2025 Electric Integrated Resource Plan

Technical Advisory Committee Meeting No. 6 Agenda

Tuesday, May 7, 2024

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

Topic	Staff
Introductions	John Lyons
Conservation Potential Assessment	AEG
Demand Response Potential Assessment	AEG

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2025 IRP TAC 6 Introductions

John Lyons, Ph.D.
Technical Advisory Committee Meeting No. 6
May 7, 2024

Today's Agenda

Introductions, John Lyons

Conservation Potential Assessment, AEG

Demand Response Potential Assessment, AEG

Remaining 2025 Electric IRP TAC Schedule

- **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

Remaining 2025 Electric IRP DRAFT 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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AEG
APPLIED ENERGY GROUP

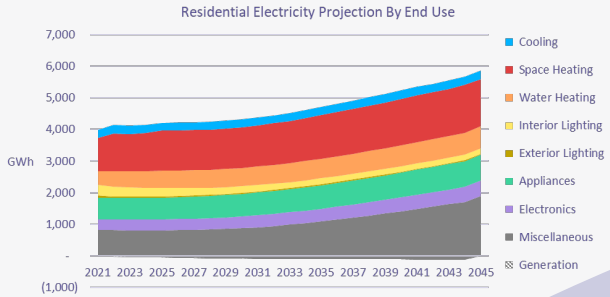
Avista Energy
Electric CPA Draft Results

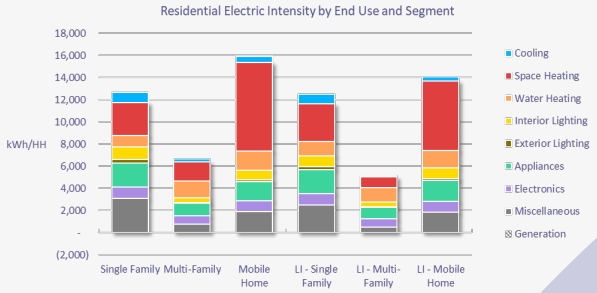
Prepared for Avista Energy TAC Meeting 5/7/2024

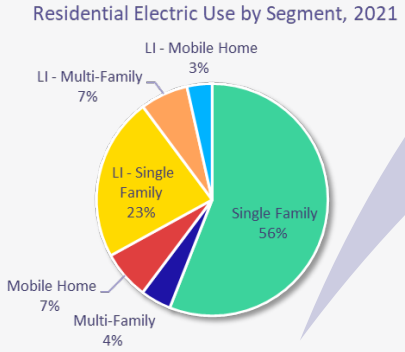
CPA Objectives

- Assess a broad set of technologies to identify long-term energy efficiency and demand response potential in Avista's Washington and Idaho service territories to support:
  - **Integrated Resource Planning**
  - **Portfolio target-setting**
  - **Program development**
- Provide information on costs and seasonal impacts of conservation to compare to supply-side alternatives
- Understand differences in energy consumption and energy efficiency opportunities by income level
- Ensure transparency into methods, assumptions, and results

EE Modeling Approach







Market Characterization

- Baseline studies
- Utility data
- Secondary data

Baseline Projection

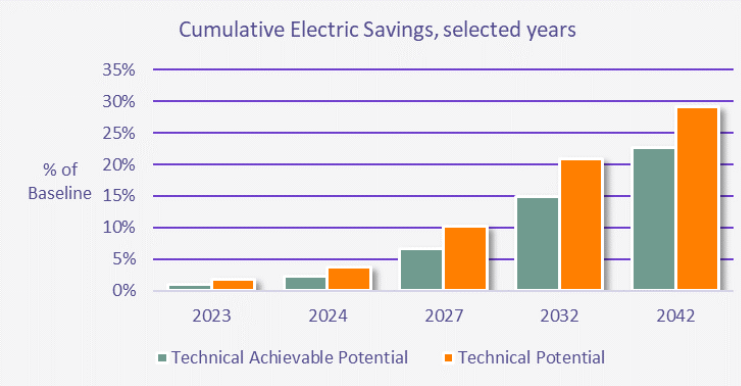
- Utility forecasts
- Standards and building codes

Identify Demand-Side Resources

- EE equipment
- EE measures
- Emerging tech.

Potential Estimation

- Technical
- Achievable Tech.
- Economic screen in IRP



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

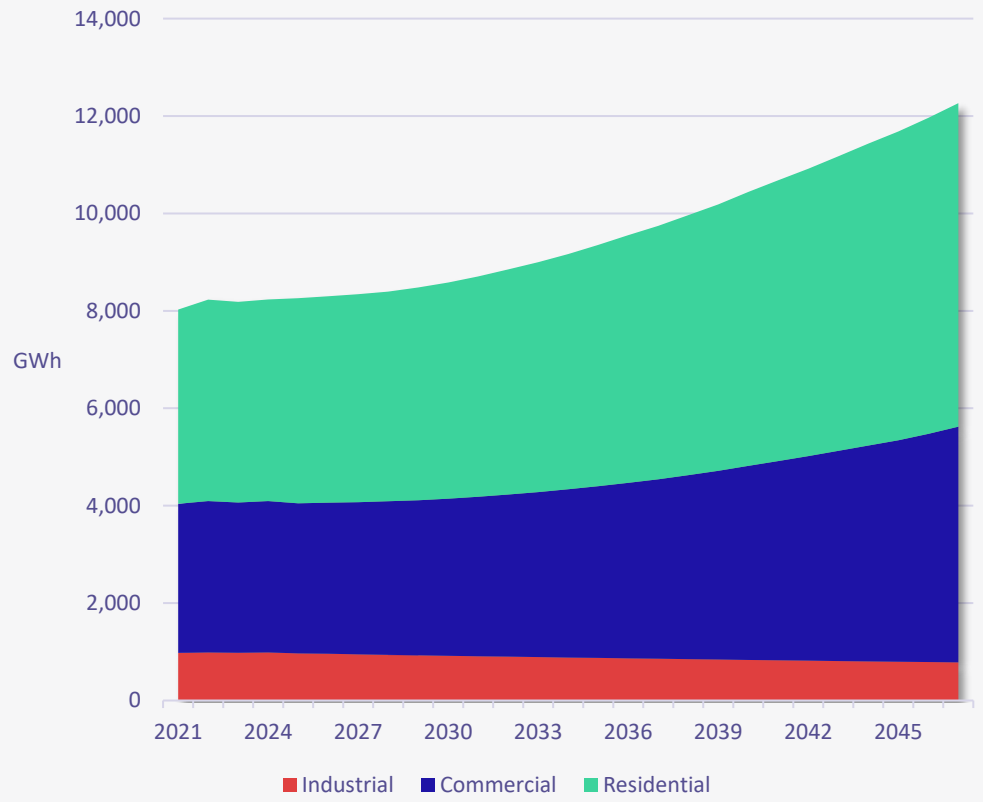
Market trends and effects

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

Baseline 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)



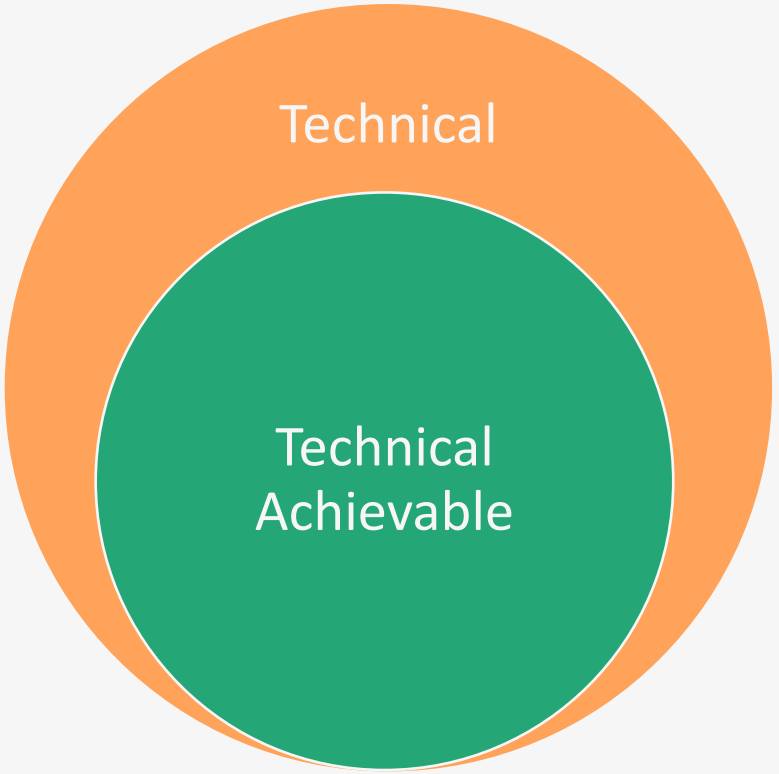
Levels of Savings Estimates

NW Power Council Methodology

This study develops two sets of estimates:

- Technical potential (TP): upper bound on potential, assuming all of the most energy efficiency opportunities are adopted without consideration of cost or customer willingness to participate.
- This may include emerging or very expensive ultra-high efficiency technologies
- Technical Achievable Potential (TAP) is a subset of TP that accounts for customer preference and likelihood to adopt through both utility- and non-utility driven mechanisms, but does not consider cost-effectiveness

In addition to these estimates, the study produces cost data for the Total Resource Cost (TRC) and Utility Cost Test (UC)T perspectives that can be used by Avista's IRP process to select energy efficiency measures in competition with other resources (see next slide)



Potential Estimates

Achievability

All potential "ramps up" over time – all ramp rates are based on those found within the NWPCC's 2021 Power Plan

- Max Achievability
  - **NWPCC 2021 Plan allows some measures max achievability to reach up to 100% of technical potential**
  - **Previous Power Plans assumed a maximum achievability of 85%**
  - **AEG has aligned assumptions with the 2021 Plan and measures such as lighting reach greater than 85%**
- Note that Council ramp rates are agnostic to delivery to acquisition mechanism and include potential that may be realized through utility DSM programs, regional initiatives and market transformation, or enhanced codes and standards

Measures examples over 85% Achievability:

- All Lighting
- Washers/Dryers
- Dishwashers
- Refrigerators/Freezers
- Circulation Pumps
- Thermostats
- C&I Fans

Residential Electric Draft Results

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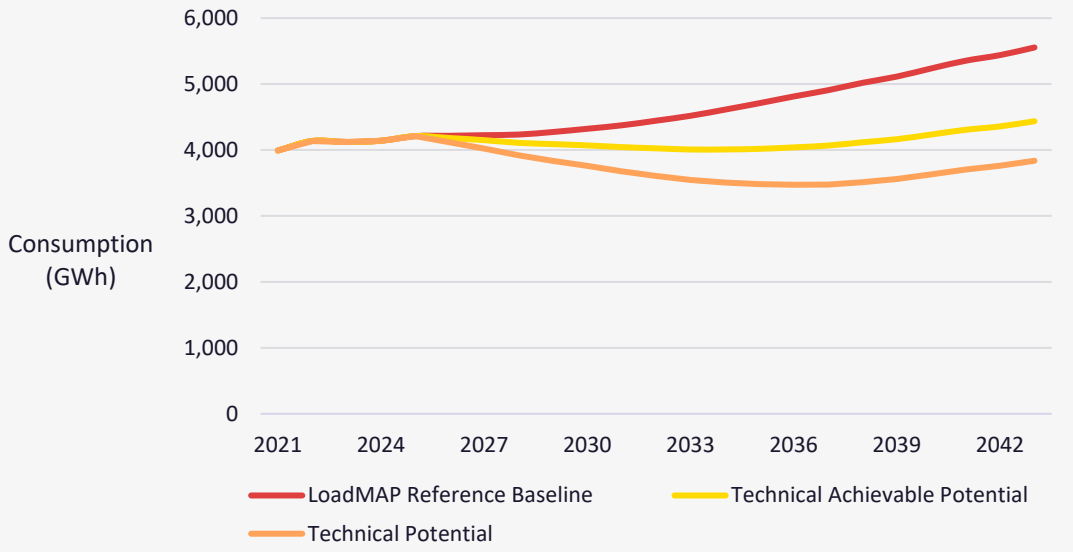
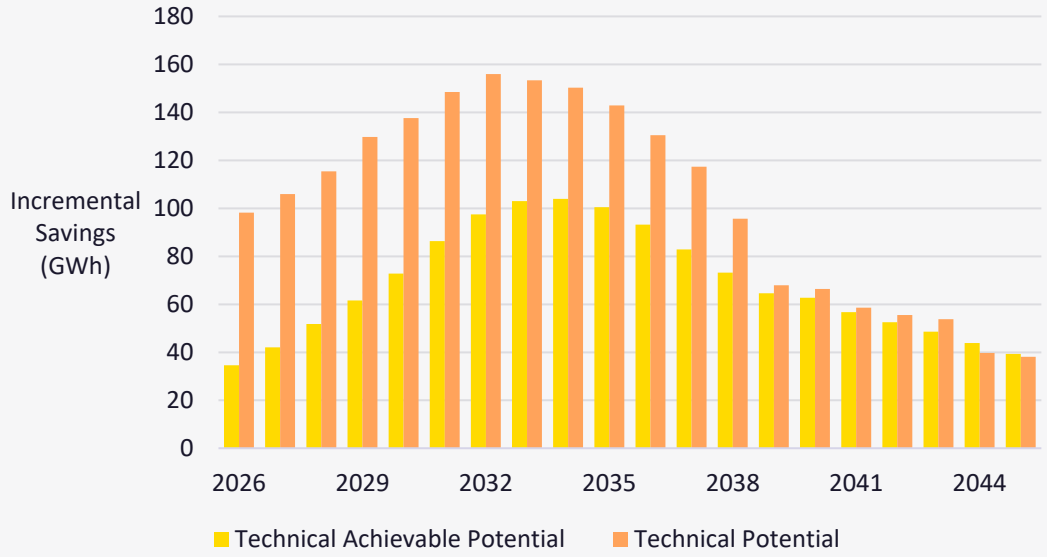
Residential EE Potential

- Draft results indicate energy savings of 1.0% of baseline consumption per year are Technically Achievable.
  - **76 GWh (2.4 aMW) in next biennial period (2026-2027)**
  - **693 GWh (79.1 aMW) by 2035**
  - **1,170 GWh (133.6 aMW) by 2045**
- Top measures in 2045 include:
  - **Heat Pump Water Heaters**
  - **ENERGY STAR 7.0 Windows**
  - **Level 2 Electric Vehicle Chargers**





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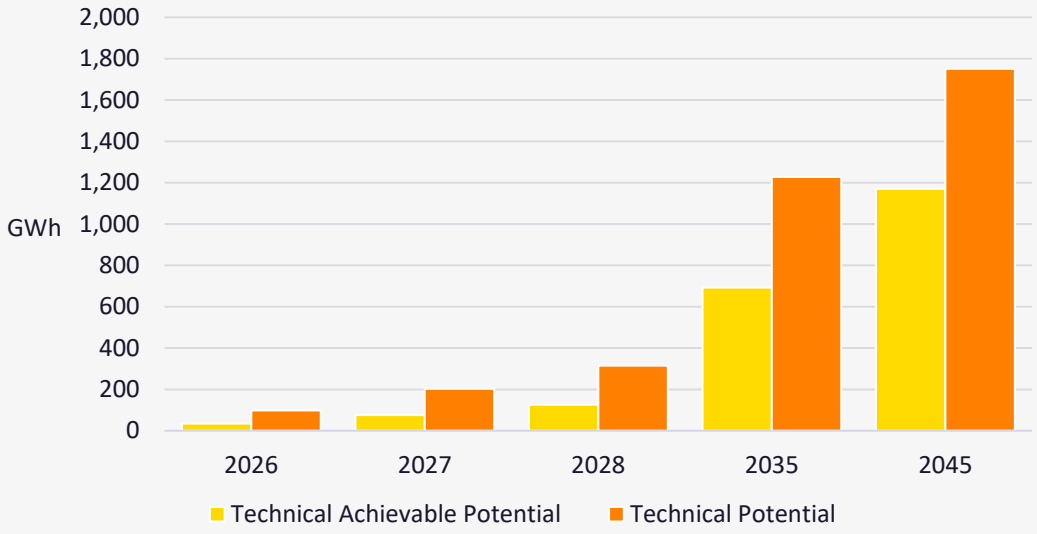
Residential EE Potential

WA and ID

Summary of Energy Savings (GWh), Selected Years	2023	2024	2027	2032	2042
Reference Baseline	**8,658**	**8,679**	**8,717**	**9,832**	**12,023**
Washington	*5,731*	*5,745*	*5,769*	*6,525*	*8,035*
Idaho	*2,927*	*2,934*	*2,948*	*3,307*	*3,988*
Cumulative Savings (GWh)					
Technical Achievable Potential	35	76	126	693	1,170
Washington	*23*	*50*	*83*	*468*	*780*
Idaho	*12*	*26*	*42*	*225*	*390*
Technical Potential	98	203	315	1,227	1,751
Energy Savings (% of Baseline)					
Technical Achievable Potential	0.4%	0.9%	1.4%	7.0%	9.7%
Washington	*0.3%*	*0.6%*	*1.0%*	*4.8%*	*6.5%*
Idaho	*0.1%*	*0.3%*	*0.5%*	*2.3%*	*3.2%*
Technical Potential	1.1%	2.3%	3.6%	12.5%	14.6%
Incremental Savings (GWh)					
Technical Achievable Potential	35	42	52	101	39
Washington	*23*	*28*	*35*	*68*	*25*
Idaho	*12*	*14*	*17*	*32*	*15*
Technical Potential	98	106	115	143	38



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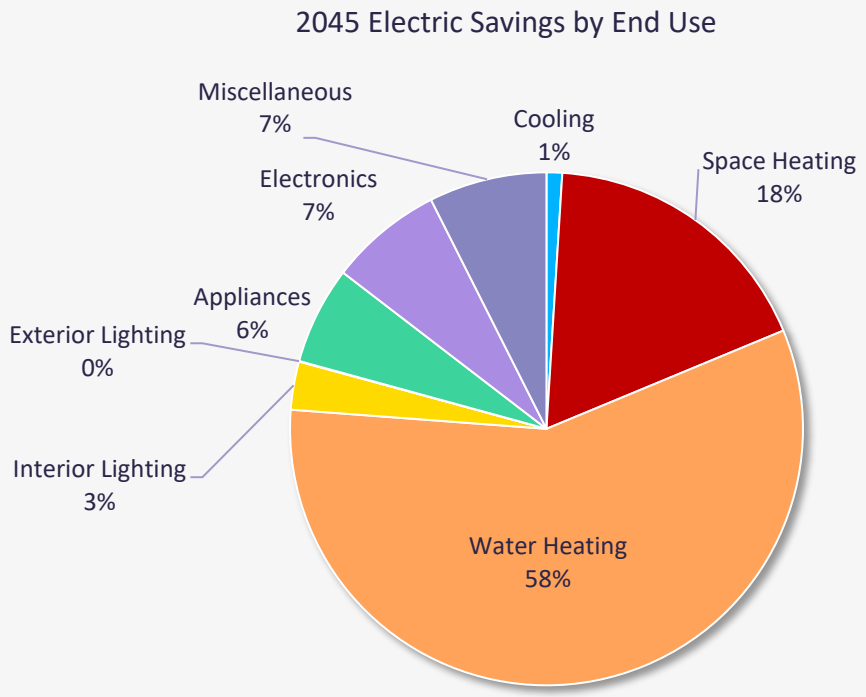
Residential EE Potential

Top Measures Summary (ID & WA Combined)



Rank	Measure / Technology	2045	% of Total
1	Water Heater (<= 55 Gal) - NEEA Tier 5 Heat Pump (CCE 3.5)	321,629	27.5%
2	Windows - High Efficiency (ENERGY STAR 7.0) - U-0.22, SHGC 0.40 | 2021 IECC Level for NC BL = U-0.30, SHGC 0.40	88,245	7.5%
3	Electric Vehicles - Level 2	51,493	4.4%
4	Windows - High Efficiency (Triple Pane) - U-0.17	35,255	3.0%
5	Ducting - Repair and Sealing - Conventional duct sealing; reduce duct leakage by 33%	33,960	2.9%
6	Insulation - Wall Sheathing - R-19	29,884	2.6%
7	Advanced New Construction Designs - Not Applicable	29,169	2.5%
8	Engine Block Heater Controls - Controls upgrade to engine block heater	27,356	2.3%
9	Home Energy Reports - Implementation of behavioral information-based programs	26,065	2.2%
10	Insulation - Ducting - R-8 Ducts (Code)	25,361	2.2%
11	Building Shell - Air Sealing (Infiltration Control) - Reduction of outdoor air infiltration	25,239	2.2%
12	TVs - ENERGY STAR (9.0)	24,637	2.1%
13	Clothes Dryer - UCEF 2.62/CEF 3.93 - ENERGY STAR 1.1/2028 Standard	23,742	2.0%
14	Clothes Washer - CEE Tier 2 - Clothes washer meeting CEE Tier 2 specification	22,462	1.9%
15	Air-Source Heat Pump - SEER 16.0 / HSPF 9.2 | SEER2 15.2 / HSPF2 7.8 (ENERGY STAR 6.1)	21,920	1.9%
16	HVAC - Maintenance and Tune-Up - HVAC system which has been serviced	21,229	1.8%
17	Ducting - Repair and Sealing - Aerosol - Aerosol duct sealing; reduce duct leakage by 67% (aerosol is approx. 30-40% more effective than conventional duct sealing)	19,142	1.6%
18	Home Energy Management System (HEMS) - Home with "Smart" home controls	17,412	1.5%
19	Linear Lighting - LED 2025 (126 lm/W system)	16,063	1.4%
20	Water Heater - Drainwater Heat Recovery - Drain with a Heat Recovery System	15,508	1.3%
	Total of Top 20 Measures	**875,771**	**74.8%**
	Total Cumulative Savings	**1,170,352**	**100.0%**

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Residential EE Potential

Major drivers and Changes from prior study

- Higher tiers of Heat Pump Water Heaters have been added since the prior study
- Large growth of Electric Vehicles, particularly in Washington give more opportunity for EV Charger savings.
- Efficient Windows have higher ENERGY STAR requirement. AEG also updated base assumptions using latest Residential Energy Consumption Survey data.
- Connected Thermostats have lower savings than prior study due to lowered savings and lifetime assumptions in RTF workbooks.
- Updated the applicability of certain measures from the previous study, which lowered savings. Some measures include Manual Window Shading, Low-e Storm Windows, and HVAC Conversions to Ground-Source Heat Pumps

Commercial Electric Draft Results

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Commercial EE Potential

Draft results indicate energy savings of ~1.1% of baseline consumption per year are Technically Achievable.

- TBD in next biennial period (2023-2024)
- TBD by 2032
- TBD by 2042

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Commercial EE Potential (TBD)

WA and ID

Summary of Energy Savings (GWh), Selected Years	2023	2024	2027	2032	2042
Reference Baseline					
Washington					
Idaho					
Cumulative Savings (GWh)					
Technical Achievable Potential					
Washington					
Idaho					
Technical Potential					
Energy Savings (% of Baseline)					
Technical Achievable Potential					
Washington					
Idaho					
Technical Potential					
Incremental Savings (GWh)					
Technical Achievable Potential					
Washington					
Idaho					
Technical Potential					

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Commercial EE Potential

Top Measures Summary (ID & WA Combined)

- TBD

Rank	Measure / Technology	2032 Achievable Technical Potential (MWh)	% of Total	TRC Levelized $/kWh
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
	Total of Top 20 Measures			
	Total Cumulative Savings			

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Commercial EE Potential

Major drivers and Changes from prior study

- TBD
- TBD
- TBD
- TBD
- TBD

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Demand Response

DR Study Approach

Characterize the Market

Develop list of DR Options

Characterize the Options

Estimate Potential

Align with EE Potential Study
- Market Profiles

Secondary Sources
- Industry or regional reports
- Previous studies

Segmentation by Customer Class
- Residential
- General Service
- Large General Service
- Extra-Large General Service

Program Categories
- Conventional DLC
- Smart/Interactive DLC
- Curtailment
- Energy Storage
- Time-Varying Rates/Behavioral
- Ancillary Services

Develop Program Assumptions
- Impacts
- Participation
- Technology
- Costs
- Incentives

Technical Achievable Potential
- Potential for all programs regardless of cost and without consideration of dual participation

Achievable Potential
- Integrated program options without participant overlap

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All Program Options

Conventional DLC	Central AC Water Heating
Smart/Interactive DLC	Grid-Interactive Water Heating Smart Thermostats (Cooling/Heating) Smart Appliances
Third Party Curtailment	Capacity Bidding Emergency Curtailment
Energy Storage	Battery Storage Thermal Storage
Time-Varying Rates/Behavioral	Behavioral Time-of-Use Electric Vehicle Time-of-Use Electric Vehicle V1G Telematics Variable Peak Pricing

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Current and Future DR Programs

Current DR Programs include:

- Electric Vehicle TOU
- Electric Vehicle V1G Telematics
- Third Party Contracts (one large industrial customer for 30 MW)

DR Pilot Programs beginning in June 2024:

- Time-of-Use Opt-in
- Peak Time Rebate

Pilot Programs will run for two years starting in 2024

- For DR potential, AEG ramps up pilot programs to steady state participation once pilot period has commenced

Advanced Metering Infrastructure (AMI) Assumptions

Some of the options require AMI

- DLC Options- No AMI Metering Required
- Dynamic Rates- require AMI for billing

Washington

- Assume 100% throughout study for all sectors

Idaho starting AMI rollout March 2027

- 36-month deployment schedule

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Assumptions and Updates

Smart Thermostat - Heating Program will piggyback off Cooling Program

Shared Admin, Development, and O&M Costs

Grid-Interactive Water Heaters

Split results across water heater type- ER and HP

- Per-customer impacts reflect AEG-estimated grid-interactive water heater peak kW

Dynamic Rates

PTR - Residential and General Service

VPP - Large and Extra-Large General Services

EV TOU - General Service and Large General Service

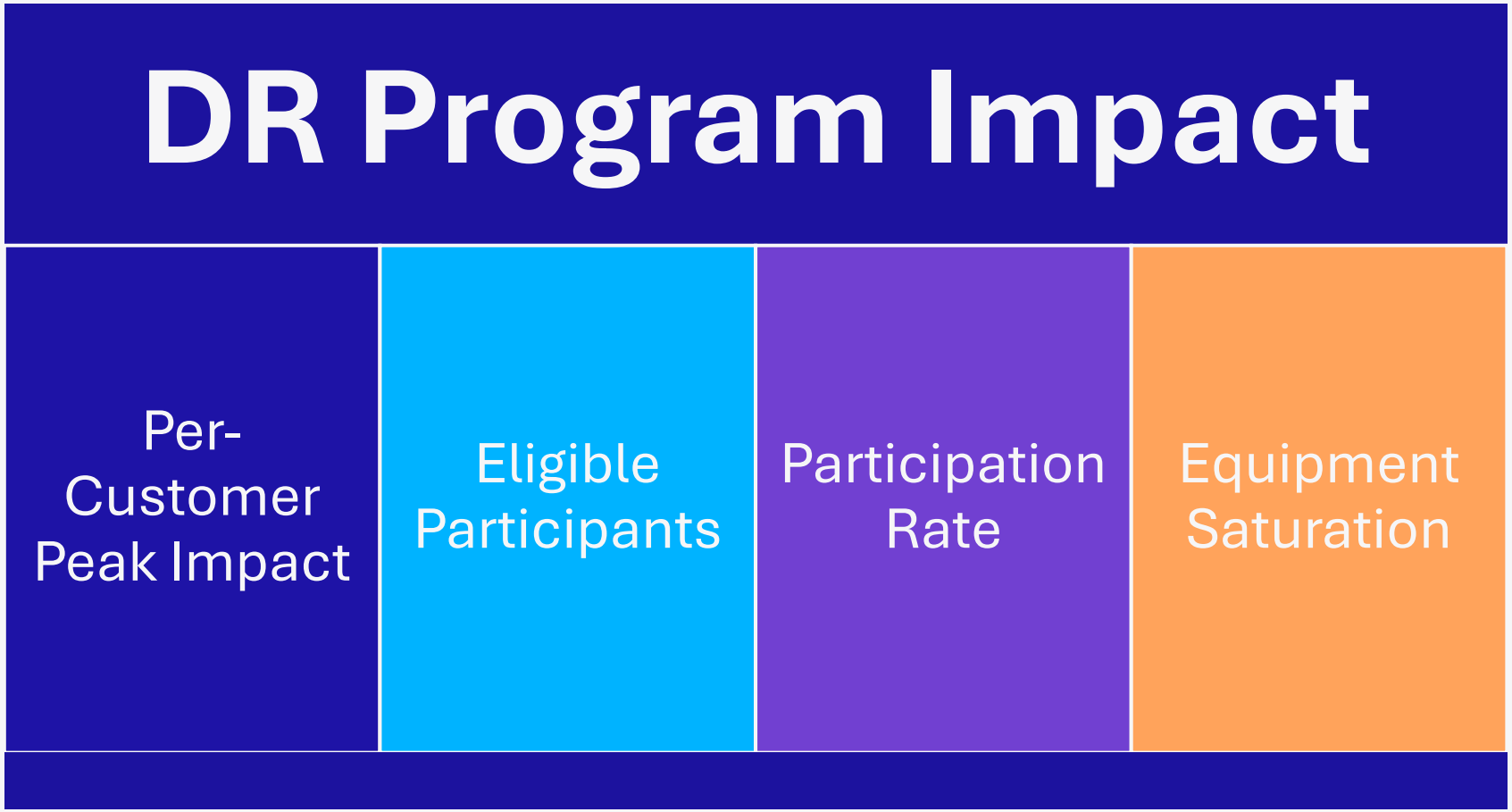
TOU - Residential and General Service

Program Impact and Cost assumptions based on NWPCC 2021 Power Plan assumptions and DR program results from surrounding utilities

Diverged from these where appropriate

- Customization for Avista's service territory
- Where NWPCC program information wasn't available

Calculating DR Potential



Draft DR Results

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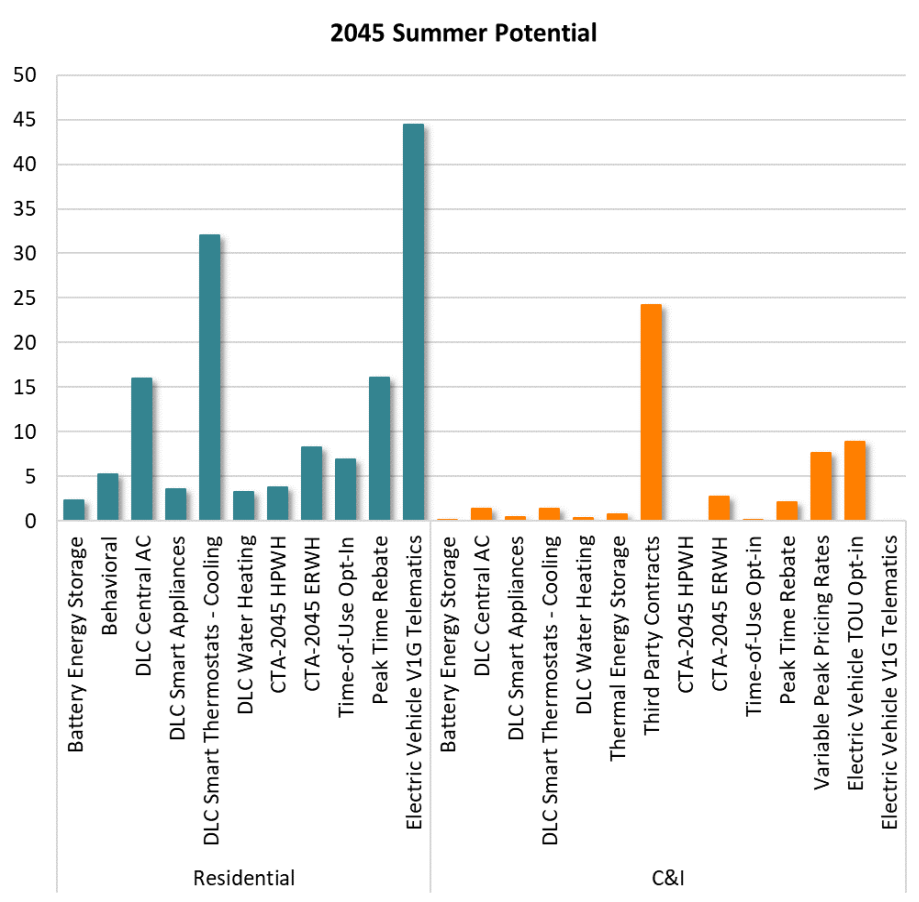
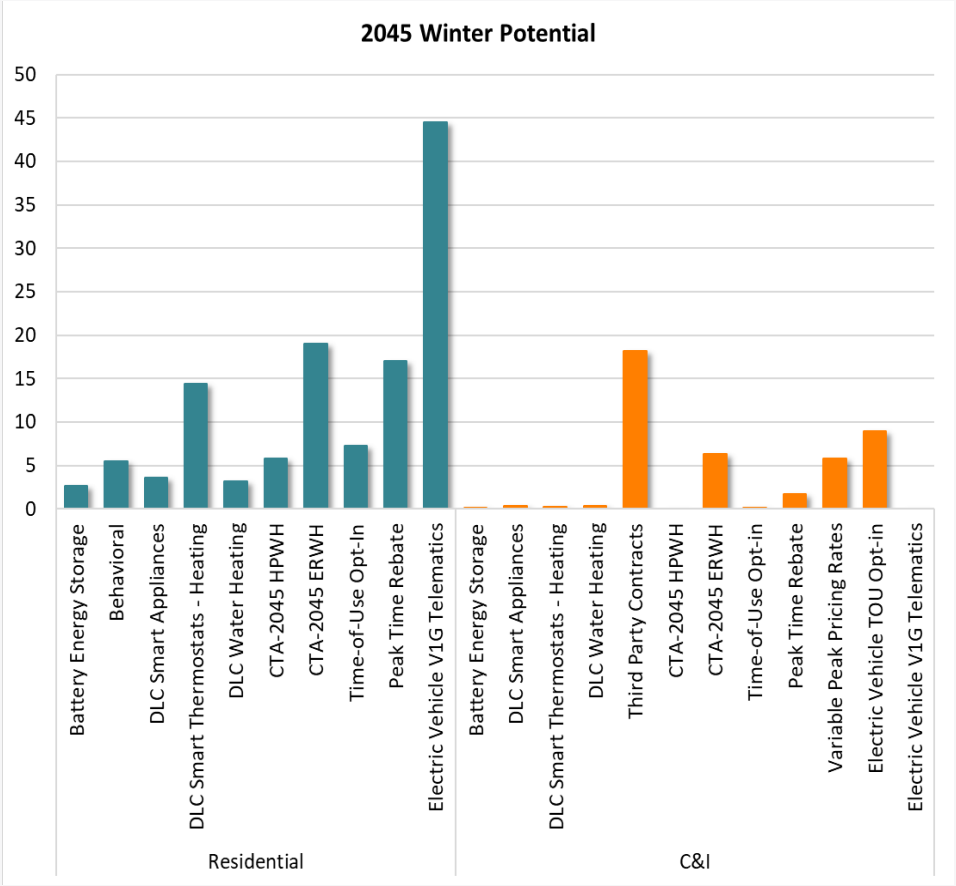
Summer DR Potential - Technical Achievable

Summer TAP	2025	2026	2030	2035	2045	2045 from 2022 CPA
Baseline Forecast (Summer MW)	**1,838**	**1,856**	**1,890**	**2,011**	**2,458**	**1,986**
Battery Energy Storage	-	0.1	2.0	2.1	2.3	5.5
Behavioral	-	1.1	3.1	3.9	5.2	4.4
CTA-2045 HPWH	-	0.0	0.4	2.0	3.7	1.0
CTA-2045 ERWH	-	0.1	1.7	8.2	11.0	5.3
DLC Central AC	-	1.2	12.9	14.3	17.4	15.4
V1G Telematics	0.2	0.9	7.6	16.4	44.5	29.3
DLC Smart Appliances	-	0.3	3.2	3.5	4.0	3.7
DLC Smart Thermostats - Cooling	-	2.3	24.7	27.4	33.4	30.7
DLC Smart Thermostats - Heating	-	-	-	-	-	-
DLC Water Heating	-	0.3	2.8	3.0	3.5	2.4
Electric Vehicle TOU Opt-in	0.0	0.1	0.9	2.7	8.9	4.7
Thermal Energy Storage	-	0.0	0.6	0.7	0.7	0.8
Third Party Contracts	-	8.1	20.9	22.2	24.2	29.1
Time-of-Use Opt-in	0.2	0.2	3.6	5.2	6.9	10.3
Time-of-Use Opt-out	8.8	7.7	4.1	3.1	4.1	39.6
Variable Peak Pricing Rates	-	0.6	6.6	7.0	7.6	5.4
Peak Time Rebate	0.3	0.3	9.5	13.8	18.1	15.5

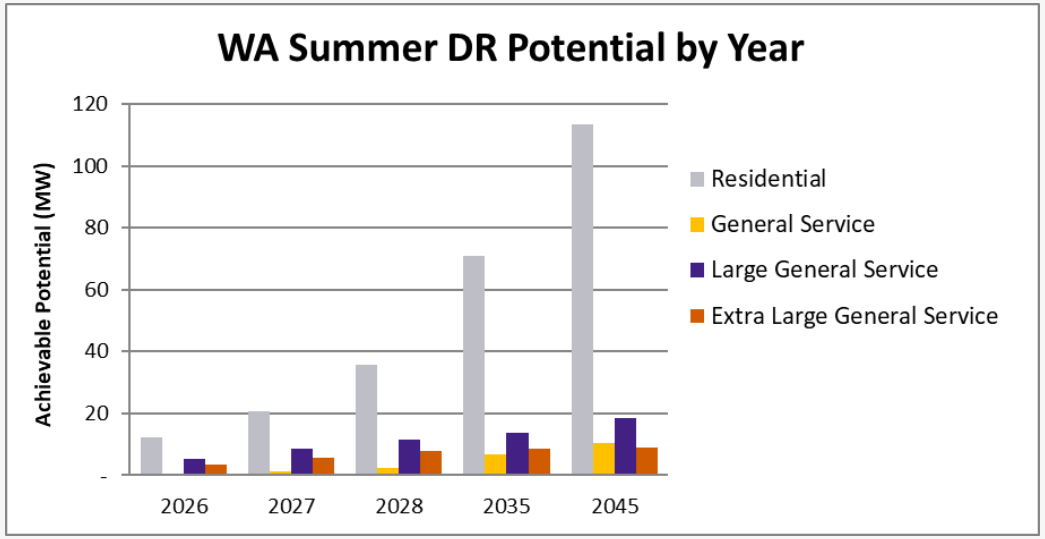


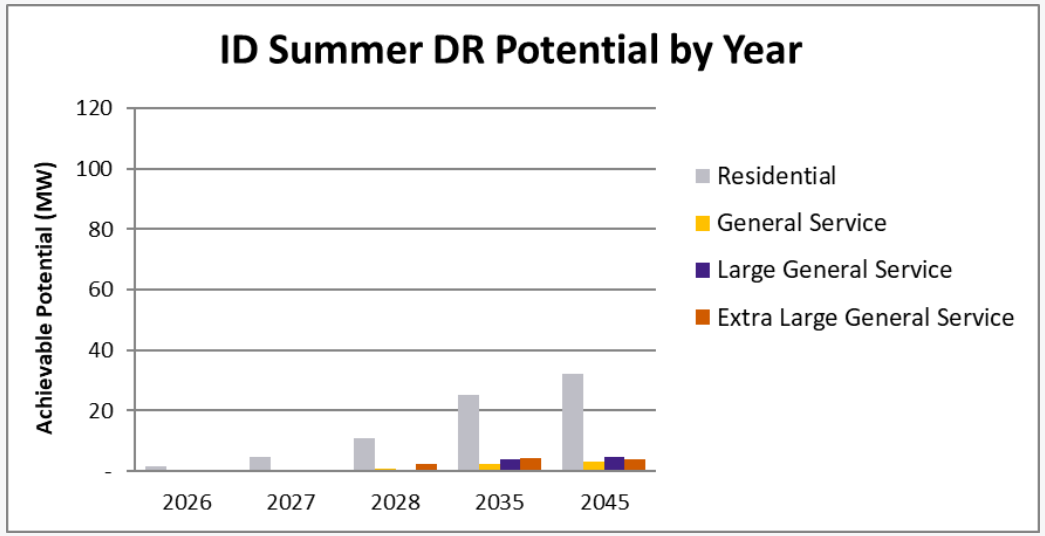
Winter DR Potential – Technical Achievable

Winter TAP	2025	2026	2030	2035	2045	2045 from 2022 CPA
Baseline Forecast (Winter MW)	**1,787**	**1,803**	**1,856**	**1,922**	**2,282**	**1,936**
Battery Energy Storage	-	0.1	2.3	2.5	2.7	5.5
Behavioral	-	1.4	3.8	4.5	5.5	4.2
CTA-2045 HPWH	-	0.0	0.6	3.1	5.8	2.6
CTA-2045 ERWH	-	0.3	4.0	19.0	25.3	5.7
DLC Central AC	-	-	-	-	-	-
V1G Telematics	0.2	0.9	7.6	16.4	44.5	29.3
DLC Smart Appliances	-	0.3	3.2	3.5	4.0	3.7
DLC Smart Thermostats - Cooling	-	-	-	-	-	-
DLC Smart Thermostats - Heating	-	0.8	9.2	10.9	14.6	5.8
DLC Water Heating	-	0.3	2.8	3.0	3.5	2.4
Electric Vehicle TOU Opt-in	0.0	0.1	0.9	2.7	8.9	4.7
Thermal Energy Storage	-	-	-	-	-	-
Third Party Contracts	-	5.9	15.3	16.4	18.2	29.6
Time-of-Use Opt-in	0.2	0.2	4.3	5.9	7.3	9.9
Time-of-Use Opt-out	10.5	9.1	5.1	3.5	4.3	38.3
Variable Peak Pricing Rates	-	0.4	4.8	5.2	5.8	5.5
Peak Time Rebate	0.3	0.3	11.0	15.3	18.7	14.8

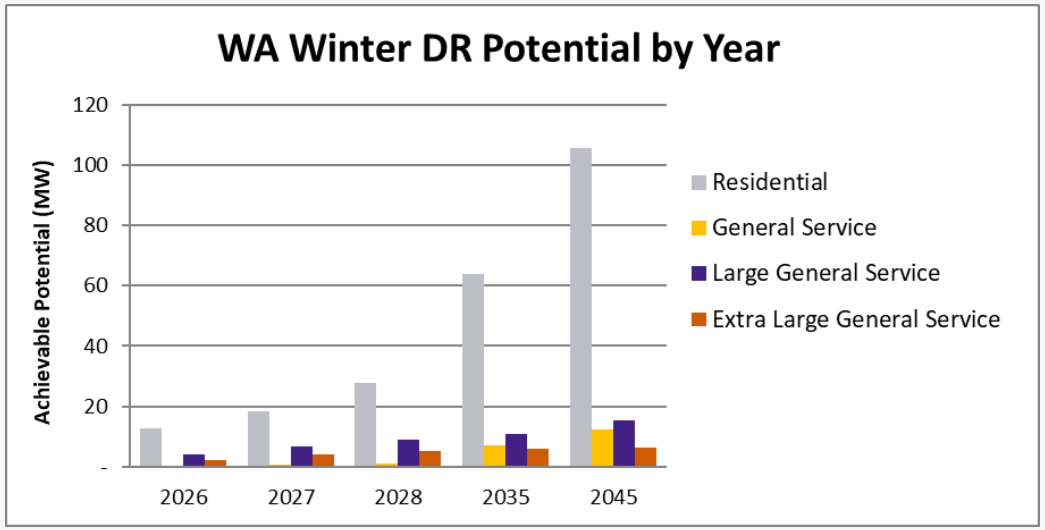


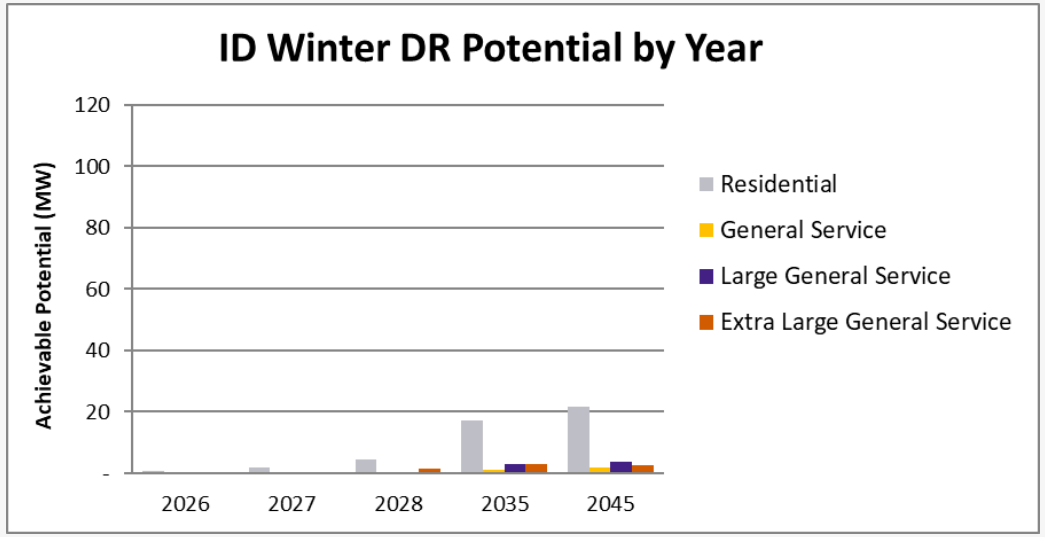
Summer DR Potential





Winter DR Potential





Developing Demand Response Resource Costs

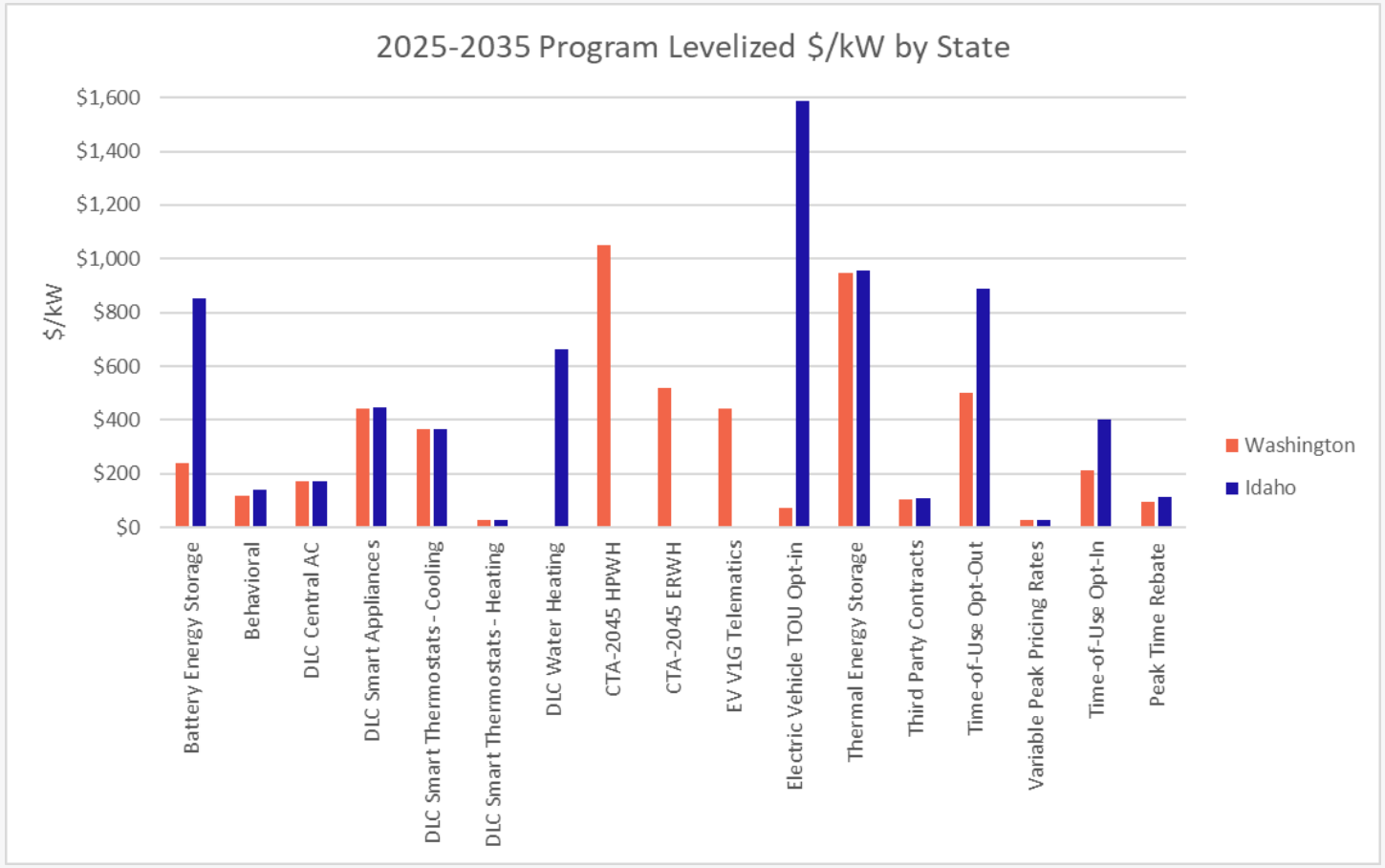
- DR Programs have both upfront and ongoing costs according to the table below
- DR costs are amortized over 10 years to allow programs time to fully ramp up
- Levelized costs are presented in $/kW-year

One-Time Fixed Costs	One-Time Variable Costs	Ongoing Costs
Program Development Costs ($/program)	Equipment Costs ($/participant)	Administrative Costs (shared costs)
	Marketing Costs ($/participant)	O&M Costs ($/participant)
		Incentives ($/participant or $/kW)

Example: Residential Grid-Interactive Electric Resistance Water Heaters

Cost Type	Unit	Cost
Development	$/program	$34,000
Administrative	$/program/yr	$40,800
O&M	$/participant/yr	$0
Marketing	$/new participant	$60
Equipment	$/new participant	$170
Incentive	$/program/yr	$24

Program Levelized Costs by State



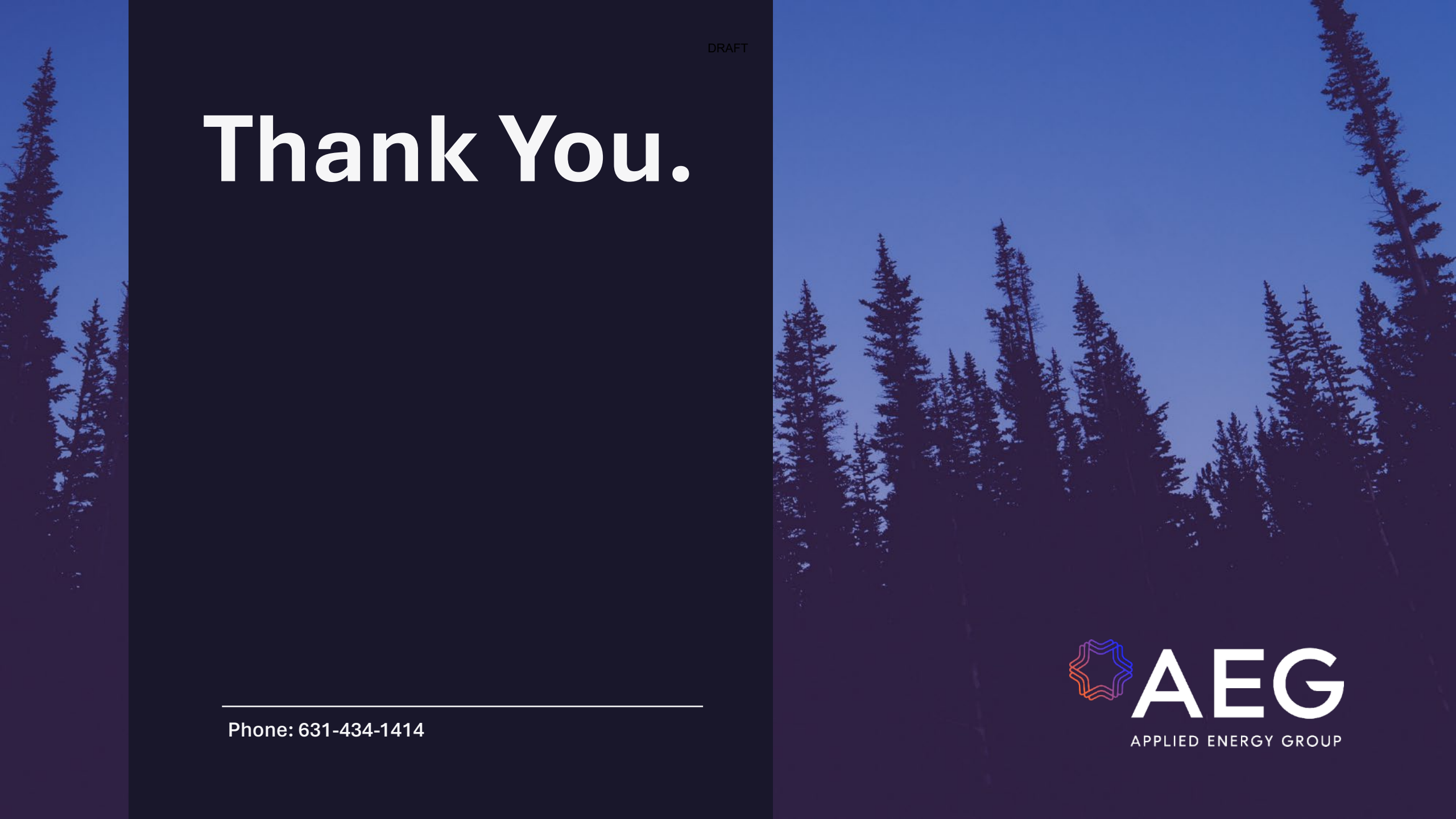
Next Steps

- AEG to wrap up Industrial EE potential by May 10th
- Working IRP Inputs due to Avista by May 17th

DRAFT

Thank You.

Phone: 631-434-1414



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