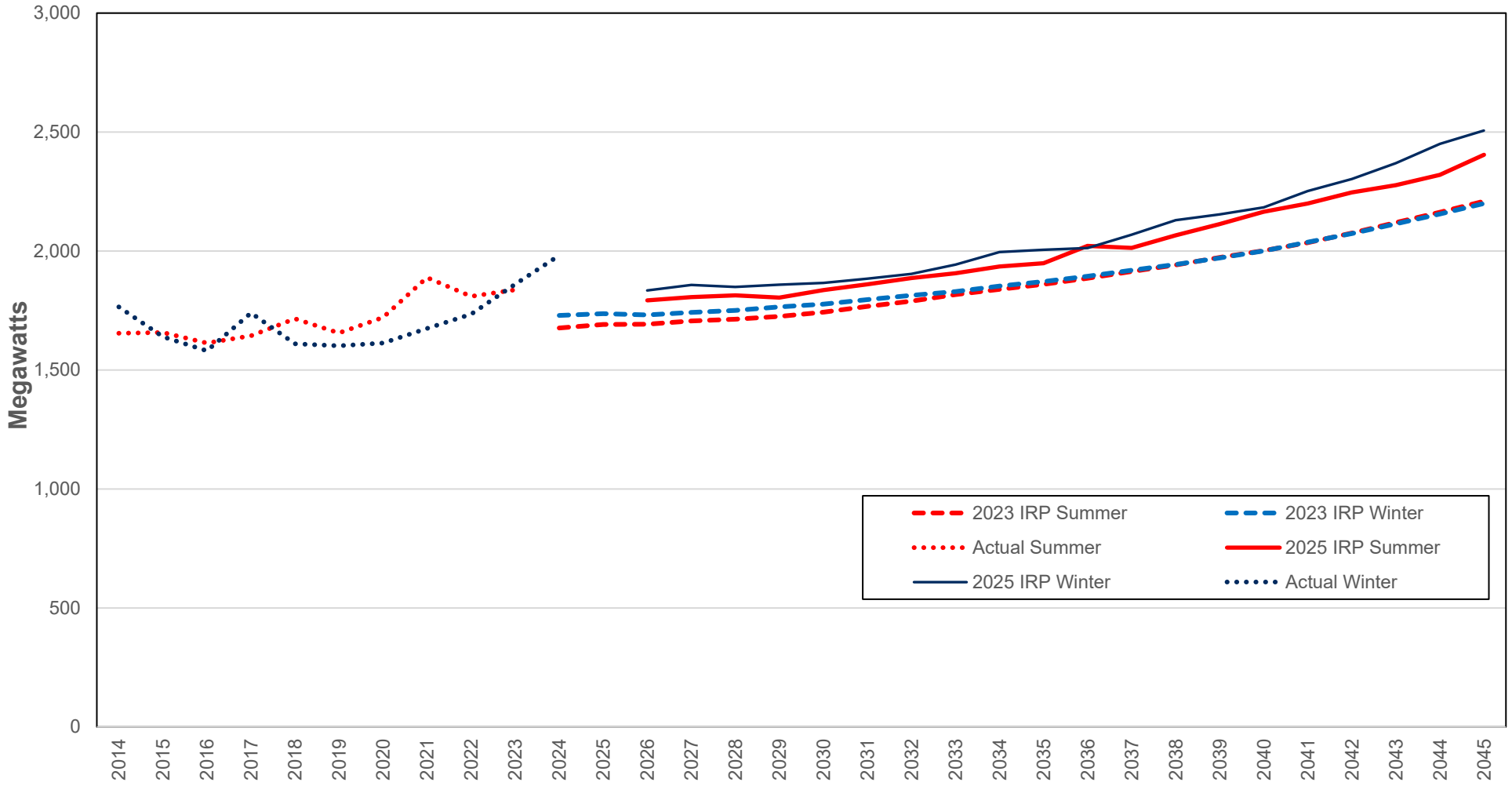
The PRiSM model will include a load forecast without DSM and the model will select cost effective programs and may adjust this estimate to ensure the amount of selected energy efficiency arrives at a similar net load forecast as presented today.

Energy Forecast



Note: Includes 67 aMW of energy efficiency w/ losses: ~60 aMW (WA) & ~7 aMW (ID)

Peak Forecast (1-in-2 weather event)



Note: Historical peak values include curtailed loads

Peak Distribution

- **Winter and summer distribution charts of peak load by temperature will be added in the final slide deck.**

2025 Electric IRP Portfolio Proposed Scenario List

	Scenario	Market Price Sensitivity	LOLP Study (2030)	LOLP Study (2045)
1	Preferred Resource Strategy	Deterministic Low NG Prices High NG Prices	X	X
2	Alternative Lowest Reasonable Cost			
3	Baseline: Least Cost Reliable Portfolio	Deterministic Low NG Prices High NG Prices	X	X
4	Clean Resource Portfolio by 2045	Deterministic Low NG Prices High NG Prices	X	X
5	Low Growth (Low Load Growth)			
6	High Growth (High Load Growth)			
7	80% Washington Building Electrification by 2045			
8	80% Washington Building Electrification by 2045 & High Transportation Electrification Scenario			
9	Extreme Building/Transportation Electrification for Washington & Idaho w/o new Natural Gas CTs			X
10	Maximum Washington Customer Benefits			
11	Least Cost + 500 MW Nuclear in 2040	Deterministic Low NG Prices High NG Prices		X
12	WRAP PRM		X	X
13	Least Cost + 0% LOLP		X	X
14	Power to Gas Unavailable			X
15	Minimal Viable CETA Target			
16	Maximum Viable CETA Target			
17	Preferred Resource Strategy w/ CCA repealed	No CCA Forecast		
18	Unconstrained Cost Preferred Resource Strategy			
19	High QCC on Demand Response (w/ minimum selection)		X	
20	Data Center in 2030		X	
21	Nuclear Cost Sensitivity			
22	RCP 8.5 Weather		X	X
	Avoided Cost Portfolios			
A	No Supply-Side Resource Additions			
B	Clean Capacity by 2045			

Scenario Description:

1- **Preferred Resource Strategy:** Using the expected case load, resource, and stochastic price forecast, the model will determine the least cost resource strategy meeting each state's energy and capacity requirements. Portfolio will also track Customer Benefit Indicators in Washington and use Social Cost of Greenhouse Gas (SCGHG), Non-Energy Impacts, and Named Community Fund (NCIF) spending for Washington's portfolio optimization. Idaho's optimization will focus on least cost to meet energy and capacity requirements. Portfolio uses planning margin requirement to ensure 5% Loss of Load Probability (LOLP) in 2030. CETA targets are shown in Figure 1.
2- **Alternative Lowest Reasonable Cost**: Required study to determine CETA cost cap impacts. This scenario assumes no CETA clean energy requirements, no NCIF, but includes SCGHG for resource selection [in Washington] while meeting physical monthly energy/capacity requirements.
3- **Baseline: Least Cost Reliable Portfolio:** Determines the least cost portfolio to meet energy and capacity requirements based on economic decisions w/o SCGHG or CETA; same as the 'Alternative Lowest Cost Alternative' scenario w/o SCGHG prices for Washington. The portfolio will also be used to develop avoided costs as it separates portfolio costs by renewable and capacity premiums; quantifies the impacts of SCGHG.
4- **Clean Resource Portfolio by 2045**: Determines the portfolio to eliminate all greenhouse gas emitting generation resources in the portfolio by 2045. The resulting portfolio must meet all capacity and energy requirements.
5- **Low Growth (Low Load Growth)**: Studies the portfolio effects of loads not materializing due to lower growth than forecasted.
6- **High Growth (High Load Growth)**: Studies the portfolio effects of higher load levels materializing due to higher growth than forecasted.
7- **80% Washington Building Electrification by 2045:** Determines the least cost portfolio of converting 80% of Washington State natural gas residential and commercial demand to electric through heat/water conversions to heat pump and resistance technologies by 2045.
8- **80% Washington Building Electrification by 2045 & High Transportation Electrification Scenario**: Determines the least cost portfolio of converting 80% of Washington State natural gas demand to electric through heat/water conversions to heat pump and resistance technologies by 2045 along with a higher-than-expected electric transportation forecast.
9- **Extreme Building/Transportation Electrification w/o new Natural Gas CTs:** Determines the least cost portfolio of converting 80% of Washington & Idaho natural gas demand to electric through heat/water conversions to heat pump and resistance technologies by 2045 along with a higher-than-expected electric transportation forecast for both states. This scenario also assumes all natural gas resources are retired by 2045.
10- **Maximum Washington Customer Benefits:** Washington State required scenario to understand the portfolio and cost impacts of improving Customer Benefit Indicators. This portfolio will exclude non-Washington sited resources, air emitting resources and lower energy burden through additional energy efficiency and community solar for named communities. Higher named community penetration of roof-top solar and electric vehicles from the Distributed Energy Resource Study will also be considered.
11- **Least Cost + 500 MW Nuclear in 2040:** Uses the Preferred Resource Strategy assumptions with the addition of up to 500 MW of nuclear generation beginning in 2040.
12- **WRAP PRM**: Solves for the least cost portfolio meeting capacity, energy, and state policies using the Planning Reserve Margin currently required in the WRAP.
13- **Least Cost + 0% LOLP:** Solves for the least cost portfolio meeting capacity, energy, and state policies, but acquires generation to ensure the loss of load probability (LOLP) is zero rather than 5%.
14- **Power to Gas Unavailable:** Similar portfolio design as the "PRS" scenario without the option of using power to gas fuels such as Ammonia or Hydrogen.

15- **Minimal Viable CETA Target**: Uses the same portfolio design as the “PRS” scenario except the CETA targets for clean energy use the minimal viable targets from Figure 1.
16- **Maximum Viable CETA Target**: Uses the same portfolio design as the “PRS” scenario except the CETA targets for clean energy use the maximum viable targets from Figure 1.
17- **Preferred Resource Strategy w/ CCA repealed**: This portfolio uses the No CCA market price forecast and estimates the portfolio if the CCA is repealed by voters in November 2024.
18- **Unconstrained Cost Preferred Resource Strategy:** In the event the PRS scenario is constrained by the 2% cost cap, this portfolio illustrates the cost to comply with 2045 CETA regardless of cost.
19- **High QCC on Demand Response (w/ minimum selection)**: This portfolio will be optimized using a higher QCC for demand response programs than used in the PRS scenario. If the portfolio does not result in higher demand response, the lower cost program options will be included in the portfolio.
20- **Data Center:** Add 100 MW of load in 2030 due to a new data center load.
21- **Nuclear Cost Sensitivity:** Determine cost of nuclear to be selected in PRS (if not already selected)
22- **RCP 8.5 Weather:** Use RCP 8.5 climate future for the load forecast

Avoided Costs Portfolios:
No Supply-Side Resource Additions: This “portfolio” is only used to estimate the capacity premium of the avoided cost calculation; uses same EE selections as ‘PRS’ scenario; uses same assumptions as ‘baseline’ scenario except uses market purchases to meet demand instead of acquiring new resources.

Clean Capacity by 2045: This portfolio is similar to the ‘baseline’ scenario except it does not allow for new natural gas generation, does not require the model to satisfy monthly energy targets and assumes Coyote Springs 2 is not available in Washington in 2045. The portfolio is used to determine the clean capacity credit for avoided cost calculations only.

Figure 1: CETA Target Scenarios