

Avista 2022 Natural Gas Potential Assessments

Date: August 10, 2022 Prepared for: Avista Technical Advisory Committee





Overview

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Consulting Client History



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South:

Columbia Gas VA Duke Energy LG&E/KU Oklahoma Gas & Electric (OK and AR) * South Mississippi Electric Power Association Southern Company (Services and utilities) * TVA

> \chi Current Work States and Provinces in which we've worked AEG offices As of May 2021



Methodology Overview



AEG Modeling Approach



Washington & Idaho CPA

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CPA Objectives

- 1. Conduct an independent assessment of available and cost-effective natural gas energy efficiency opportunities in Avista's service area, consistent with HB 1257.
- 2. Use methodology consistent with the Northwest Power and Conservation Council while recognizing differences between electricity and natural gas resources.
- 3. Estimate opportunities for energy efficiency by residential household income.
- 4. Understand energy efficiency opportunities in commercial and industrial sectors





Market Characterization



- ✓ The first step in the CPA process is to define energy-consumption characteristics in the base year of the study (2021).
- ✓ AEG incorporates Avista's actual consumption and customer counts to develop "Control Totals" — values to which the model will be calibrated.
- Market characterization is an important step in the CPA process as it grounds the analysis in Avista's data and provides us with enough details to project assumptions forward, developing a baseline energy projection.

Sector	Accounts	2021 Dth	Segmentation
Residential	237,935	16,973,954	Single Family, Multi-Family, Manufactured Home, and by Income Group within housing type
Commercial	24,454	9,814,874	Office, Retail, Restaurant, Grocery, College, School, Hospital, Lodging, Warehouse, Other
Industrial	194	496,972	Mix of industries from customer data will inform presence of end uses and measure applicability
Total	262,584	27,285,801	



Energy Market Profile

Example – Washington Residential

- Calibrated to Avista's use-per-customer at the \odot household level
- Breaks down energy consumption to the end use \odot and technology level
- Defines the saturation (presence of equipment) \odot and the annual consumption of a given technology where it is present (Unit Energy Consumption - UEC)
 - Data taken from NEEA's RBSA / CBSA surveys, US DOE Annual Energy Outlook, and Avista's 2013 **GenPop Survey**





WA Residential Intensity (therms/HH)



Single Family Profile

End Use	Technology	Saturation	UEC (therms)	Intensity (therms/HH)	Usage (Dth)
Space Heating	Furnace	85%	646	548	8,648,686
	Boiler	2%	432	10	160,215
Secondary Heating	Fireplace	5%	110	6	88,017
Water Heating	Water Heater (<= 55 Gal)	55%	145	80	1,258,802
	Water Heater (> 55 Gal)	0%	52	0	162
Appliances	Clothes Dryer	28%	22	6	97,826
	Stove/Oven	59%	28	17	260,523
Miscellaneous	Pool Heater	1%	106	1	15,120
	Miscellaneous	100%	1	1	14,482



Estimating Energy Efficiency Potential

We estimate three levels of potential. These are standard practice for CPAs in the Northwest:

- Technical: everyone chooses the most efficient option when equipment fails regardless of cost.
- Achievable Technical is a subset of technical that accounts for achievable participation within utility programs as well as non-utility mechanisms, such as regional initiatives and market transformation.
- Achievable Economic is a subset of achievable technical potential that includes only <u>cost-effective</u> measures. Tests considered within this study were the UCT for Idaho and TRC for Washington.





Measure Ramp Rates

- ⊘ For this study, AEG adapted the 2021 Power Plan ramp rates for use in a natural gas CPA.
- ⊘ All measures "ramp up" over time to a maximum of 85% adoption
 - In the 2021 plan, some electric measures have had their maximum achievability increased beyond 85%. None of those specific measures apply to natural gas, and AEG has not increased the achievability for any measures in this study.
 - Power Council's ramp rates include potential realized from outside of utility DSM programs, including regional initiatives and market transformation.
 - A cost-effectiveness screen is applied to equipment measures to address very high-cost measures before ramp rates are applied, consistent with Council methodology.
- AEG considered Avista's recent program achievement when assigning ramp rates to reflect differences between electric and natural gas markets.

Draft Potential Results (All Sectors)





- Cumulative Achievable Technical Potential reaches 7,427,167 Dth, or 20.3% of the reference baseline by the end of the 20-year study period
- Cumulative Achievable Economic Potential reaches 3,136,202
 Dth, or 8.6% of the baseline over the study period





Summary Results Continued



Summary of Energy Savings (Dth), Selected Years	2023	2024	2027	2032	2042
Reference Baseline (Dth)	29,414,120	29,675,685	30,496,490	32,215,067	36,547,665
Cumulative Savings (Dth)					
Achievable Economic	134,786	272,271	749,007	1,786,294	3,136,102
Achievable Technical	297,165	651,909	1,927,022	4,672,773	7,427,167
Technical Potential	683,777	1,382,691	3,717,219	8,099,510	13,024,530
Energy Savings (% of Baseline)					
Achievable Economic	0.5%	0.9%	2.5%	5.5%	8.6%
Achievable Technical	1.0%	2.2%	6.3%	14.5%	20.3%
Technical Potential	2.3%	4.7%	12.2%	25.1%	35.6%
Incremental Savings (Dth)					
Achievable Economic	134,786	148,614	172,490	227,703	93,621
Achievable Technical	297,165	357,151	480,848	589,559	190,622
Technical Potential	693,690	723,398	846,959	934,311	439,915

Draft Residential Potential Results





Residential Summary Results (WA & ID Combined)

- Cumulative Achievable Technical Potential reaches 4,911,795 Dth, or
 20.8% of the reference baseline by the end of the 20-year study period
- ✓ Cumulative Achievable Economic Potential reaches 1,353,411 Dth, or 5.7% of baseline over the study period





Summary Results Continued



Summary of Energy Savings (Dth), Selected Years	2023	2024	2027	2032	2042
Reference Baseline (Dth)	18,489,822	18,688,449	19,295,674	20,539,977	23,591,578
Cumulative Savings (Dth)					
Achievable Economic	69,555	132,295	356,199	815,071	1,353,411
Achievable Technical	176,790	399,302	1,252,962	3,206,725	4,911,795
Technical Potential	429,994	905,601	2,530,507	5,747,603	9,337,234
Energy Savings (% of Baseline)					
Achievable Economic	0.4%	0.7%	1.8%	4.0%	5.7%
Achievable Technical	1.0%	2.1%	6.5%	15.6%	20.8%
Technical Potential	2.3%	4.8%	13.1%	28.0%	39.6%
Incremental Savings (Dth)					
Achievable Economic	69,555	73,083	77,290	93,201	52,239
Achievable Technical	176,790	223,252	327,945	406,973	135,250
Technical Potential	439,907	479,545	598,656	678,285	347,207

Residential Top Measures (Achievable Economic)

Rank	Idaho – Achievable Economic UCT Potential	Achievable Economic Potential (Dth)	% of Total Savings
1	Furnace	216,304	37.1%
2	Connected Thermostat - ENERGY STAR (1.0)	155,844	26.7%
3	ENERGY STAR Home Design	65,417	11.2%
4	Building Shell - Whole-Home Aerosol Sealing	53,919	9.3%
5	Insulation - Ceiling Installation	38,952	6.7%
6	Gas Furnace - Maintenance	27,441	4.7%
7	Windows - Low-e Storm Addition	9,508	1.6%
8	Behavioral Programs	4,155	0.7%
9	Circulation Pump - Timer	2,744	0.5%
10	Insulation - Wall Sheathing	2,433	0.4%
	Subtotal	576,716	99.0%
	Total Savings in Year	582,595	100.0%

Ran k	Washington – Achievable Economic TRC Potential	2042 Achievable Economic Potential (Dth)	% of Total Savings
1	Furnace	420,956	54.6%
2	Building Shell - Whole-Home Aerosol Sealing	124,541	16.2%
3	Insulation - Ceiling Installation	70,670	9.2%
4	Gas Furnace - Maintenance	51,736	6.7%
5	Connected Thermostat - ENERGY STAR (1.0)	30,781	4.0%
6	Boiler	18,677	2.4%
7	ENERGY STAR Home Design	9,959	1.3%
8	Behavioral Programs	9,196	1.2%
9	Building Shell - Liquid-Applied Weather- Resistive Barrier	8,367	1.1%
10	Windows - Low-e Storm Addition	5,914	0.8%
	Subtotal	750,798	97.4%
	Total Savings in Year	770,816	100.0%



Residential Potential by Income Group

Low Income potential is proportional to the low-income share of natural gas consumption





Draft Commercial Potential Results





- Cumulative Achievable Technical Potential reaches 2,450,164 Dth, or 19.7% of the reference baseline over the 20-year study period.
- Cumulative Achievable Economic Potential reaches 1,717,894 Dth, or 13.8% of the baseline.



Commercial Summary Results Continued

Summary of Energy Savings (Dth), Selected Years	2023	2024	2027	2032	2042
Reference Baseline (Dth)	10,412,372	10,470,104	10,678,947	11,153,754	12,435,557
Cumulative Savings (Dth)					
Achievable Economic	61,744	132,968	375,053	935,651	1,717,894
Achievable Technical	116,869	245,560	656,182	1,430,257	2,450,164
Technical Potential	249,222	468,009	1,163,993	2,307,056	3,606,368
Energy Savings (% of Baseline)					
Achievable Economic	0.6%	1.3%	3.5%	8.4%	13.8%
Achievable Technical	1.1%	2.3%	6.1%	12.8%	19.7%
Technical Potential	2.4%	4.5%	10.9%	20.7%	29.0%
Incremental Savings (Dth)					
Achievable Economic	61,744	72,005	91,557	130,956	38,704
Achievable Technical	116,869	130,350	149,230	179,030	52,649
Technical Potential	249,222	239,290	243,712	251,628	89,333

Commercial Top Measures (Achievable Economic)

	Total Savings in Year	516,012	100.0%
	Subtotal	436,642	84.6%
10	HVAC - Energy Recovery Ventilator	14,140	2.7%
9	Water Heater - Circulation Pump Controls	15,684	3.0%
8	Gas Boiler - Thermostatic Radiator Valves	15,741	3.1%
7	Fryer	29,491	5.7%
6	Furnace	38,787	7.5%
5	Water Heater	40,158	7.8%
4	Ducting - Repair and Sealing	53,296	10.3%
3	Insulation - Ceiling	57,598	11.2%
2	Windows - Secondary Glazing Systems	57,922	11.2%
1	Insulation - Wall Cavity	113,825	22.1%
Rank	Idaho – Achievable Economic UCT Potential	2042 Achievable Economic Potential (Dth)	% of Total Savings

Rank	Washington – Achievable Economic TRC Potential	2042 Achievable Economic Potential (Dth)	% of Total Savings
1	Insulation - Wall Cavity	146,946	12.2%
2	Boiler	138,797	11.5%
3	Ducting - Repair and Sealing	121,645	10.1%
4	Windows - Secondary Glazing Systems	111,172	9.2%
5	Insulation - Ceiling	84,303	7.0%
6	Water Heater	79,479	6.6%
7	Furnace	78,323	6.5%
8	HVAC - Energy Recovery Ventilator	58,049	4.8%
9	Strategic Energy Management	41,377	3.4%
10	Broiler	36,258	3.0%
	Subtotal	896,351	74.6%
	Total Savings in Year	1,201,882	100.0%

Draft Industrial Potential Results

Industrial Summary Results (WA & ID Combined)

- ✓ Cumulative Achievable Technical Potential reaches 65,208 Dth, or 12.5% of the reference baseline over the 20-year study period.

Industrial Summary Results Continued

Summary of Energy Savings (Dth), Selected Years	2023	2024	2027	2032	2042
Reference Baseline (Dth)	511,926	517,132	521,869	521,336	520,530
Cumulative Savings (Dth)					
Achievable Economic	3,487	7,008	17,756	35,571	64,796
Achievable Technical	3,506	7,047	17,879	35,791	65,208
Technical Potential	4,561	9,081	22,719	44,852	80,927
Energy Savings (% of Baseline)					
Achievable Economic	0.7%	1.4%	3.4%	6.8%	12.4%
Achievable Technical	0.7%	1.4%	3.4%	6.9%	12.5%
Technical Potential	0.9%	1.8%	4.4%	8.6%	15.5%
Incremental Savings (Dth)					
Achievable Economic	3,487	3,526	3,643	3,546	2,679
Achievable Technical	3,506	3,549	3,673	3,557	2,723
Technical Potential	4,561	4,563	4,591	4,397	3,376

Industrial Top Measures (Achievable Economic)

Rank	Idaho – Achievable Economic UCT Potential	2042 Achievable Economic Potential (Dth)	% of Total Savings
1	Process - Heat Recovery	22,382	79.8%
2	Process Boiler - Hot Water Reset	1,207	4.3%
3	Process Boiler - Stack Economizer	814	2.9%
4	Process Boiler - Insulate Steam Lines/Condensate Tank	785	2.8%
5	Process Boiler - Burner Control Optimization	568	2.0%
6	Process Boiler - Insulate Hot Water Lines	395	1.4%
7	Destratification Fans (HVLS)	344	1.2%
8	Insulation - Wall Cavity	332	1.2%
9	Insulation - Ceiling	257	0.9%
10	Unit Heater	146	0.5%
	Subtotal	27,230	97.1%
	Total Savings in Year	28,042	100.0%

Rank	Washington – Achievable Economic TRC Potential	2042 Achievable Economic Potential (Dth)	% of Total Savings
1	Process - Heat Recovery	29,905	81.4%
2	Process Boiler - Hot Water Reset	1,398	3.8%
3	Process Boiler - Stack Economizer	1,086	3.0%
4	Process Boiler - Insulate Steam Lines/Condensate Tank	919	2.5%
5	Process Boiler - Burner Control Optimization	760	2.1%
6	Process Boiler - Insulate Hot Water Lines	462	1.3%
7	Destratification Fans (HVLS)	453	1.2%
8	Insulation - Wall Cavity	374	1.0%
9	Insulation - Ceiling	298	0.8%
10	Unit Heater	183	0.5%
	Subtotal	35,838	97.5%
	Total Savings in Year	36,754	100.0%

Natural Gas Demand Response

Approach to the Study

Align with EE Potential Study

 Market Profiles

Secondary Sources

DR Program
 Evaluation
 Reports from
 other Utilities

Characterize the Market

Segmentation by Customer Class

- Residential
- Commercial
- Industrial

- Program Options
- Behavioral
- DLC Water Heating
- DLC Smart Thermostats BYOT

Develop list of DR

Options

- Third Party Contracts
- Time-of-Use
- Variable Peak Pricing

the Options

Characterize

Develop Program Assumptions

- Impacts
- Participation
- End Use
- Saturations
- Costs
- Incentives

Achievable Potential

Estimate

Potential

 Integrated program options without participant overlap

Study Assumptions

Or The programs in this study target the peak hour of the peak day (therms)

⊘ Winter only

Program Impact and Cost assumptions

⊘ Derived Primarily from other Gas DR Programs

- Smart Thermostat Program based on SoCalGas' Smart Therm Program
- Third Party Contracts Program based on National Grid and ConEdison Programs
- ⊘ Diverged where gaps in research
 - Customized for Avista's service territory
 - Pulled remaining assumptions from Electric DR Model and scaled down where appropriate

Advanced Metering Infrastructure (AMI) Assumptions

Some of the options require AMI

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

Washington

- ♂ Utilized current Avista AMI saturation rates by sector and held constant
 - Residential 85%
 - Commercial Firm 86%
 - Industrial Firm 97%

Idaho starting AMI rollout in 2024

- ⊘ No AMI Projected in Idaho
- ⊘ Dynamic Rate Programs not estimated in Idaho

Achievable Potential

Program Impact Calculation

Program Impact_{year,program}

- = Per Customer Peak Impact_{y,p} * Eligible Participants_{y,p} * Participation Rate_{y,p}
- * Equipment Saturation Rate y,p

Achievable Potential Forecast by State

Washington Potential	2024	2025	2026	2032	2042
Baseline Forecast (Dth)	13,643	13,812	13,982	15,025	16,946
Market Potential	39	108	238	355	403
Peak Reduction % of Baseline	0.3%	0.8%	1.7%	2.4%	2.4%
Potential Forecast	13,604	13,704	13,743	14,670	16,543

daho Potential	2024	2025	2026	2032	2042
Baseline Forecast (Dth)	6,955	7,073	7,203	7,806	8,952
Market Potential	14	39	87	134	157
Peak Reduction % of Baseline	0.2%	0.6%	1.2%	1.7%	1.8%
Potential Forecast	6,941	7,034	7,115	7,672	8,795

Washington Potential by Program

WA - Winter Potential	2024	2025	2026	2032	2042
Baseline Forecast (Dth)	13,643	13,812	13,982	15,025	16,946
Achievable Potential (Dth)	39	108	238	355	403
Behavioral	8	15	25	31	35
DLC Water Heating	6	19	46	72	81
DLC Smart Thermostats - BYOT	12	37	86	135	154
Time-of-Use	2	6	14	20	23
Variable Peak Pricing	10	30	66	96	109
Third Party Contracts	0	1	1	1	1

Idaho Potential by Program

ID - Winter Potential	2024	2025	2026	2032	2042
Baseline Forecast (Dth)	6,955	7,073	7,203	7,806	8,952
Achievable Potential (Dth)	14	39	87	134	157
Behavioral	4	8	13	16	18
DLC Water Heating	3	11	25	40	48
DLC Smart Thermostats - BYOT	7	20	48	77	90
Time-of-Use	-	-	-	-	-

Results by Sector

Program Costs

Gas DR Key Findings

Natural Gas DR is an emerging resource

Small number of programs in existence

⊘ Numerous questions surround applicability and reliability of Gas DR

Program Potential

⊘ DLC Water Heating

- Expensive to implement
- Low savings potential
- ⊘ Smart Thermostats Heating
 - Largest savings potential
- ⊘ Third Party Contracts
 - Small amount of customers
 - Not a lot of discretionary load to reduce

OR Low-Income Energy Efficiency Potential Study

Objectives and Data Sources

- Income group segmentation provides Avista an understanding of where these customers are located, differences in their consumption, and levels of energy efficiency savings opportunities.
 - US Census data provides the basis of household demographics by location
- Oetailed surveys like RBSA capture differences in how customers at different income levels use energy, which affects savings potential and cost-effectiveness:
 - Household intensity (therms per home)
 - Building shell
 - Presence of equipment

Gas Customer Intensity by Income Level – RBSA II

Income Class	Responses	Avg. Therms/HH	∆ from Regular
Non-Low-Income	180	636	n/a
Low Income	55	544	-14%

Income Groups by Household Size

HH Size	Low Income Threshold
1	\$25,760
2	\$34,840
3	\$43,920
4	\$53,000
5	\$62,080
6	\$71,160
7	\$80,240
8	\$89,320

Income by Region

OR Low-Income Customers and Energy Consumption by Home Type

Segment	Households	% of All Homes	Usage (Dth)	Therms / HH
Single Family	12,289	65.0%	622,559	539
Multi-Family	4,428	23.4%	88,679	200
Mobile Home	2,197	11.6%	113,191	515
Total	18,914	100.0%	864,429	457

Gas Use by Segment

Summary Results

- For Oregon Low-Income Customers, Cumulative Achievable Technical Potential is 193,386 Dth, or 17.8% of the baseline over 20 years
- Cumulative Achievable Economic Potential (TRC) is 87,816 Dth, or 8.1 % of the baseline

Summary Results Continued

Summary of Energy Savings (Dth), Selected Years	2023	2024	2025	2032	2042
Baseline Forecast (Dth)	914,784	919,566	924,873	970,712	1,084,508
Cumulative Savings (Dth)					
Achievable Economic TRC Potential	3,816	7,383	12,114	46,713	87,816
Achievable Technical Potential	8,877	18,471	30,274	136,654	193,386
Technical Potential	14,319	28,147	44,987	186,349	280,253
Energy Savings (% of Baseline)					
Achievable Economic TRC Potential	0.4%	0.8%	1.3%	4.8%	8.1%
Achievable Technical Potential	1.0%	2.0%	3.3%	14.1%	17.8%
Technical Potential	1.6%	3.1%	4.9%	19.2%	25.8%
Incremental Savings (Dth)					
Achievable Economic TRC Potential	3,816	3,991	4,768	5,691	4,215
Achievable Technical Potential	8,877	10,082	12,013	16,345	4,560
Technical Potential	14,319	15,043	17,214	22,036	9,225

OR LI Top Measures

Rank	Oregon – Achievable Economic TRC Potential	2042 Achievable Economic Potential (Dth)	% of Total Savings
1	Water Heater - Intermittent Ignition System	20,106	22.9%
2	Connected Thermostat - ENERGY STAR (1.0)	17,561	20.0%
3	Furnace	14,529	16.5%
4	ENERGY STAR Home Design	13,955	15.9%
5	Insulation - Ceiling Installation	6,757	7.7%
6	Gas Furnace - Maintenance	4,885	5.6%
7	Circulation Pump - Timer	1,625	1.9%
8	Windows - Low-e Storm Addition	1,530	1.7%
9	Clothes Washer - ENERGY STAR (8.0)	1,475	1.7%
10	Water Heater - Thermostatic Shower Restriction Valve	1,313	1.5%
	Subtotal	83,737	95.4
	Total Savings in Year	87,816	100.0%

OR-WA Transport Customer Energy Efficiency Potential Study

Market Characterization

- \odot Define energy-consumption characteristics in the base year of the study (2021).
- ⊘ Incorporates Avista's actual consumption and customer counts to develop "Control Totals" values to which the model will be calibrated.
- Grounds the analysis in Avista data and provides enough detail to project assumptions forward to develop a baseline energy projection.
- ⊘ After separating gas consumption into sectors and segments, it is allocated to specific end uses and technologies.

Considerations for this Analysis

- Available potential is largely a function of baseline consumption

 segments with the highest baseline consumption are likely to
 have the highest potential
- Potential studies rely on average information, which may not reflect conditions or opportunities for any single customer
 - This is particularly relevant for this study, where a small number of customers represent a large share of transport load
 - Ramp rates are derived from the Northwest Power and Conservation Council's 2021 Power Plan and reflect expected adoption across a broad set of customers. Actual adoption of energy efficiency for large transport customers may be lumpier based on cycles for implementing large capital projects
- Survey sent to Transport customers to gather info on past and future projects, equipment, and interest in energy efficiency. Initial response rate was low so AEG and Avista are working to gather more responses

Draft Potential Results

Summary Results (All States & Sectors)

Annual Incremental Potential

Achievable Economic Achievable Technical Potential Technical Potential

Summary of Energy Savings (Dth), Selected Years	2023	2024	2027	2032	2042
Reference Baseline (Dth)	12,630,414	12,603,587	12,536,256	12,461,252	12,381,843
Cumulative Savings (Dth)					
Achievable Economic	107,191	218,064	559,247	1,152,647	1,948,052
Achievable Technical	124,024	252,377	647,251	1,314,951	2,159,878
Technical Potential	188,234	376,388	933,031	1,815,113	2,880,756
Energy Savings (% of Baseline)					
Achievable Economic	0.8%	1.7%	4.5%	9.2%	15.7%
Achievable Technical	1.0%	2.0%	5.2%	10.6%	17.4%
Technical Potential	1.5%	3.0%	7.4%	14.6%	23.3%
Incremental Savings (Dth)					
Achievable Economic	105,937	110,468	118,059	122,313	56,419
Achievable Technical	124,024	129,555	139,511	140,942	59,652
Technical Potential	188,234	190,900	194,773	185,788	90,879

Commercial Summary Results (All States)

Annual Incremental Potential

Achievable Economic Achievable Technical Potential Technical Potential

Summary of Energy Savings (Dth), Selected Years	2023	2024	2027	2032	2042
Reference Baseline (Dth)	3,876,336	3,850,572	3,786,849	3,718,685	3,652,695
Cumulative Savings (Dth)					
Achievable Economic	46,984	97,364	253,184	532,339	813,871
Achievable Technical	63,623	131,295	340,370	694,783	1,028,470
Technical Potential	113,277	226,642	555,555	1,058,457	1,507,428
Energy Savings (% of Baseline)					
Achievable Economic	1.2%	2.5%	6.7%	14.3%	22.3%
Achievable Technical	1.6%	3.4%	9.0%	18.7%	28.2%
Technical Potential	2.9%	5.9%	14.7%	28.5%	41.3%
Incremental Savings (Dth)					
Achievable Economic	45,776	49,907	54,949	59,216	10,220
Achievable Technical	63,623	68,758	76,240	78,244	13,377
Technical Potential	113,277	115,781	117,358	109,862	34,382

Commercial Transport Top Measures

Rank	Oregon – Achievable Economic TRC Potential	2042 Achievable Economic Potential (Dth)	% of Total Savings
1	Water Heater - Circulation Pump Controls	16,536	11.7%
2	Boiler	13,554	9.6%
3	Insulation - Wall Cavity	11,059	7.8%
4	Ducting - Repair and Sealing	10,949	7.7%
5	Windows - Secondary Glazing Systems	9,204	6.5%
6	Water Heater - Solar System	9,040	6.4%
7	Water Heater	8,241	5.8%
8	Insulation - Ceiling	7,362	5.2%
9	Gas Boiler - Thermostatic Radiator Valves	7,030	5.0%
10	HVAC - Energy Recovery Ventilator	6,801	4.8%
	Subtotal	99,777	70.5%
	Total Savings in Year	141,627	100.0%

Rank	Washington – Achievable Economic TRC Potential	2042 Achievable Economic Potential (Dth)	% of Total Savings
1	Insulation - Wall Cavity	88,949	13.5%
2	Ducting - Repair and Sealing	75,713	11.5%
3	Windows - Secondary Glazing Systems	75,654	8.3%
4	HVAC - Energy Recovery Ventilator	54,894	7.8%
5	Insulation - Ceiling	51,005	7.5%
6	Gas Boiler - Thermostatic Radiator Valves	49,198	6.0%
7	Water Heater	39,310	5.5%
8	Water Heater - Circulation Pump Controls	36,069	5.2%
9	Gas Boiler - Insulate Steam Lines/Condensate Tank	34,275	3.6%
10	Hydronic Heating Radiator Replacement	33,280	3.5%
	Subtotal	538,346	72.3%
	Total Savings in Year	771,266	100.0%

Industrial Summary Results (All States)

Annual Incremental Potential

Achievable Economic Achievable Technical Potential Technical Potential

Summary of Energy Savings (Dth), Selected Years	2023	2024	2027	2032	2042
Reference Baseline (Dth)	8,754,078	8,753,015	8,749,407	8,742,566	8,729,148
Cumulative Savings (Dth)					
Achievable Economic	60,207	120,700	306,063	620,308	1,134,181
Achievable Technical	60,401	121,082	306,881	620,168	1,131,408
Technical Potential	74,957	149,746	377,476	756,657	1,373,328
Energy Savings (% of Baseline)					
Achievable Economic	0.7%	1.4%	3.5%	7.1%	13.0%
Achievable Technical	0.7%	1.4%	3.5%	7.1%	13.0%
Technical Potential	0.9%	1.7%	4.3%	8.7%	15.7%
Incremental Savings (Dth)					
Achievable Economic	60,161	60,562	63,109	63,097	46,199
Achievable Technical	60,401	60,798	63,272	62,698	46,275
Technical Potential	74,957	75,119	77,414	75,926	56,497

Industrial Transport Top Measures

Rank	Oregon – Achievable Economic TRC Potential	2042 Achievable Economic Potential (Dth)	% of Total Savings
1	Process - Heat Recovery	409,396	77.5%
2	Process Boiler - Hot Water Reset	24,562	4.6%
3	Process Boiler - Insulate Steam Lines/Condensate Tank	16,222	3.1%
4	Process Boiler - Stack Economizer	15,124	2.9%
5	Process Boiler - Burner Control Optimization	10,364	2.0%
6	Process Boiler - Insulate Hot Water Lines	7,905	1.5%
7	Insulation - Wall Cavity	7,332	1.4%
8	Boiler	6,480	1.2%
9	Destratification Fans (HVLS)	5,839	1.1%
10	Insulation - Ceiling	5,645	1.1%
	Subtotal	508,868	96.3%
	Total Savings in Year	528,593	100.0%

Rank	Washington – Achievable Economic TRC Potential	2042 Achievable Economic Potential (Dth)	% of Total Savings
1	Process - Heat Recovery	467,011	77.2%
2	Process Boiler - Hot Water Reset	28,019	4.6%
3	Process Boiler - Insulate Steam Lines/Condensate Tank	18,505	3.1%
4	Process Boiler - Stack Economizer	17,253	2.9%
5	Process Boiler - Burner Control Optimization	11,822	2.0%
6	Boiler	10,861	1.8%
7	Process Boiler - Insulate Hot Water Lines	9,017	1.5%
8	Insulation - Wall Cavity	8,260	1.4%
9	Destratification Fans (HVLS)	6,612	1.1%
10	Insulation - Ceiling	6,360	1.1%
	Subtotal	583,720	96.4%
	Total Savings in Year	605,243	100.0%

Thank You.

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Supplemental Slides

Baseline Projection

The baseline projection is an independent enduse forecast of natural gas consumption at the same level of detail as the market profile.

- "How much energy would customers use in the future if Avista stopped running conservation programs now and in the absence of naturally occurring efficiency?"
 - The baseline projection answers this question

The baseline projection:

- To the extent possible, the same forecast drivers used in the official load forecast, particularly customer growth, natural gas prices, normal weather, income growth, etc.
- Trends in appliance saturations, including distinctions for new construction.
- Efficiency options available for each technology, with share of purchases reflecting codes and standards (current and finalized future standards)
- Expected impact of appliance standards that are "on the books"
- Expected impact of building codes, as reflected in market profiles for new construction
- Market baselines when present in regional planning assumptions

Excludes

- Expected impact of naturally occurring efficiency (except market baselines)
- Exception: RTF workbooks have a market baseline for lighting, which AEG's models also use.
- Impacts of current and future demand-side management programs
- Potential future codes and standards not yet enacted

Economic Achievable Potential

In assessing cost-effective, achievable potential within Avista's territory, AEG considered two perspectives:

- ✓ Washington Total Resource Cost Test (TRC): Assesses cost-effectiveness from the perspective of the utility and its customers. Includes non-energy impacts if they can be <u>quantified</u> and <u>monetized</u>.
- ⊘ Idaho Utility Cost Test (UCT): Assesses cost-effectiveness from a utility or program administrator's perspective.

Component	TRC	UCT
Avoided Energy	Benefit	Benefit
Non-Energy Impacts*	Cost/Benefit	
Incremental Cost	Cost	
Incentive		Cost
Administrative Cost	Cost	Cost
10% Conservation Credit	Benefit	

*NEI Categories

- Quantified and monetized non-energy impacts (e.g. water, detergent, wood)
- Projected cost of carbon in Washington
- Heating calibration credit for secondary fuels (12% for space heating, 6% for secondary heating)
- Electric benefits for applicable measures

Council Methodology: Ramp Rate Examples

- Describe the % of units assumed to be adopted relative to all units purchased in that year (based on lifetime/turnover)
- ⊘ Approach their maximum limit over time, but reach that limit at different speeds

- Oescribe the % of the total market that is acquired in each year