AEG
APPLIED ENERGY GROUP

Avista Energy Natural Gas CPA Draft Results

Prepared for Avista Energy TAC Meeting 1/9/2025

Overview

- Introduction
- Methodology Overview
- WA & ID Conservation Potential Assessment
  - Energy Efficiency
  - Demand Response
- Oregon Low-Income Energy Efficiency Potential Study
- OR-WA Transport Customer Energy Efficiency Potential Study

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
- Use methodology consistent with the Northwest Power and Conservation Council, while recognizing differences between electricity and natural gas.
- Understand differences in energy consumption and energy efficiency opportunities by sector, and for Residential, by income level
- Ensure transparency into methods, assumptions, and results

Methodology Overview for Washington & Idaho CPA

AEG Modeling Approach

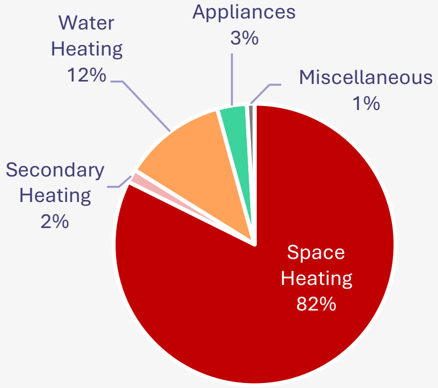
Market Characterization
- Baseline studies
- Utility data
- Secondary data

Identify Demand-Side Resources
- EE equipment
- EE measures
- Emerging tech.

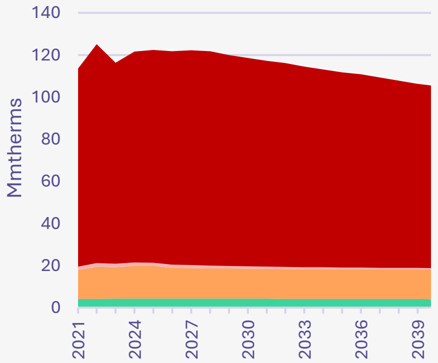
Baseline Projection
- Utility forecasts
- Standards and building codes

Potential Estimation
- Technical
- Achievable Tech.
- Economic Achiev.

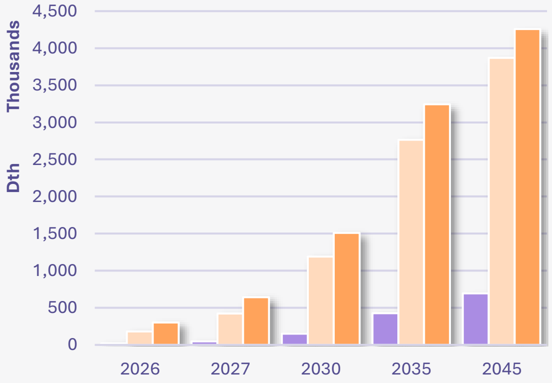
Residential Gas Usage by End Use



Natural Gas Projection by End Use



Cumulative Natural Gas Savings



Major Modeling Inputs and Sources

Avista foundational data

- Avista gas 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

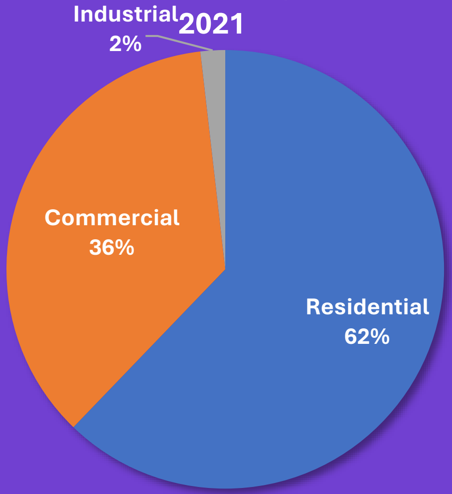
- Washington State Energy Code
- Idaho Energy Code
- Federal energy standards by equipment class

Market trends and effects

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

Market Characterization

Natural Gas Use by Sector 2021



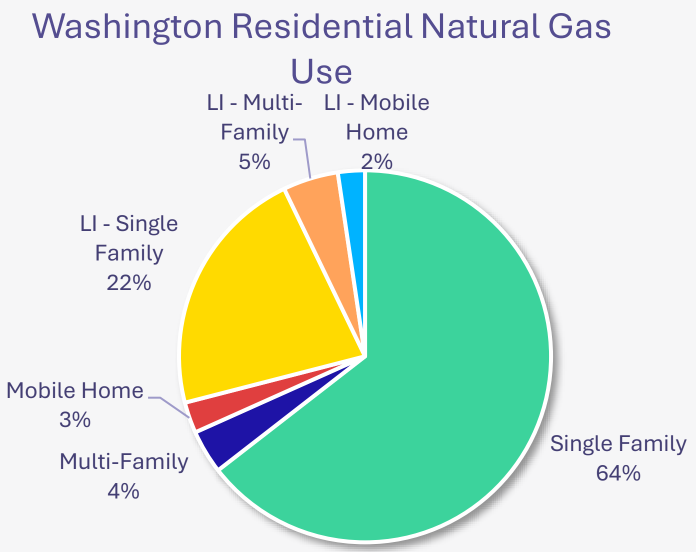
- The first step in the CPA process is to define energy-consumption characteristics in the base year of the study (2021).
- AEG incorporates Avista's actual consumption and customer counts to develop "Control Totals" – values to which the model will be calibrated.
- Market characterization is an important 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.
- After separating gas consumption into sectors and segments, it is allocated to specific end uses and technologies in the Market Profile (next slide).

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

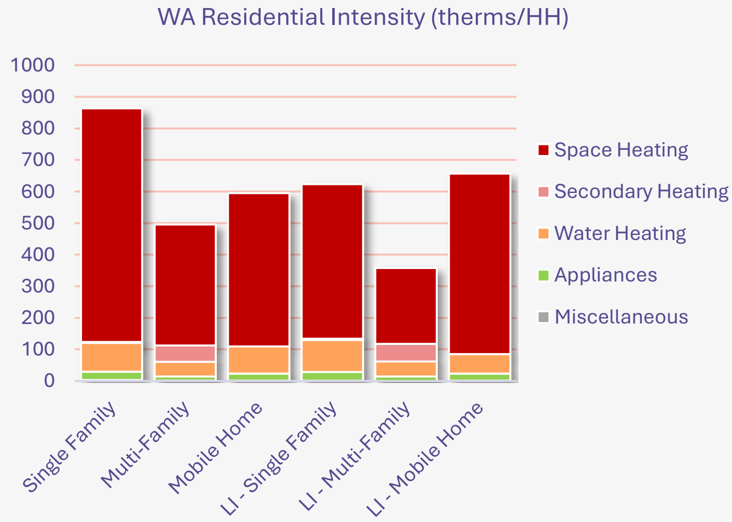
Example – Washington Residential

- Calibrated to Avista's use-per-customer at the household level
- Breaks down energy consumption to the end use and technology level
- Defines the **saturation** (presence of equipment) 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



Single Family Profile

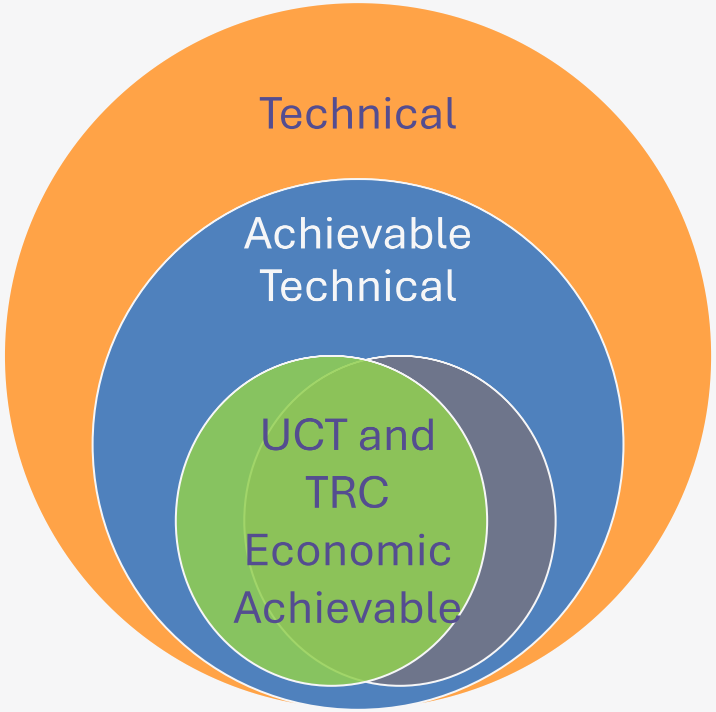
End Use	Technology	Saturation	UEC (therms)	Intensity (therms/HH)	Usage (Dth)
Space Heating	Furnace	85%	646	548	8,648,686
	Boiler	2%	432	10	160,215
Secondary Heating	Fireplace	5%	110	6	88,017
Water Heating	Water Heater (<= 55 Gal)	55%	145	80	1,258,802
	Water Heater (> 55 Gal)	0%	52	0	162
Appliances	Clothes 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

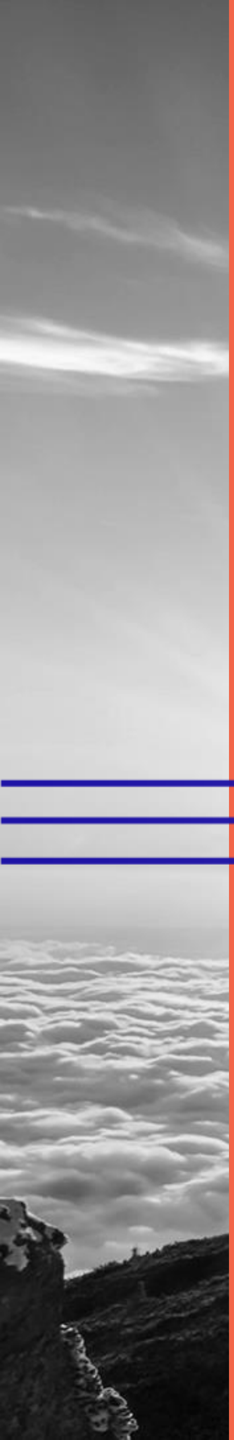
We estimate three levels of potential. These are standard practice for CPAs in the Northwest:

- **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 cost-effective measures. Tests considered within this study were the UCT for Idaho and TRC for Washington.



Measure Ramp Rates

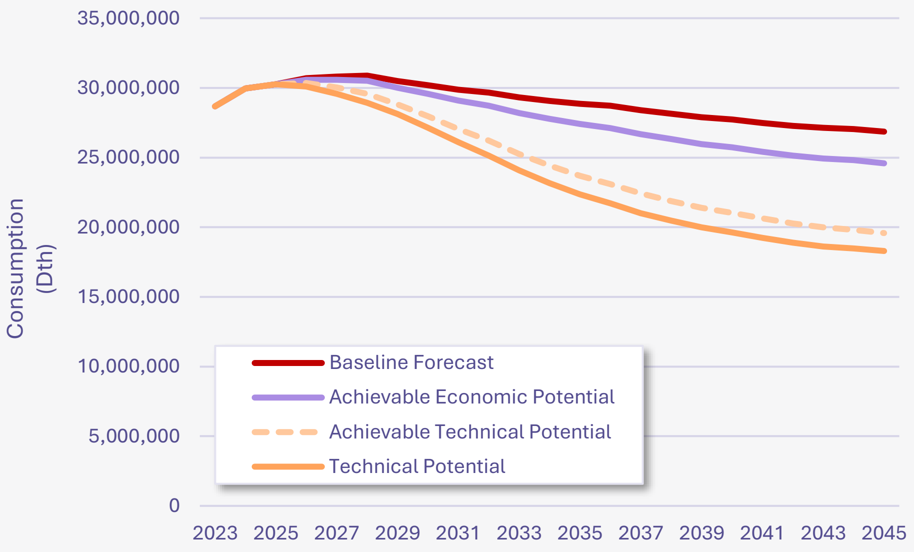
- For this study, AEG adapted the 2021 Power Plan ramp rates for use in a natural gas CPA.
- All measures "ramp up" over time to a maximum of 85% adoption
  - In the 2021 plan, some electric measures have had their maximum achievability increased beyond 85%. None of those specific measures apply to natural 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.

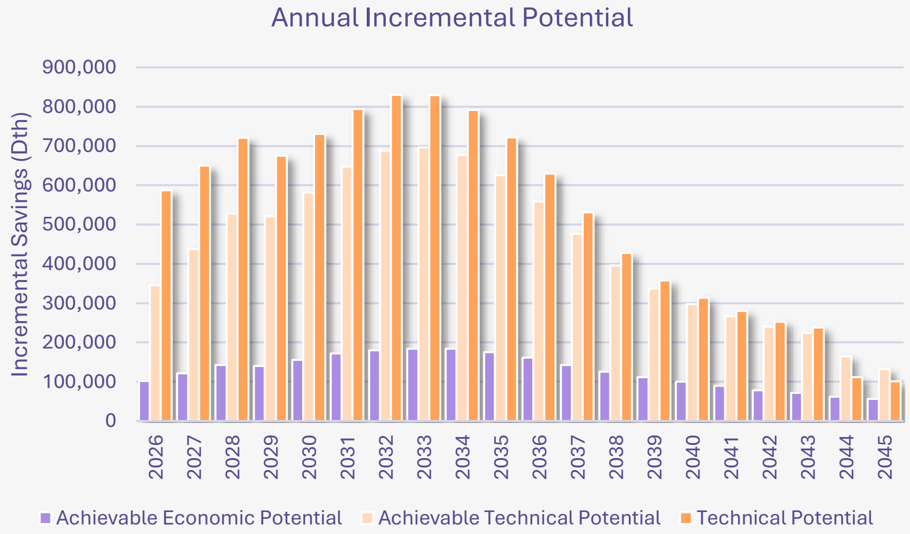


Draft Potential Results (All Sectors)

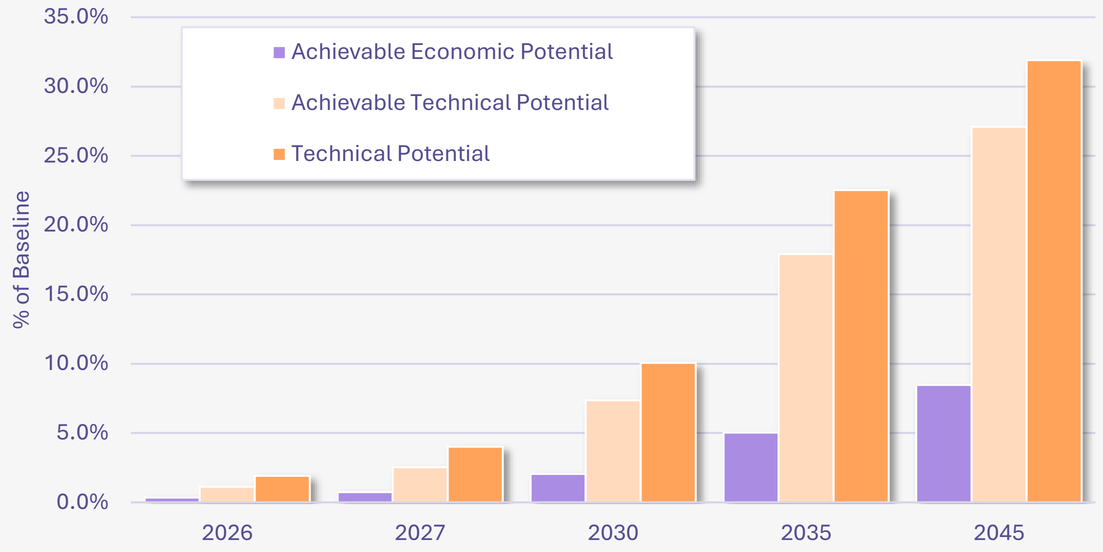
Summary Results (All Sectors, WA & ID Combined)

- Cumulative Achievable Technical Potential reaches 7,280,599 Dth, or 27.1% of the reference baseline by the end of the 20-year study period
- Cumulative Achievable Economic Potential reaches 2,273,359 Dth, or 8.5% of the baseline over the study period





Summary Results Continued

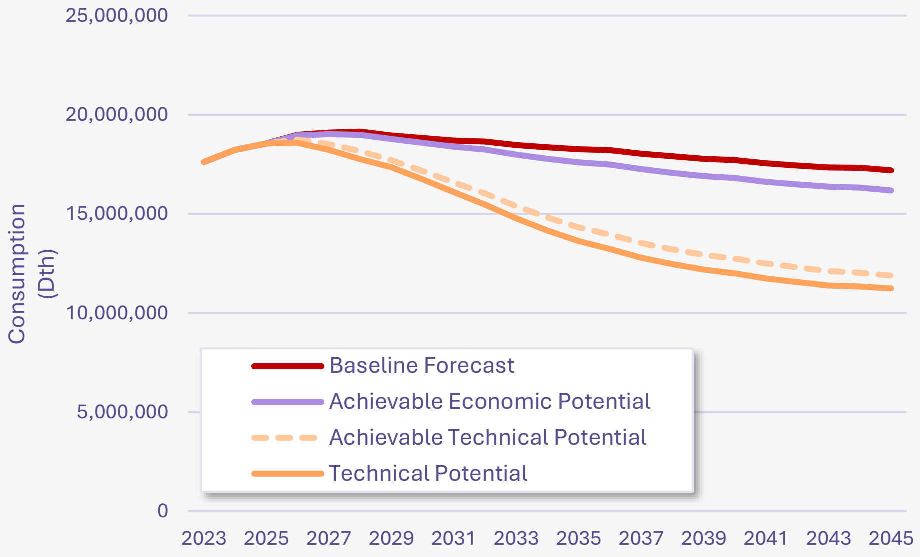


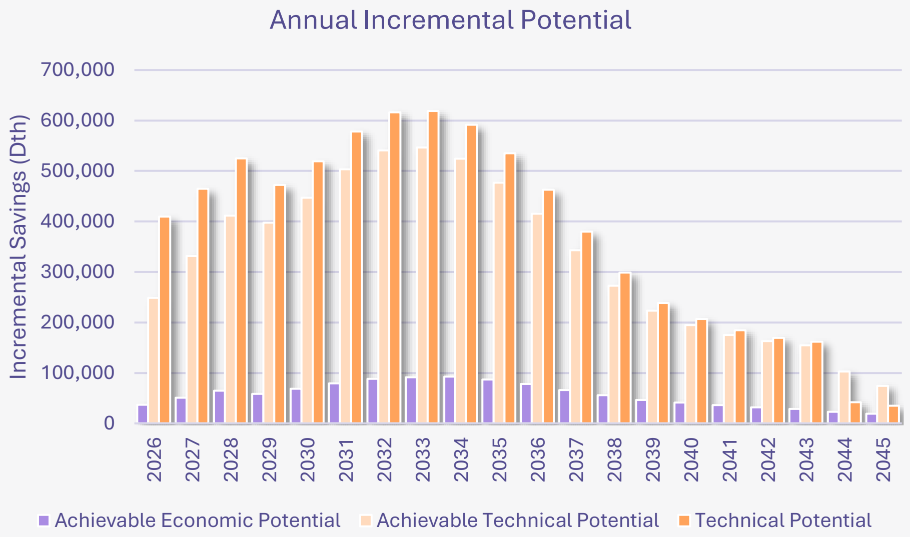
Summary of Energy Savings (Dth), Selected Years	2026	2027	2030	2035	2045
Reference Baseline (Dth)	**30,694,608**	**30,821,229**	**30,189,317**	**28,865,919**	**26,858,182**
Cumulative Savings (Dth)					
Achievable Economic	101,956	224,167	618,329	1,452,725	2,273,359
Achievable Technical	345,378	781,698	2,223,030	5,169,004	7,280,599
Technical Potential	587,137	1,236,115	3,038,374	6,504,292	8,570,562
Energy Savings (% of Baseline)					
Achievable Economic	0.3%	0.7%	2.0%	5.0%	8.5%
Achievable Technical	1.1%	2.5%	7.4%	17.9%	27.1%
Technical Potential	1.9%	4.0%	10.1%	22.5%	31.9%
Incremental Savings (Dth)					
Achievable Economic	101,954	121,649	155,584	175,424	56,357
Achievable Technical	345,371	437,413	581,629	625,774	131,572
Technical Potential	587,129	650,476	730,576	721,826	100,708

Draft Residential Potential Results

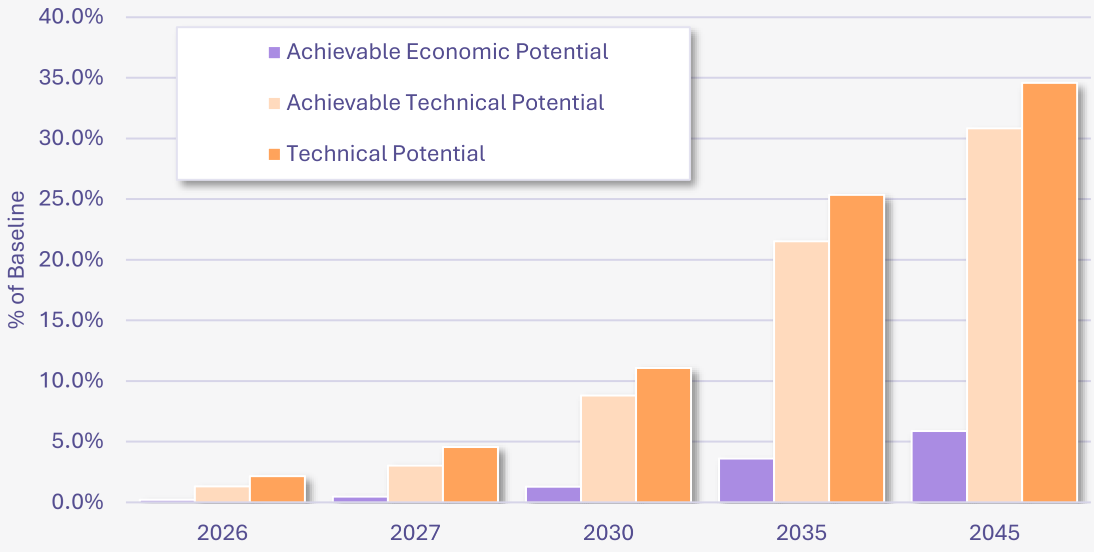
Residential Summary Results (WA & ID Combined)

- Cumulative Achievable Technical Potential reaches 5,299,926 Dth, or 30.8% of the reference baseline by the end of the 20-year study period
- Cumulative Achievable Economic Potential reaches 1,010,061 Dth, or 5.9% of baseline over the study period





Summary Results Continued



Summary of Energy Savings (Dth), Selected Years	2026	2027	2030	2035	2045
Reference Baseline (Dth)	**18,987,239**	**19,099,846**	**18,823,213**	**18,249,556**	**17,185,408**
Cumulative Savings (Dth)					
Achievable Economic	36,948	87,781	242,714	657,590	1,010,061
Achievable Technical	248,509	578,806	1,656,795	3,928,342	5,299,926
Technical Potential	409,851	872,234	2,083,457	4,625,799	5,945,955
Energy Savings (% of Baseline)					
Achievable Economic	0.2%	0.5%	1.3%	3.6%	5.9%
Achievable Technical	1.3%	3.0%	8.8%	21.5%	30.8%
Technical Potential	2.2%	4.6%	11.1%	25.3%	34.6%
Incremental Savings (Dth)					
Achievable Economic	36,948	50,917	68,500	87,033	19,293
Achievable Technical	248,509	331,903	446,884	476,864	74,182
Technical Potential	409,851	464,676	519,371	534,862	34,879

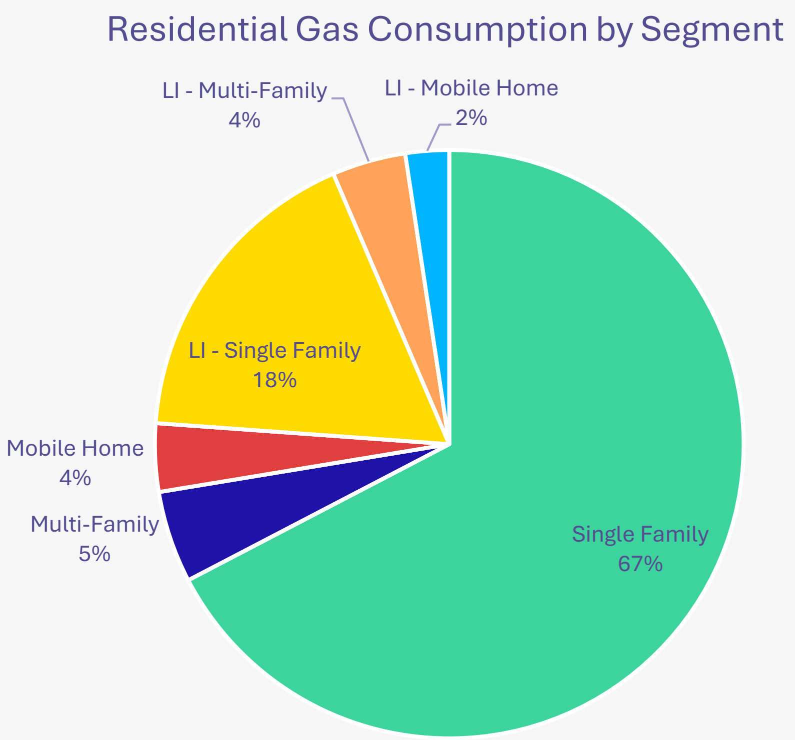
Residential Top Measures (Achievable Economic)

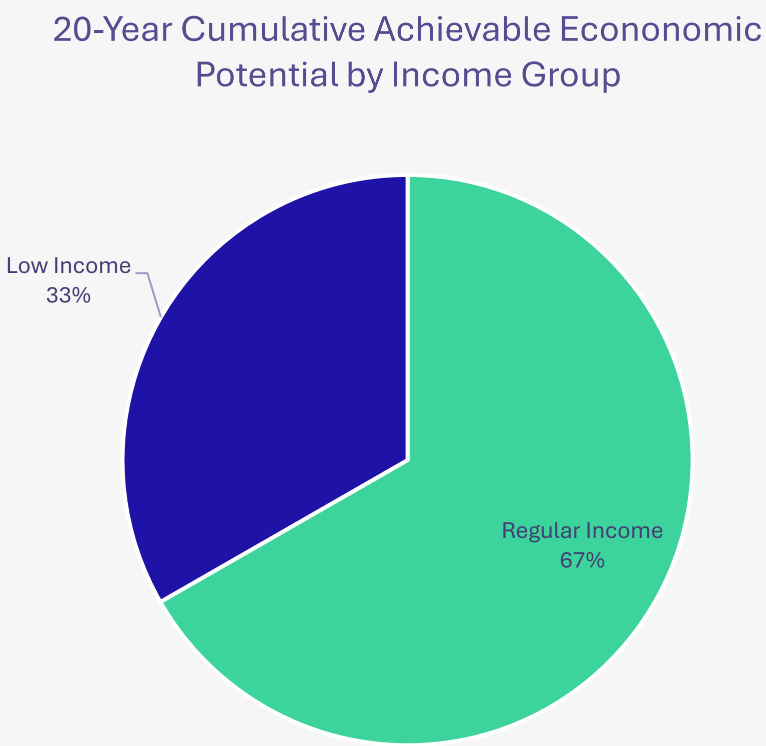
Rank	**Idaho** – Achievable Economic UCT Potential	2045 Achievable Economic Potential (Dth)	% of Total Savings
1	Connected Thermostat - ENERGY STAR (1.0)	71,555	22.6%
2	Insulation - Ceiling Installation	69,252	21.9%
3	Furnace	44,423	14.1%
4	ENERGY STAR Home Design	29,219	9.2%
5	Clothes Washer - CEE Tier 2	16,871	5.3%
6	Home Energy Reports	16,867	5.3%
7	Water Heater - Faucet Aerators	15,641	5.0%
8	Water Heater - Low-Flow Showerheads	14,319	4.5%
9	Building Shell - Air Sealing (Infiltration Control)	9,099	2.9%
10	Windows - Low-e Storm Addition	6,015	1.9%
	Subtotal	**293,261**	**92.8%**
	Total Savings in Year	**315,968**	**100.0%**

Rank	**Washington** – Achievable Economic TRC Potential	2045 Achievable Economic Potential (Dth)	% of Total Savings
1	Furnace	252,172	36.3%
2	Insulation - Ceiling Installation	85,451	12.3%
3	Home Energy Management System (HEMS)	57,291	8.3%
4	Ducting - Repair and Sealing - Aerosol	57,284	8.3%
5	Water Heater (<= 55 Gal)	49,898	7.2%
6	Water Heater - Drainwater Heat Recovery	41,161	5.9%
7	Clothes Washer - CEE Tier 2	25,511	3.7%
8	Home Energy Reports	25,435	3.7%
9	Building Shell - Air Sealing (Infiltration Control)	20,339	2.9%
10	Fireplace	11,915	1.7%
	Subtotal	**626,457**	**90.3%**
	Total Savings in Year	**694,094**	**100.0%**

Residential Potential by Income Group

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

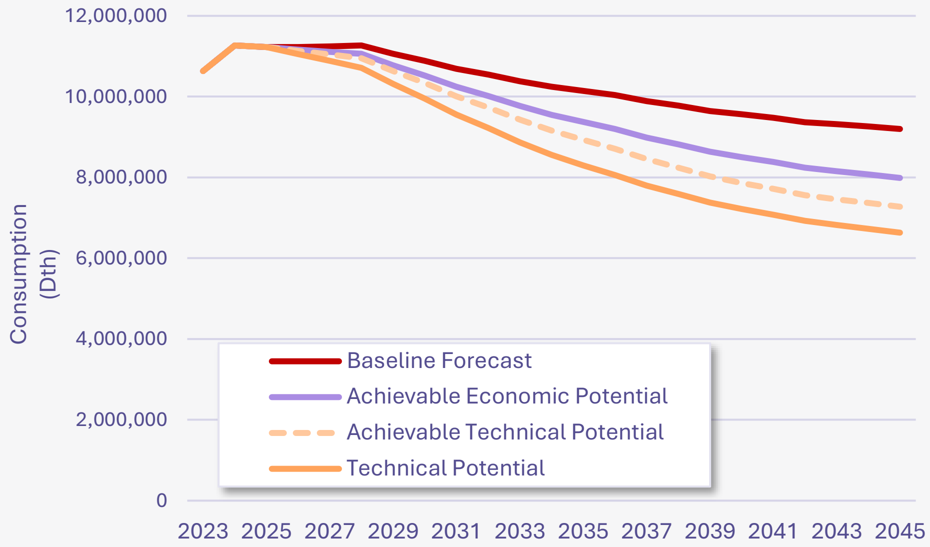


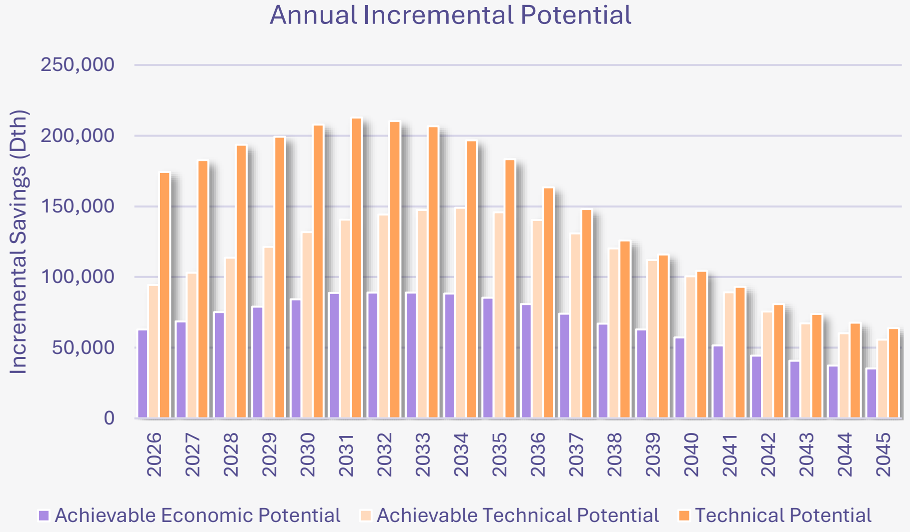


Draft Commercial Potential Results

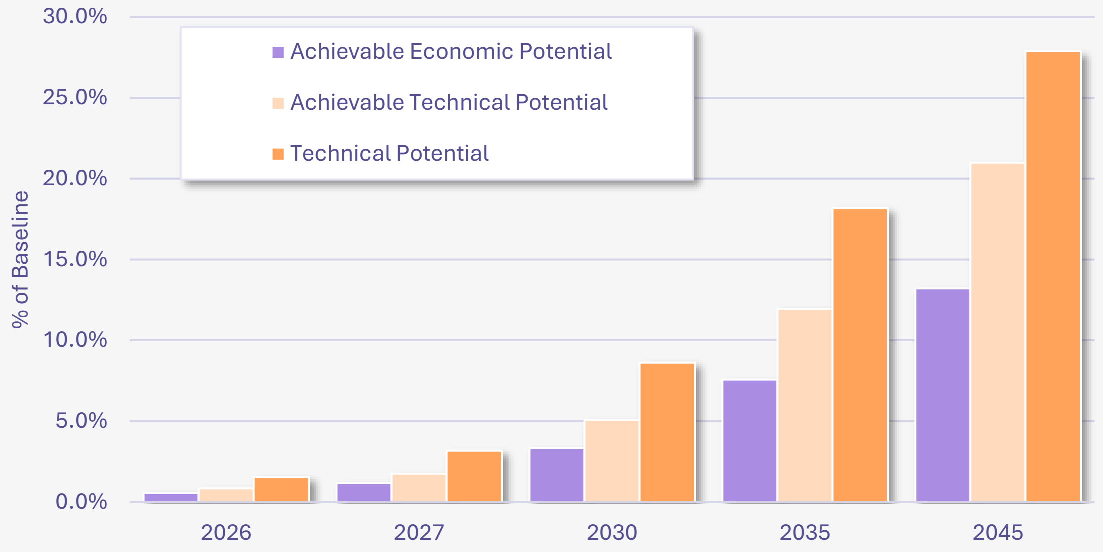
Commercial Summary Results (WA & ID Combined)

- Cumulative Achievable Technical Potential reaches 1,931,836 Dth, or 21% of the reference baseline over the 20-year study period.
- Cumulative Achievable Economic Potential reaches 1,217,146 Dth, or 13.2% of the baseline.





Commercial Summary Results Continued



Summary of Energy Savings (Dth), Selected Years	2026	2027	2030	2035	2045
Reference Baseline (Dth)	**11,229,877**	**11,244,262**	**10,890,299**	**10,142,703**	**9,203,073**
Cumulative Savings (Dth)					
Achievable Economic	62,957	132,246	364,283	768,870	1,217,146
Achievable Technical	94,431	197,967	553,157	1,212,068	1,931,836
Technical Potential	174,326	357,927	939,269	1,844,706	2,567,719
Energy Savings (% of Baseline)					
Achievable Economic	0.6%	1.2%	3.3%	7.6%	13.2%
Achievable Technical	0.8%	1.8%	5.1%	12.0%	21.0%
Technical Potential	1.6%	3.2%	8.6%	18.2%	27.9%
Incremental Savings (Dth)					
Achievable Economic	62,955	68,637	84,298	85,399	35,432
Achievable Technical	94,424	103,018	131,847	145,822	55,739
Technical Potential	174,318	182,798	207,770	183,362	63,935

Commercial Top Measures (Achievable Economic)

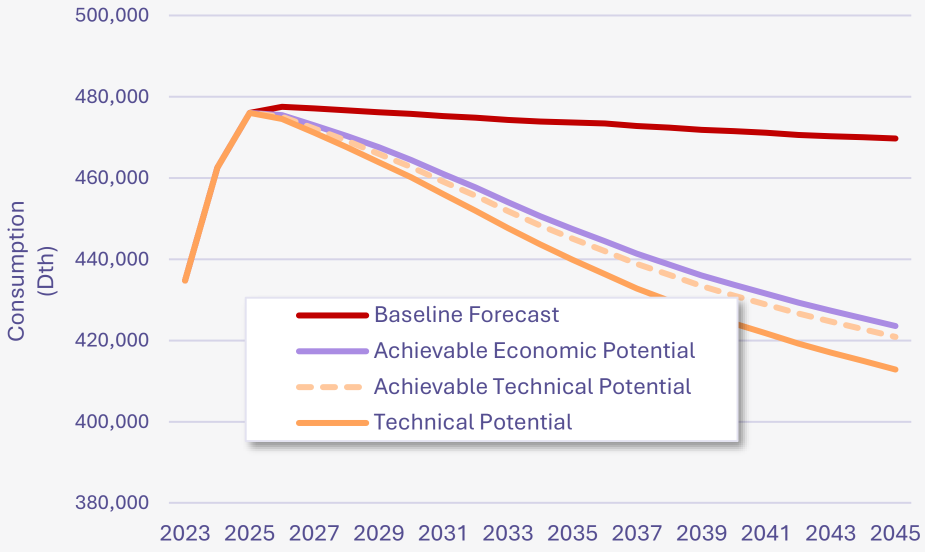
Rank	**Idaho** – Achievable Economic UCT Potential	2045 Achievable Economic Potential (Dth)	% of Total Savings
1	Furnace	55,089	16.1%
2	Fryer	37,786	11.0%
3	HVAC - Energy Recovery Ventilator	30,097	8.8%
4	Water Heater	26,886	7.8%
5	Retrocommissioning	18,855	5.5%
6	Unit Heater	18,435	5.4%
7	Water Heater - Pipe Insulation	16,126	4.7%
8	Boiler	14,536	4.2%
9	Broiler	12,322	3.6%
10	Oven	10,766	3.1%
	Subtotal	**240,898**	**70.3%**
	Total Savings in Year	**342,501**	**100.0%**

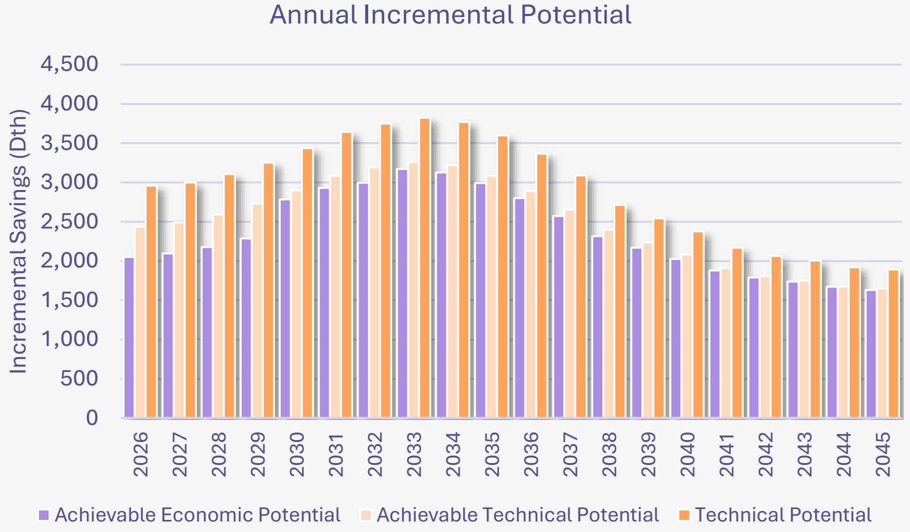
Rank	**Washington** – Achievable Economic TRC Potential	2045 Achievable Economic Potential (Dth)	% of Total Savings
1	Furnace	145,463	16.6%
2	Destratification Fans (HVLS)	76,738	8.8%
3	Ventilation - Demand Controlled	69,390	7.9%
4	HVAC - Energy Recovery Ventilator	64,414	7.4%
5	Strategic Energy Management	44,680	5.1%
6	Water Heater	44,216	5.1%
7	Retrocommissioning	44,020	5.0%
8	Water Heater - Pipe Insulation	33,466	3.8%
9	Broiler	28,854	3.3%
10	Griddle	25,480	2.9%
	Subtotal	**576,719**	**65.9%**
	Total Savings in Year	**874,645**	**100.0%**

Draft Industrial Potential Results

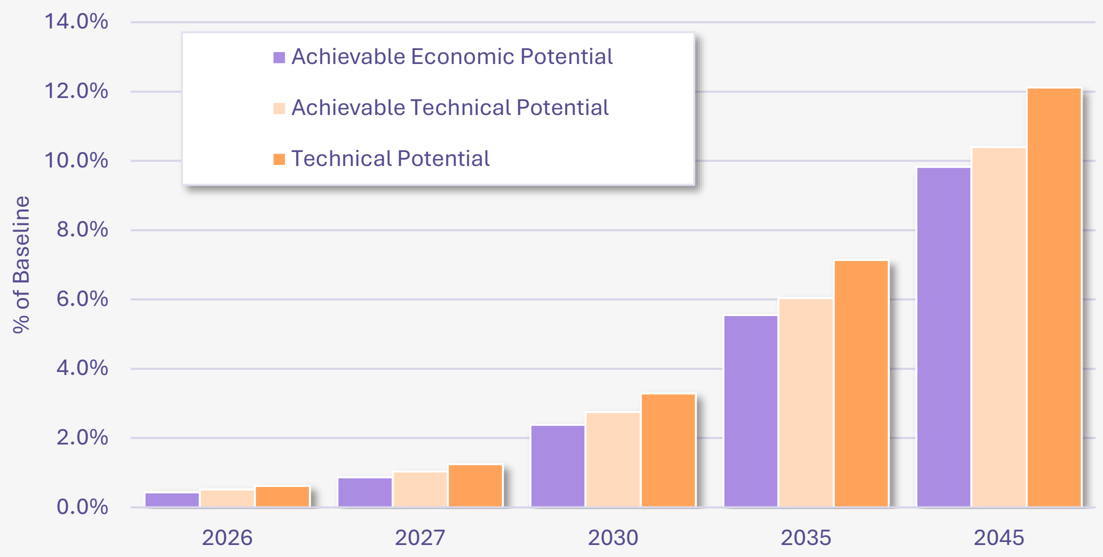
Industrial Summary Results (WA & ID Combined)

- Cumulative Achievable Technical Potential reaches 48,837 Dth, or 10.4% of the reference baseline over the 20-year study period.
- Cumulative Achievable Economic Potential reaches 46,151 Dth, or 9.8% of the baseline.





Industrial Summary Results Continued



Summary of Energy Savings (Dth), Selected Years	2026	2027	2030	2035	2045
Reference Baseline (Dth)	**477,492**	**477,120**	**475,805**	**473,660**	**469,702**
Cumulative Savings (Dth)					
Achievable Economic	2,050	4,141	11,332	26,264	46,151
Achievable Technical	2,439	4,924	13,078	28,594	48,837
Technical Potential	2,960	5,953	15,648	33,786	56,888
Energy Savings (% of Baseline)					
Achievable Economic	0.4%	0.9%	2.4%	5.5%	9.8%
Achievable Technical	0.5%	1.0%	2.7%	6.0%	10.4%
Technical Potential	0.6%	1.2%	3.3%	7.1%	12.1%
Incremental Savings (Dth)					
Achievable Economic	2,050	2,096	2,786	2,992	1,633
Achievable Technical	2,439	2,492	2,899	3,087	1,650
Technical Potential	2,960	3,002	3,435	3,601	1,894

Industrial Top Measures (Achievable Economic)

Rank	**Idaho** – Achievable Economic UCT Potential	2045 Achievable Economic Potential (Dth)	% of Total Savings
1	Process - Heat Recovery	5,697	41.8%
2	Process Boiler - Steam Trap Replacement	1,816	13.3%
3	Process Boiler - Burner Control Optimization	1,347	9.9%
4	Strategic Energy Management	1,012	7.4%
5	Retrocommissioning	915	6.7%
6	Process Boiler - Insulate Steam Lines/Condensate Tank	601	4.4%
7	Process - Insulate Heated Process Fluids	497	3.7%
8	Unit Heater	417	3.1%
9	Destratification Fans (HVLS)	400	2.9%
10	Process Boiler - High Turndown Burner	272	2.0%
	Subtotal	**12,974**	**95.3%**
	Total Savings in Year	**13,615**	**100.0%**

Rank	**Washington** – Achievable Economic TRC Potential	2045 Achievable Economic Potential (Dth)	% of Total Savings
1	Process - Heat Recovery	15,072	46.3%
2	Process Boiler - Steam Trap Replacement	3,931	12.1%
3	Process Boiler - Burner Control Optimization	2,896	8.9%
4	Strategic Energy Management	2,145	6.6%
5	Retrocommissioning	1,942	6.0%
6	Process Boiler - Insulate Steam Lines/Condensate Tank	1,289	4.0%
7	Process - Insulate Heated Process Fluids	1,078	3.3%
8	Process Furnace - Tube Inserts	924	2.8%
9	Destratification Fans (HVLS)	749	2.3%
10	Process Boiler - High Turndown Burner	585	1.8%
	Subtotal	**30,611**	**94.1%**
	Total Savings in Year	**32,536**	**100.0%**

Natural Gas Demand Response

Approach to the Study

Data Collection → Characterize the Market → Develop list of DR Options → Characterize the Options → Estimate Potential

Data Collection

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

Develop list of DR Options

Program Options

- Behavioral
- DLC Smart Thermostats – BYOT
- Third Party Contracts

Characterize the Options

Develop Program Assumptions

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

Estimate Potential

Achievable Potential

- Integrated program options without participant overlap

Changes from Previous Study

The following updates were made to the previous study

- Removed all dynamic rate options (TOU, VPP)
  - Level of sophistication required makes these programs difficult to implement for Gas DR
- Removed Water Heating DLC
  - Costly to implement, unlikely to have high participation, low peak impacts
- Limited Smart Thermostat Program to WA only due to AMI availability
- Updated per-customer peak therms – lower compared to previous study
- Updated program assumptions
- Behavioral Program limited to res-only due to vendor limitations

Assumptions

Study Assumptions

- 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 ConEd Program
  - Third Party Contracts Program based on National Grid Program
- Diverged where gaps in research
  - Customized for Avista's service territory
  - Pulled remaining assumptions from Electric DR Study and scaled-down where appropriate

Advanced Metering Infrastructure (AMI) Assumptions

Some DR Programs Require AMI

- Dynamic Rate and Smart Thermostat Programs require AMI for billing

Washington

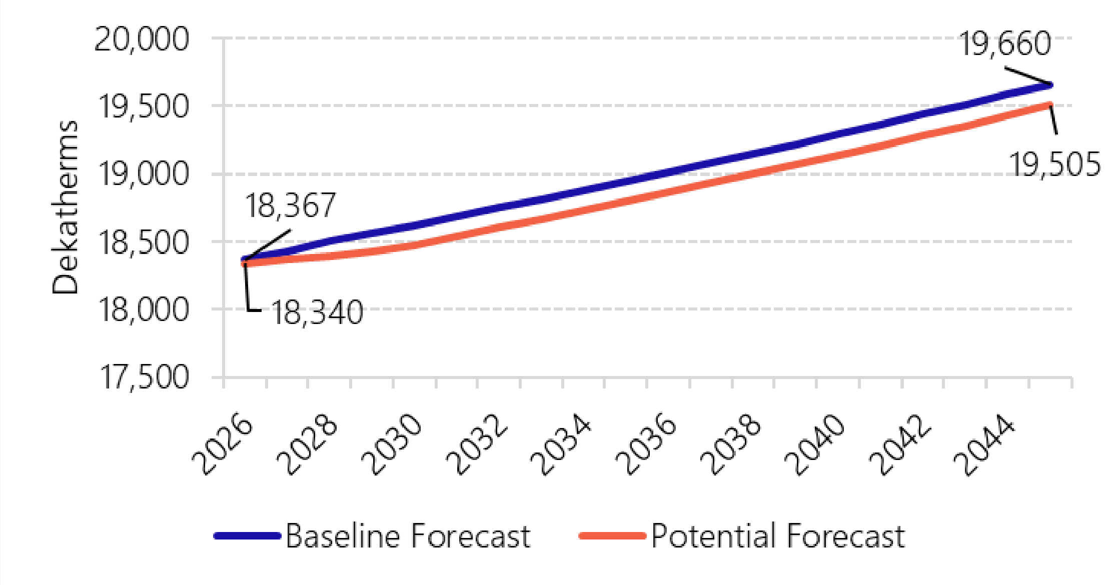
- Used current Avista AMI saturation rates by sector and held constant

Idaho and Oregon

- No AMI Projected

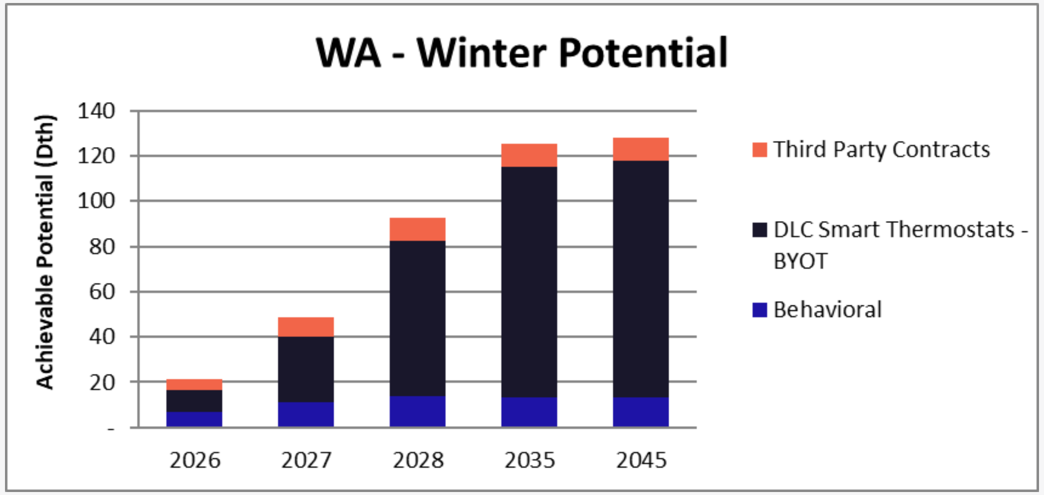
Achievable Potential

Achievable Potential Forecast (All States)



Total Potential	2026	2027	2030	2035	2045
Baseline Forecast (Dth)	**18,367**	**18,428**	**18,623**	**18,946**	**19,660**
Market Potential	26	56	147	150	155
Peak Reduction % of Baseline	0.1%	0.3%	0.8%	0.8%	0.8%
Potential Forecast	**18,340**	**18,372**	**18,476**	**18,795**	**19,505**

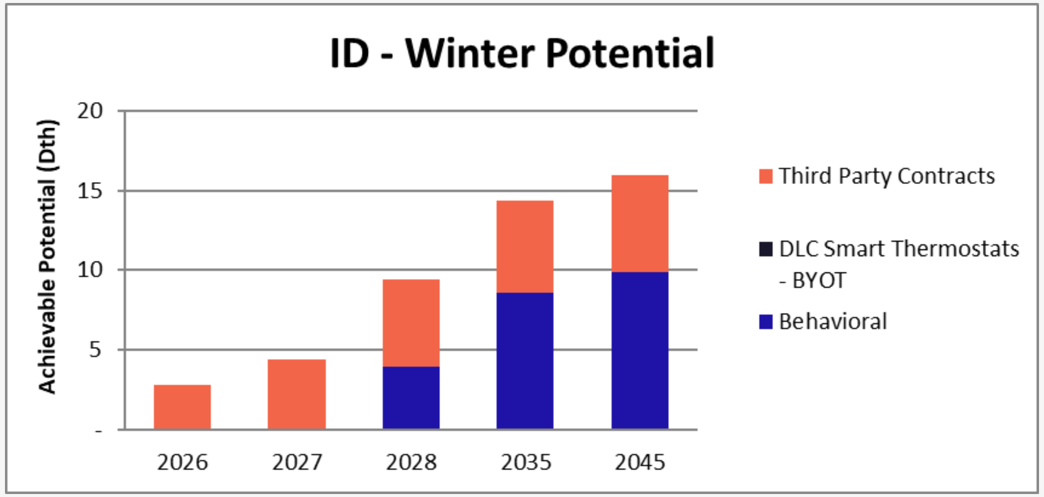
Washington Potential by Program



WA - Winter Potential	2026	2027	2028	2035	2045
Baseline Forecast (Dth)	9,217	9,207	9,193	9,094	8,956
Achievable Potential (Dth)	22	49	93	125	128
Behavioral	7	11	14	13	13
DLC Smart Thermostats - BYOT	10	29	69	102	105
Third Party Contracts	5	8	10	10	10

- Only state with Thermostat potential due to AMI limitations
- Thermostats contribute around 82% of the total potential by 2045
- Potential across all programs ~ 1.4% of WA baseline

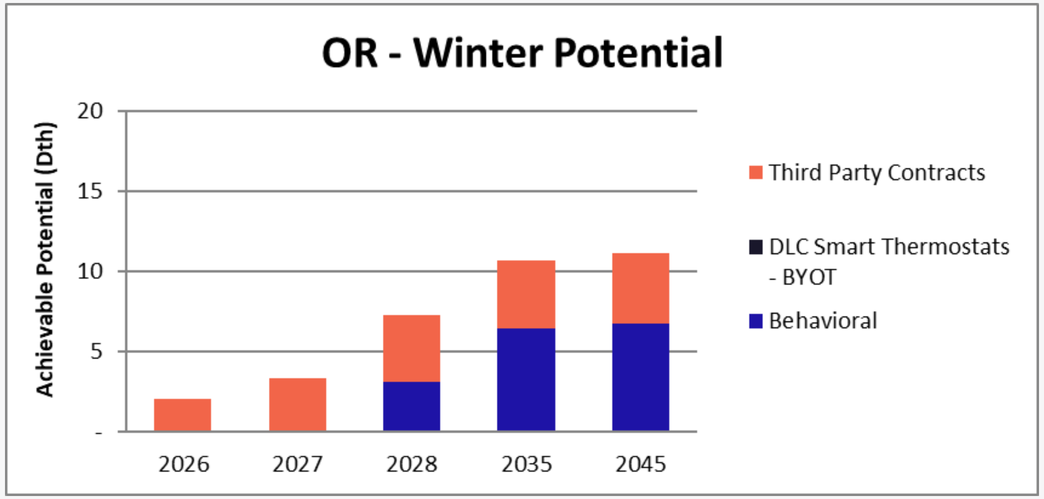
Idaho Potential by Program



ID - Winter Potential	2026	2027	2028	2035	2045
Baseline Forecast (Dth)	5,060	5,115	5,185	5,611	6,288
Achievable Potential (Dth)	3	4	9	14	16
Behavioral	-	-	4	9	10
DLC Smart Thermostats - BYOT	-	-	-	-	-
Third Party Contracts	3	4	6	6	6

- 2028 start date for the Behavioral Program for both ID and OR

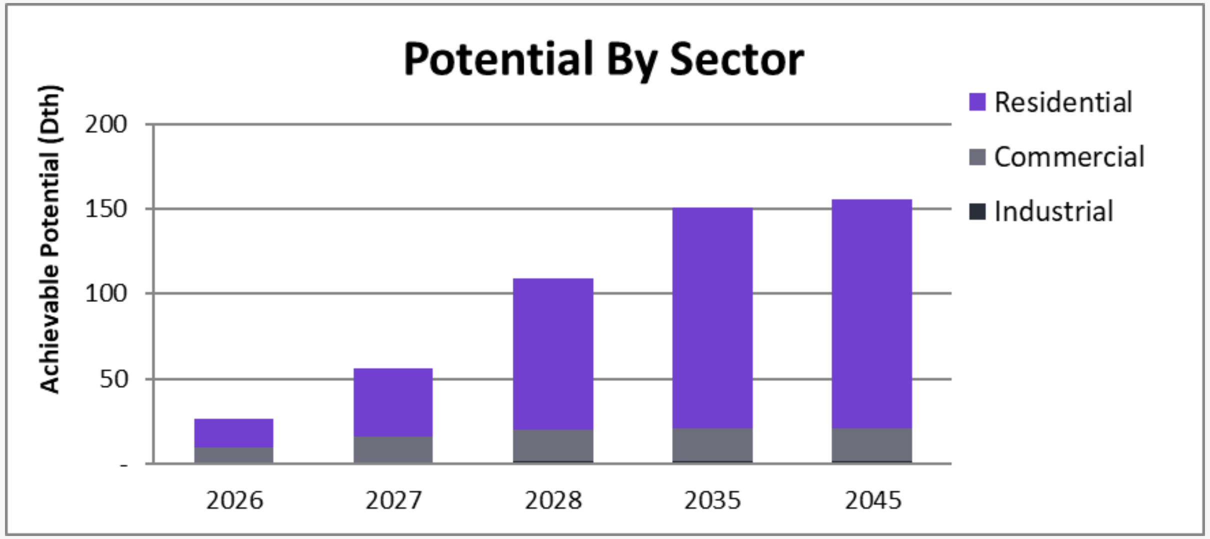
Oregon Potential by Program



OR - Winter Potential	2026	2027	2028	2035	2045
Baseline Forecast (Dth)	4,090	4,107	4,121	4,240	4,416
Achievable Potential (Dth)	2	3	7	11	11
Behavioral	-	-	3	6	7
DLC Smart Thermostats - BYOT	-	-	-	-	-
Third Party Contracts	2	3	4	4	4

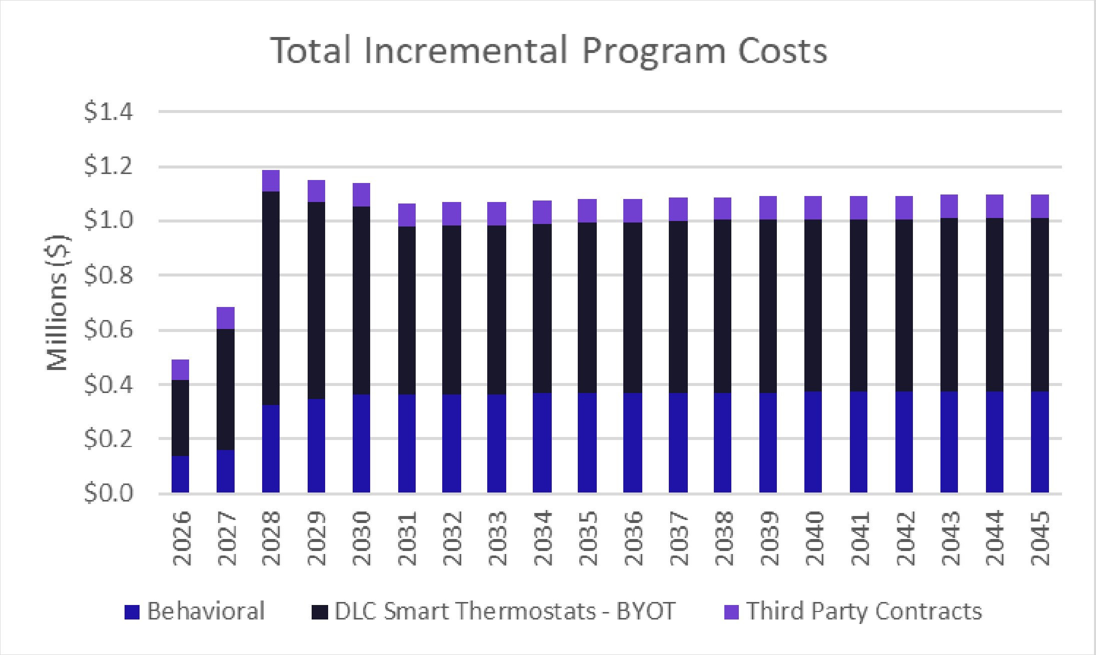
- Lowest potential across all three states due to limited AMI and proportionally low overall baseline Dth

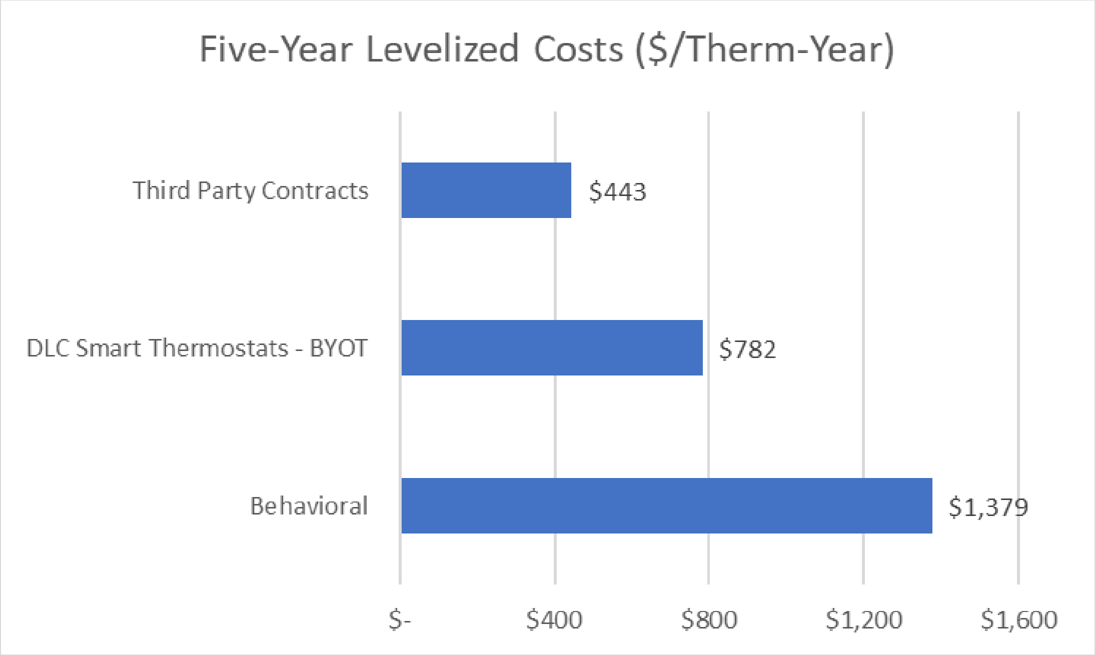
Results by Sector



Potential By Sector	2026	2027	2028	2035	2045
Baseline Forecast (Dth)	18,367	18,428	18,500	18,946	19,660
Achievable Potential (Dth)	26	56	109	150	155
Residential	16	40	89	130	134
Commercial	9	15	19	19	20
Industrial	1	1	1	1	1

Program Costs





Gas DR Key Findings

Natural Gas DR is an emerging resource

- Small number of programs in existence
- Numerous questions surround the applicability and reliability of Gas DR

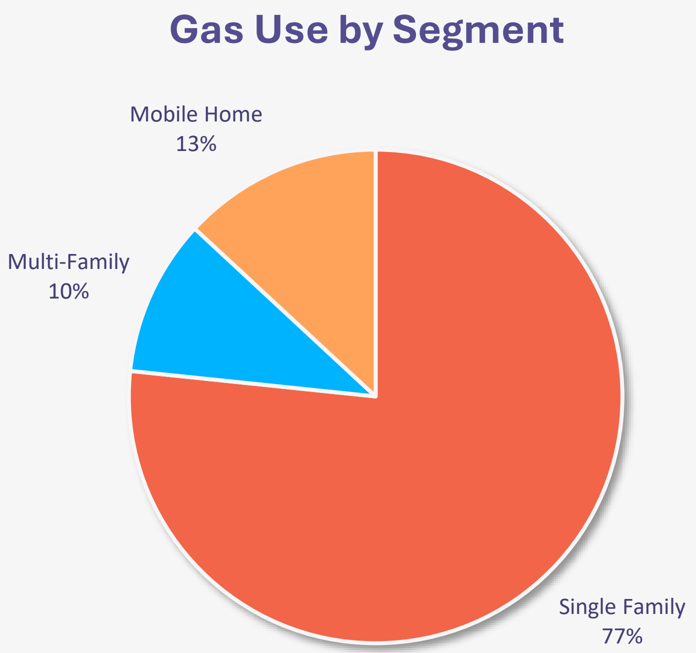
Program Potential

- Smart Thermostats
  - Largest savings potential ~ 82% of potential in WA by 2045
- Third Party Contracts
  - Lowest levelized cost but also lowest potential
    - Small amount of customers
    - Not a lot of discretionary load to reduce

OR Low-Income Energy Efficiency Potential Study

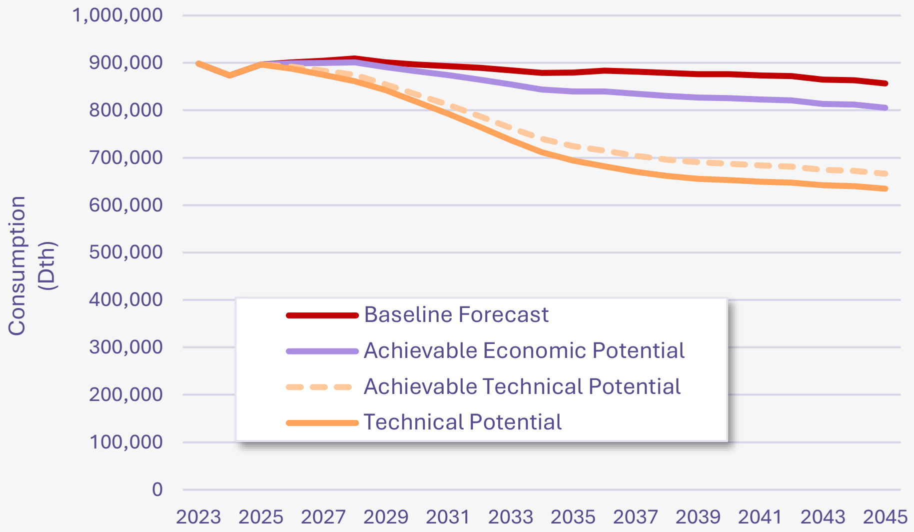
OR Low-Income Customers and Energy Consumption by Home Type

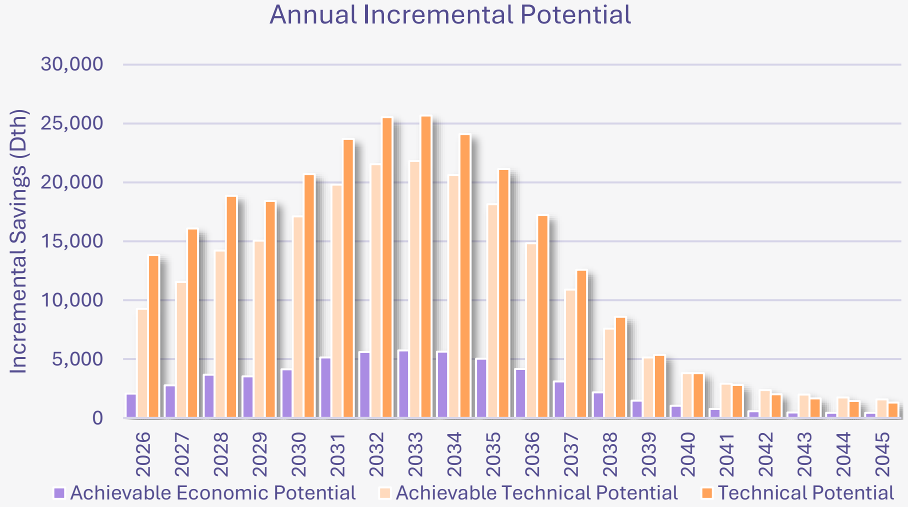
Segment	Households	% of All Homes	Usage (Dth)	Therms / HH
Single Family	12,289	65.0%	622,559	539
Multi-Family	4,428	23.4%	88,679	200
Mobile Home	2,197	11.6%	113,191	515
Total	**18,914**	**100.0%**	**864,429**	**457**



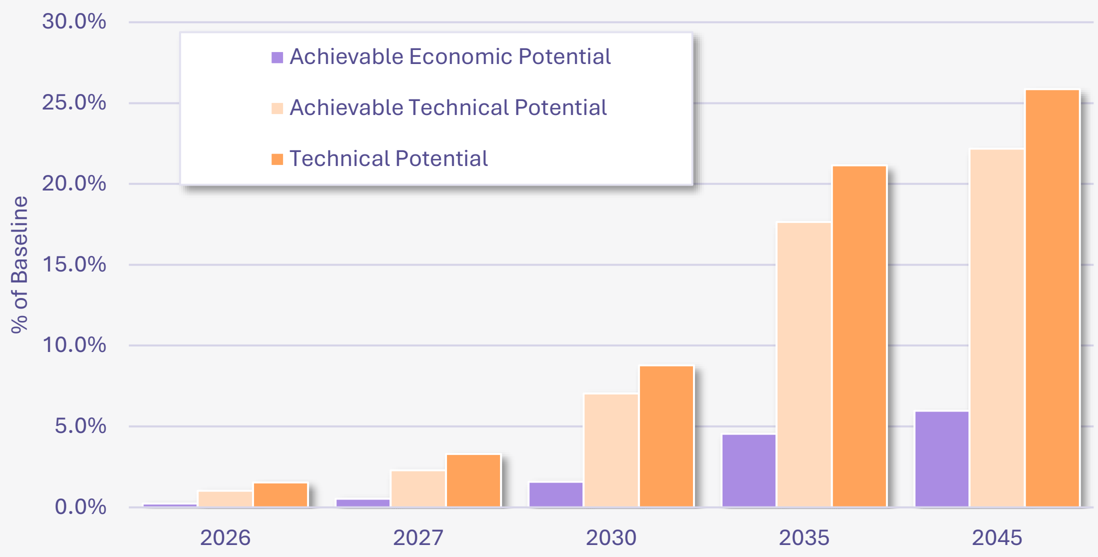
Summary Results (OR Low-Income)

- For Oregon Low-Income Customers, Cumulative Achievable Technical Potential is 189,919 Dth, or 22.2% of the baseline over 20 years
- Cumulative Achievable Economic Potential (TRC) is 51,164 Dth, or 6% of the baseline





Summary Results Continued



Summary of Energy Savings (Dth), Selected Years	2026	2027	2030	2035	2045
Reference Baseline (Dth)	**901,274**	**904,673**	**896,310**	**879,805**	**856,427**
Cumulative Savings (Dth)					
Achievable Economic	2,068	4,856	14,095	39,976	51,164
Achievable Technical	9,275	20,777	63,138	155,234	189,919
Technical Potential	13,847	29,842	78,653	186,112	221,549
Energy Savings (% of Baseline)					
Achievable Economic	0.2%	0.5%	1.6%	4.5%	6.0%
Achievable Technical	1.0%	2.3%	7.0%	17.6%	22.2%
Technical Potential	1.5%	3.3%	8.8%	21.2%	25.9%
Incremental Savings (Dth)					
Achievable Economic	2,068	2,789	4,135	5,032	444
Achievable Technical	9,275	11,566	17,115	18,168	1,580
Technical Potential	13,847	16,090	20,697	21,153	1,329

Top Measures (OR Low-Income)

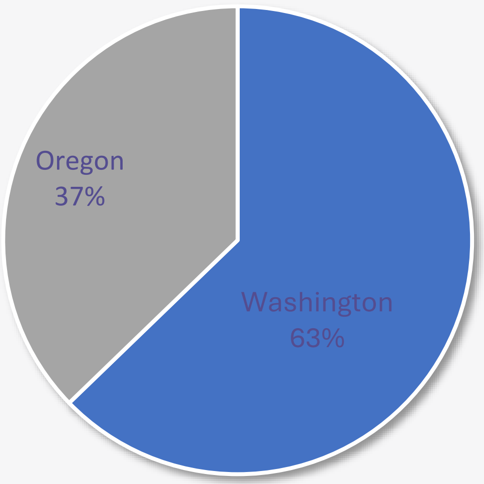
Rank	**Oregon** – Achievable Economic TRC Potential	2045 Achievable Economic Potential (Dth)	% of Total Savings
1	Insulation - Ceiling Installation	7,749	15.1%
2	Insulation - Wall Cavity Upgrade	7,107	13.9%
3	Insulation - Ceiling Upgrade	6,193	12.1%
4	Ducting - Repair and Sealing - Aerosol	4,624	9.0%
5	Building Shell - Air Sealing (Infiltration Control)	3,834	7.5%
6	Furnace	3,297	6.4%
7	Insulation - Floor Upgrade	2,287	4.5%
8	Insulation - Floor Installation	2,254	4.4%
9	Insulation - Ducting	2,073	4.1%
10	Insulation - Wall Sheathing	1,776	3.5%
	Subtotal	**41,196**	**80.5%**
	Total Savings in Year	**51,164**	**100.0%**

OR-WA Transport Customer Energy Efficiency Potential Study

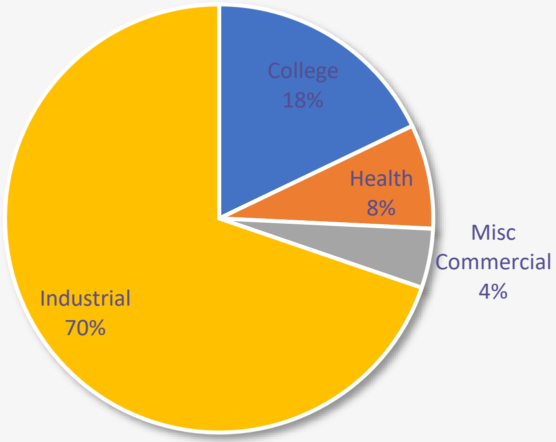
Market Characterization

- 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.

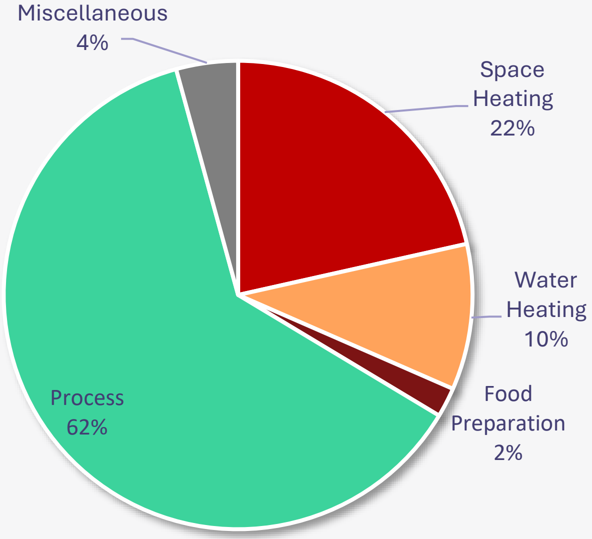
Transport Gas Use by State (2021)



Transport Gas Use by Segment (2021)



Transport Gas Use by End Use (2021)



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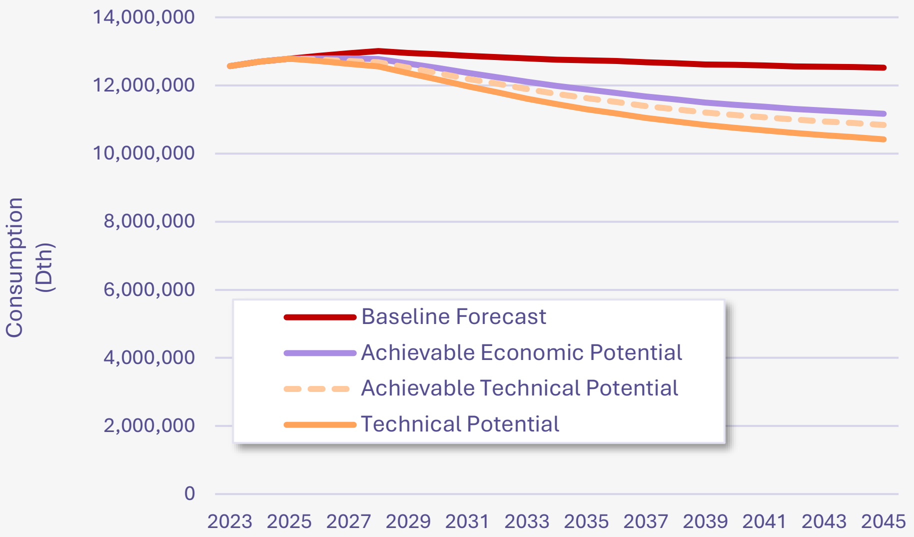
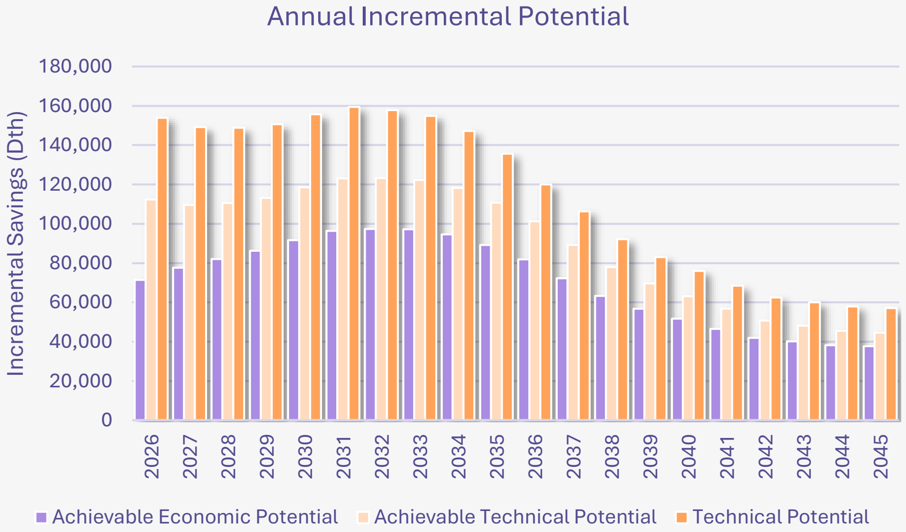
Considerations for this Analysis

- 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

Draft Potential Results

Summary Results (All States & Transport Sectors)





Summary of Energy Savings (Dth), Selected Years	2026	2027	2030	2035	2045
Reference Baseline (Dth)	**12,867,931**	**12,940,233**	**12,916,886**	**12,740,100**	**12,521,417**
Cumulative Savings (Dth)					
Achievable Economic	71,410	149,277	405,529	861,783	1,356,513
Achievable Technical	112,359	221,738	553,523	1,111,243	1,681,083
Technical Potential	153,865	302,414	741,338	1,436,433	2,104,270
Energy Savings (% of Baseline)					
Achievable Economic	0.6%	1.2%	3.1%	6.8%	10.8%
Achievable Technical	0.9%	1.7%	4.3%	8.7%	13.4%
Technical Potential	1.2%	2.3%	5.7%	11.3%	16.8%
Incremental Savings (Dth)					
Achievable Economic	71,410	77,638	91,630	89,176	37,661
Achievable Technical	112,359	109,625	118,608	110,727	44,538
Technical Potential	153,865	149,160	155,663	135,624	57,179

Transport Top Measures (All States & Sectors)

Rank	**Oregon** – Achievable Economic TRC Potential	2045 Achievable Economic Potential (Dth)	% of Total Savings
1	Process - Heat Recovery	241,167	50.3%
2	Process Boiler - Burner Control Optimization	42,084	8.8%
3	Retrocommissioning	35,257	7.4%
4	Strategic Energy Management	32,996	6.9%
5	Process Furnace - Tube Inserts	21,174	4.4%
6	Process - Insulate Heated Process Fluids	16,706	3.5%
7	Destratification Fans (HVLS)	10,447	2.2%
8	Gas Boiler - Steam Trap Replacement	10,434	2.2%
9	Process Boiler - High Turndown Burner	9,253	1.9%
10	Process Boiler - Stack Economizer	7,906	1.6%
	Subtotal	**427,423**	**89.1%**
	Total Savings in Year	**479,508**	**100.0%**

Rank	**Washington** – Achievable Economic TRC Potential	2045 Achievable Economic Potential (Dth)	% of Total Savings
1	Process - Heat Recovery	274,917	31.3%
2	Retrocommissioning	70,255	8.0%
3	Ventilation - Demand Controlled	53,105	6.1%
4	Process Boiler - Burner Control Optimization	47,973	5.5%
5	Destratification Fans (HVLS)	39,808	4.5%
6	Water Heater	39,619	4.5%
7	Strategic Energy Management	37,637	4.3%
8	Gas Boiler - Steam Trap Replacement	34,553	3.9%
9	Water Heater - Pipe Insulation	26,232	3.0%
10	Process Furnace - Tube Inserts	23,907	2.7%
	Subtotal	**648,004**	**73.9%**
	Total Savings in Year	**877,004**	**100.0%**

Thank You.

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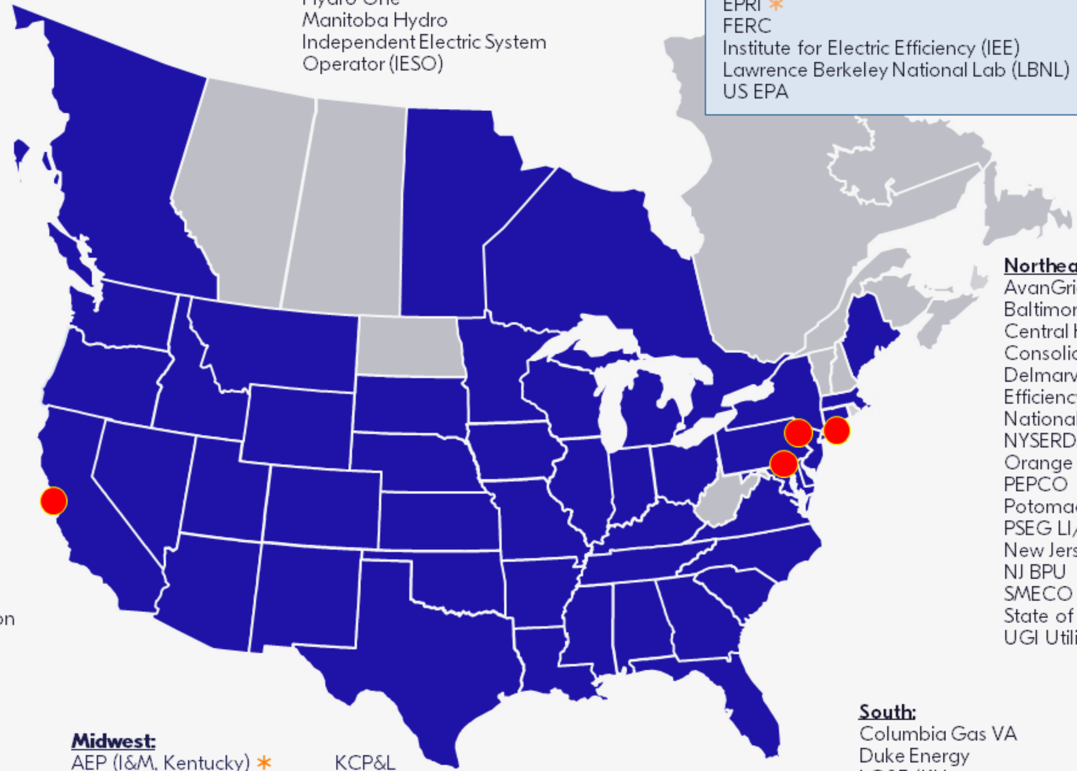
Northwest & Mountain:
Avista Energy *
Bonneville Power Ad. (BPA)
Black Hills Energy *
Cascade Natural Gas *
Chelan PUD
City of Fort Collins
Colorado Electric *
Cowlitz PUD
Energy Trust of OR
Idaho Power *
Inland P&L
Northwest EE Alliance *
Northwest Power & Conservation Council *
Oregon Trail Electric Co-op
PacifiCorp *
PNGC
Portland General Electric
Seattle City Light
Snohomish PUD
Tacoma Power *

Canada:
BC Hydro
Hydro One
Manitoba Hydro
Independent Electric System Operator (IESO)

National:
American Society of Mechanical Engineers (ASME)
EPRI *
FERC
Institute for Electric Efficiency (IEE)
Lawrence Berkeley National Lab (LBNL)
US EPA



Northeast & Mid Atlantic:
AvanGrid (RG&E & NYSEG)
Baltimore Gas & Electric
Central Hudson Electric & Gas *
Consolidated Edison of NY
Delmarva Power
Efficiency Maine *
National Grid
NYSERDA
Orange & Rockland *
PEPCO
Potomac Energy
PSEG LI/LIPA *
New Jersey Natural Gas *
NJ BPU
SMECO
State of Maryland
UGI Utilities

Southwest:
Alameda Municipal Power
Burbank W&P
California Energy Commission
HECO *
LADWP
NV Energy
PNM *
PG&E *
SCE *
SDG&E *
SMUD
State of NM
State of HI *
Tucson Electric Power
Xcel/SPS

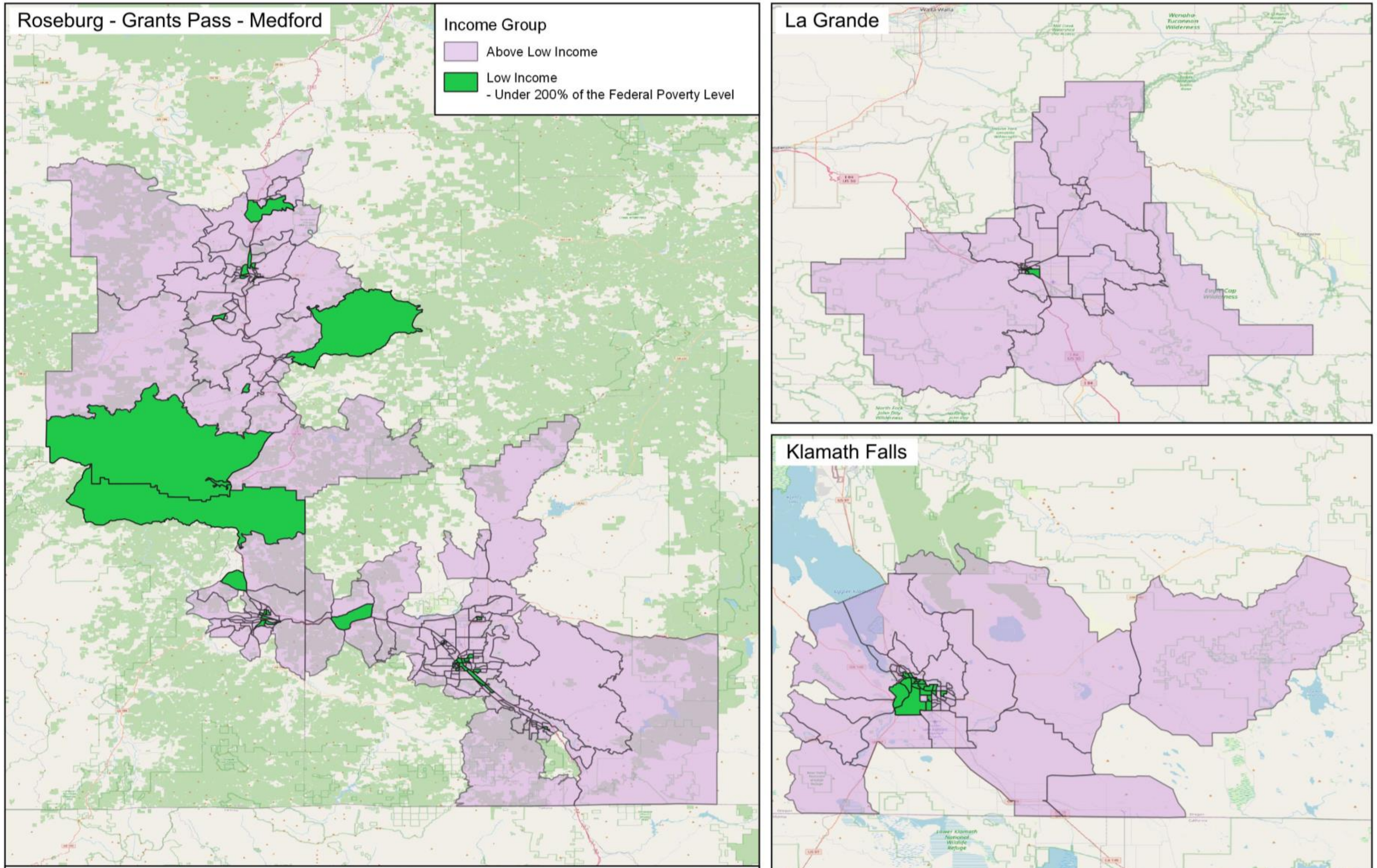
Midwest:
AEP (I&M, Kentucky) *
Alliant Energy
Ameren Missouri
Ameren Illinois *
Black Hills Energy *
Citizens Energy
ComEd
Empire District Electric *
First Energy *
Indianapolis P&L
KCP&L
Minnesota Energy Resources *
Midcontinent ISO *
NIPSCO
Omaha Public Power District *
Peoples Gas/North Shore Gas * Spire *
State of Michigan
Sunflower Electric Power Vectren (IN & OH)
Wisconsin PSC

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

■ States and Provinces in which we've worked
* Current Work
● AEG offices

As of May 2021

Income by Region



Source: Census American Community Survey 2019, provides accurate estimates of household median income, household size, and structure type within each block group.

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
- Detailed 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	Δ 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

Baseline Projection

The baseline projection is an independent end-use 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:

Includes

- 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:

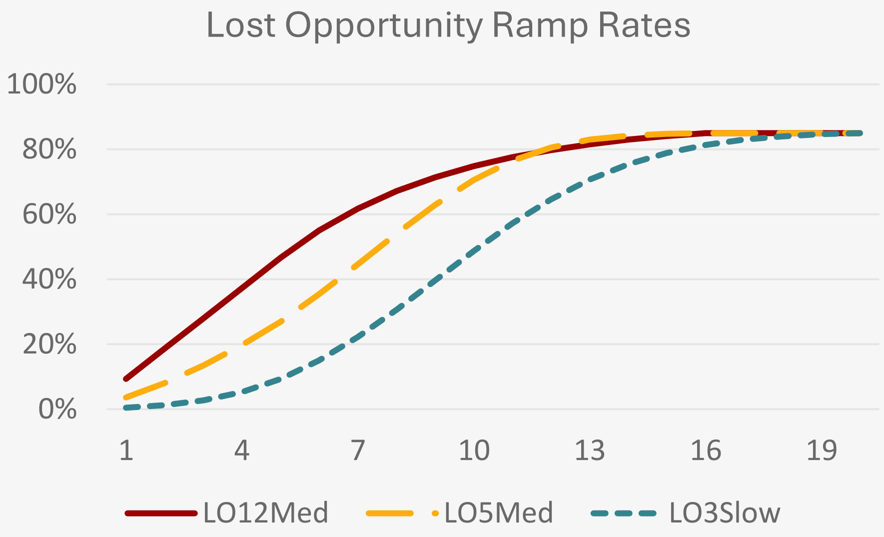
- Washington - Total Resource Cost Test (TRC): Assesses cost-effectiveness from the perspective of the utility and its customers. Includes non-energy impacts if they can be quantified and monetized.
- Idaho - Utility Cost Test (UCT): Assesses cost-effectiveness from a utility or program administrator's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

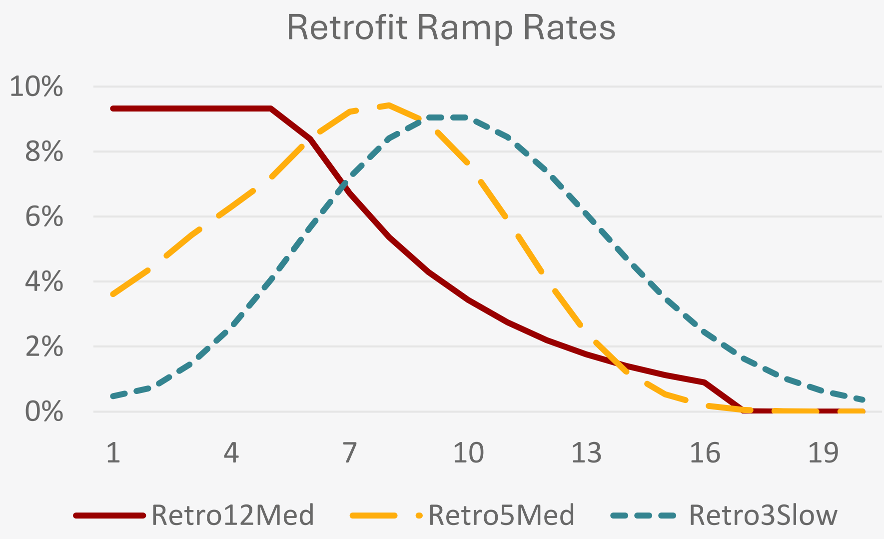
*NEI Categories

- 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

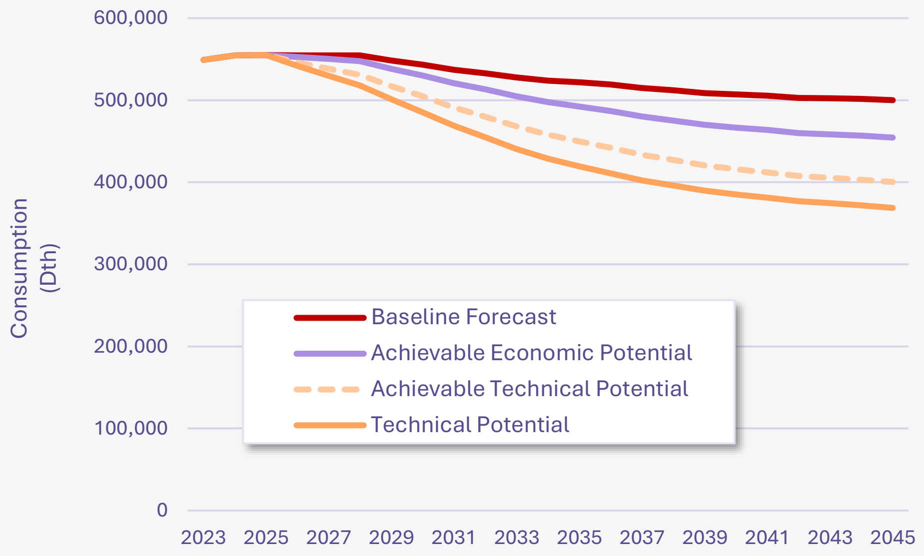


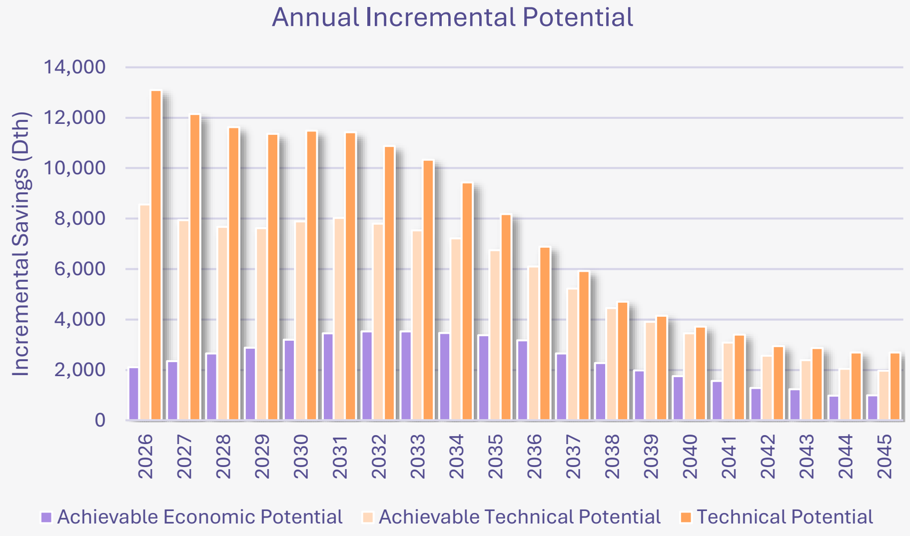
- Describe the % of units assumed to be adopted relative to all units purchased in that year (based on lifetime/turnover)
- Approach their maximum limit over time, but reach that limit at different speeds



- Describe the % of the **total market** that is acquired in each year
- **Add up** to 100% over time, but reach that total at different speeds

Commercial Summary Results (All States)





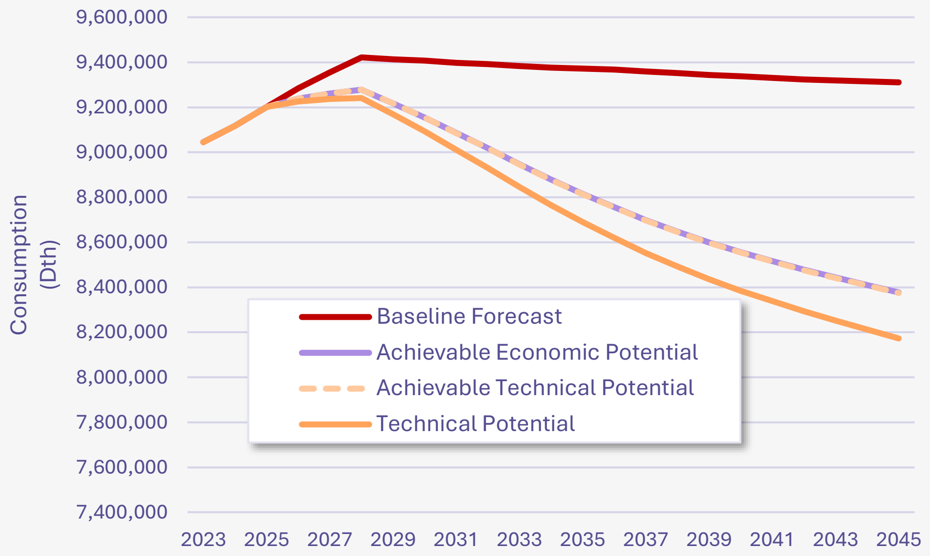
Summary of Energy Savings (Dth), Selected Years	2026	2027	2030	2035	2045
Reference Baseline (Dth)	**3,583,743**	**3,585,198**	**3,509,734**	**3,367,345**	**3,210,679**
Cumulative Savings (Dth)					
Achievable Economic	25,173	55,342	153,330	304,312	422,876
Achievable Technical	66,111	127,768	301,119	552,841	744,546
Technical Potential	95,671	184,390	427,480	753,510	966,787
Energy Savings (% of Baseline)					
Achievable Economic	0.7%	1.5%	4.4%	9.0%	13.2%
Achievable Technical	1.8%	3.6%	8.6%	16.4%	23.2%
Technical Potential	2.7%	5.1%	12.2%	22.4%	30.1%
Incremental Savings (Dth)					
Achievable Economic	25,173	30,211	35,233	28,832	7,585
Achievable Technical	66,111	62,174	62,132	50,182	14,248
Technical Potential	95,671	89,617	86,107	62,781	20,178

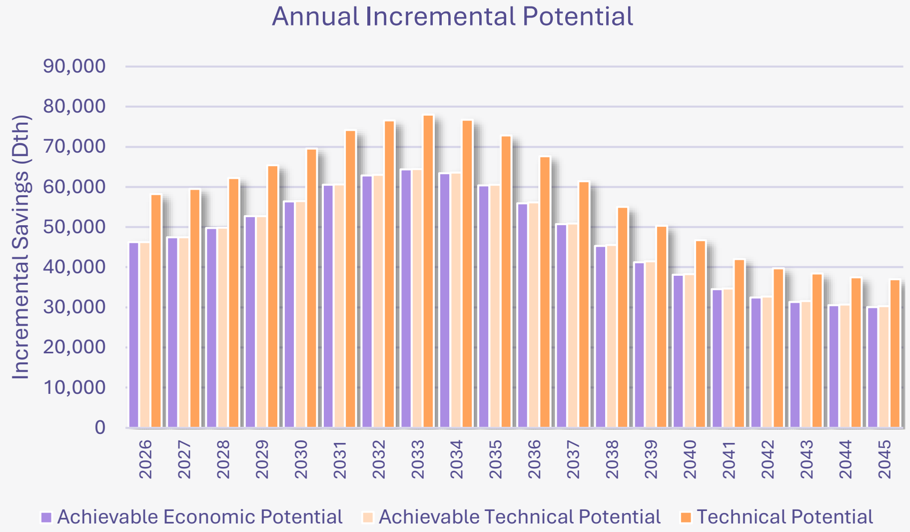
Commercial Transport Top Measures

Rank	**Oregon** – Achievable Economic TRC Potential	2045 Achievable Economic Potential (Dth)	% of Total Savings
1	Gas Boiler - Steam Trap Replacement	10,419	22.8%
2	Water Heater	5,669	12.4%
3	Water Heater - Pipe Insulation	5,443	11.9%
4	Fryer	5,152	11.3%
5	Retrocommissioning	4,886	10.7%
6	Gas Boiler - Thermostatic Radiator Valves	3,405	7.4%
7	Range	3,290	7.2%
8	Gas Boiler - Hot Water Reset	2,682	5.9%
9	Steamer	1,387	3.0%
10	Broiler	880	1.9%
	Subtotal	**43,213**	**94.5%**
	Total Savings in Year	**45,736**	**100.0%**

Rank	**Washington** – Achievable Economic TRC Potential	2045 Achievable Economic Potential (Dth)	% of Total Savings
1	Ventilation - Demand Controlled	52,001	13.8%
2	Water Heater	39,619	10.5%
3	Retrocommissioning	35,455	9.4%
4	Gas Boiler - Steam Trap Replacement	34,537	9.2%
5	Destratification Fans (HVLS)	28,495	7.6%
6	Water Heater - Pipe Insulation	26,232	7.0%
7	Gas Boiler - Thermostatic Radiator Valves	22,070	5.9%
8	Gas Boiler - Insulate Steam Lines/Condensate Tank	17,882	4.7%
9	Gas Boiler - Hot Water Reset	17,382	4.6%
10	Gas Boiler - Stack Economizer	13,625	3.6%
	Subtotal	**287,298**	**76.2%**
	Total Savings in Year	**377,141**	**100.0%**

Industrial Summary Results (All States)





Summary of Energy Savings (Dth), Selected Years	2026	2027	2030	2035	2045
Reference Baseline (Dth)	**9,284,188**	**9,355,036**	**9,407,151**	**9,372,755**	**9,310,738**
Cumulative Savings (Dth)					
Achievable Economic	46,236	93,935	252,199	557,471	933,636
Achievable Technical	46,248	93,970	252,404	558,402	936,537
Technical Potential	58,193	118,024	313,857	682,924	1,137,484
Energy Savings (% of Baseline)					
Achievable Economic	0.5%	1.0%	2.7%	5.9%	10.0%
Achievable Technical	0.5%	1.0%	2.7%	6.0%	10.1%
Technical Potential	0.6%	1.3%	3.3%	7.3%	12.2%
Incremental Savings (Dth)					
Achievable Economic	46,236	47,428	56,397	60,344	30,076
Achievable Technical	46,248	47,451	56,476	60,546	30,290
Technical Potential	58,193	59,543	69,556	72,844	37,001

Industrial Transport Top Measures

Rank	**Oregon** – Achievable Economic TRC Potential	2045 Achievable Economic Potential (Dth)	% of Total Savings
1	Process - Heat Recovery	241,167	55.6%
2	Process Boiler - Burner Control Optimization	42,084	9.7%
3	Strategic Energy Management	32,996	7.6%
4	Retrocommissioning	30,372	7.0%
5	Process Furnace - Tube Inserts	21,174	4.9%
6	Process - Insulate Heated Process Fluids	16,706	3.9%
7	Destratification Fans (HVLS)	10,447	2.4%
8	Process Boiler - High Turndown Burner	9,253	2.1%
9	Process Boiler - Stack Economizer	7,906	1.8%
10	Process Boiler - Steam Trap Replacement	5,882	1.4%
	Subtotal	**417,986**	**96.4%**
	Total Savings in Year	**433,773**	**100.0%**

Rank	**Washington** – Achievable Economic TRC Potential	2045 Achievable Economic Potential (Dth)	% of Total Savings
1	Process - Heat Recovery	274,917	55.0%
2	Process Boiler - Burner Control Optimization	47,973	9.6%
3	Strategic Energy Management	37,637	7.5%
4	Retrocommissioning	34,800	7.0%
5	Process Furnace - Tube Inserts	23,907	4.8%
6	Process - Insulate Heated Process Fluids	19,029	3.8%
7	Destratification Fans (HVLS)	11,312	2.3%
8	Process Boiler - High Turndown Burner	10,562	2.1%
9	Boiler	10,383	2.1%
10	Process Boiler - Stack Economizer	8,994	1.8%
	Subtotal	**479,513**	**95.9%**
	Total Savings in Year	**499,863**	**100.0%**

Energy Efficiency Resource Assessment

Avista 2025 IRP

January 9, 2025

Energy Trust of Oregon

Agenda

- About Energy Trust
- Resource Assessment Model Overview
- Draft Avista 2025 Resource Assessment Results and Deployment Forecast

About us

Independent nonprofit

Serving 2.4 million customers of Portland General Electric, Pacific Power, NW Natural, Cascade Natural Gas and Avista

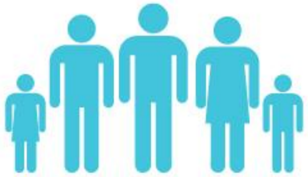
Providing access to affordable energy

Generating homegrown, renewable power

Building a stronger Oregon and SW Washington

Clean and affordable energy since 2002

From Energy Trust's investment of $2.8 billion in utility customer funds:



825,000 sites transformed into energy efficient, healthy, comfortable and productive homes and businesses

30,000 clean energy systems generating renewable power from the sun, wind, water, geothermal heat and biopower

$13.5 billion in savings over time on participant utility bills from their energy-efficiency and solar investments

42.9 million metric tons of carbon dioxide emissions kept out of our air, equal to removing 11.2 million cars from our roads for a year

Energy Trust Resource Assessment Model Overview

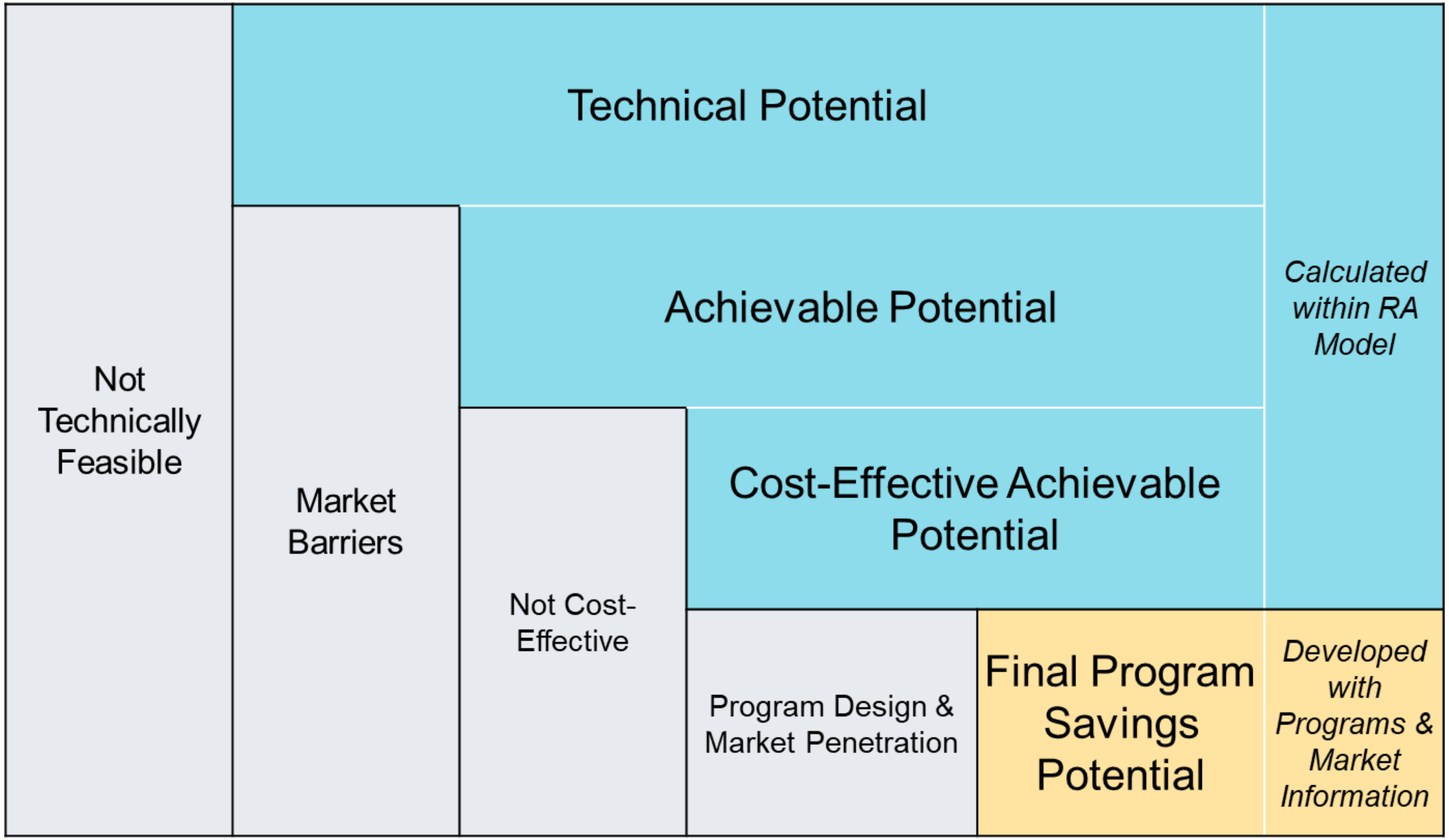
Resource Assessment Model Background

- Estimate of 20-year energy efficiency potential
- “Bottom-up” modeling approach
  - Measure level inputs are scaled to utility level
- Measure inputs
  - Baseline and efficient equipment
  - Measure savings
  - Incremental cost
  - Market data
- Utility inputs
  - Load and customer count/building stock forecast
  - Customer stock demographics
  - Avoided costs

Modeling Updates

- Measure updates
  - Measure savings, incremental cost
  - New measures
  - Emerging technologies
- 2022 Residential Building Stock Assessment (NEEA)
  - Total measure density, technical suitability and baseline initial saturation
  - Heating fuel, water heating fuel splits

Forecasted Potential Types



Cost-Effectiveness Screen

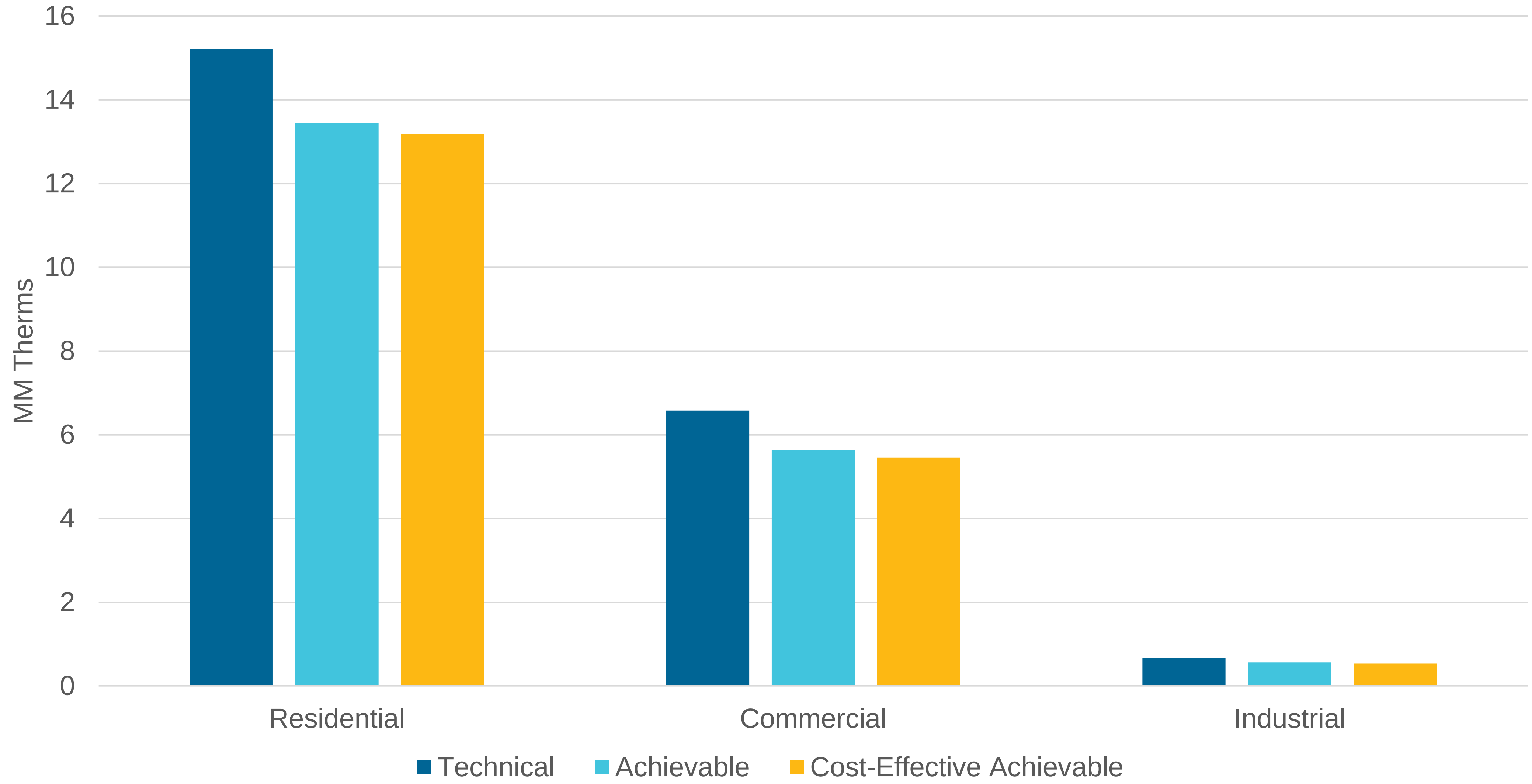
- RA model utilizes the Total Resource Cost (TRC) test to screen measures for cost-effectiveness

$$\text{TRC} = \frac{\textit{Measure Benefits}}{\textit{Total Measure Cost}}$$

- Measure benefits
  - NPV avoided costs per first-year Therm
  - Quantifiable non-energy benefits
- Measure costs
  - The customer cost of installing an efficiency measure (full cost for retrofits, incremental over baseline cost for replacements and new construction)
- Cost-Effectiveness Override
  - Measures under an OPUC exception

Draft Resource Assessment Results
Avista 2025 IRP

Draft Cumulative Potential by Sector and Type



Draft Cumulative Potential by End Use

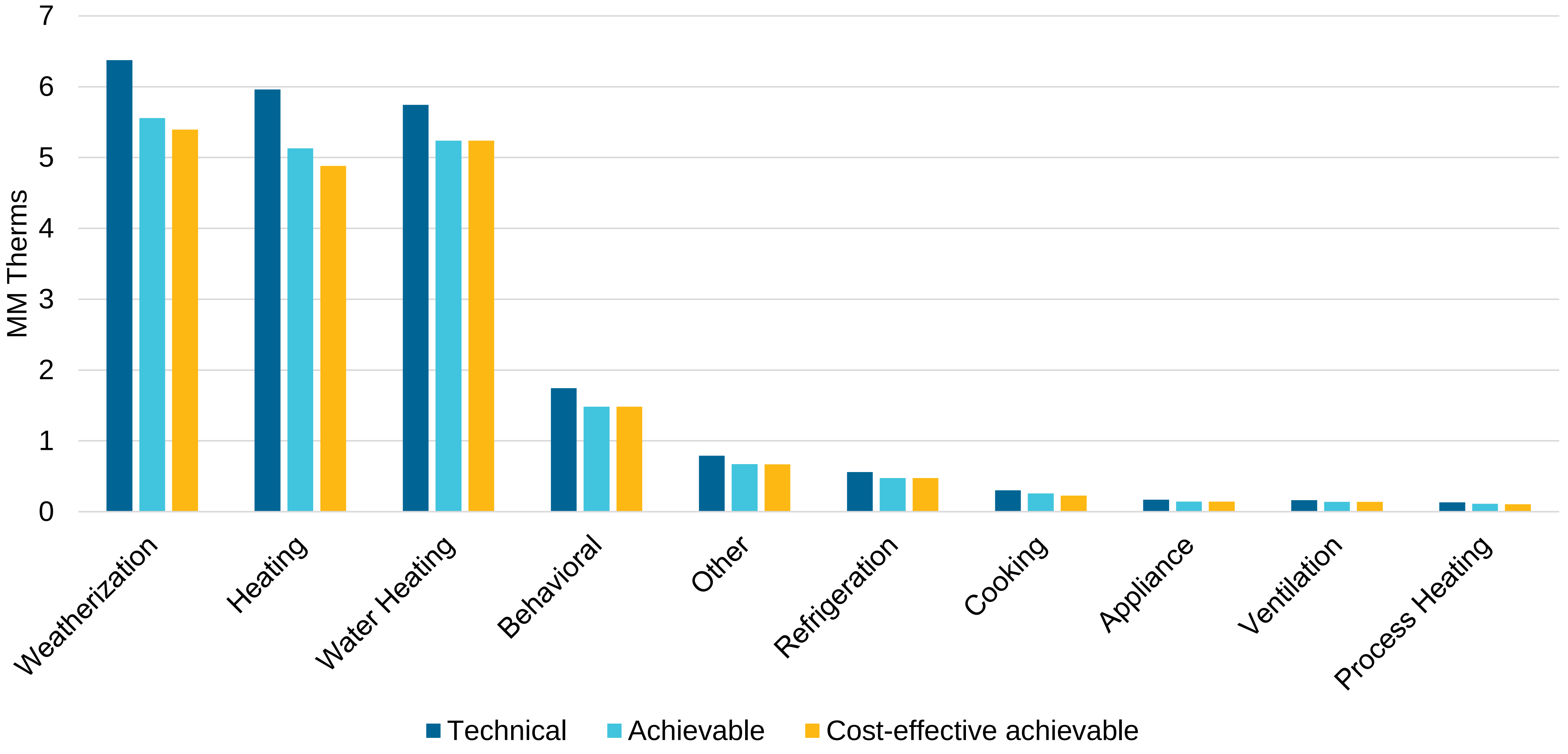


**Chart includes major end uses only and does not add up to total potential*

Draft Results and Deployment

20-year Energy Efficiency Potential (Therms)

Sector	Technical Potential	Achievable Potential	Cost-Effective Achievable Potential	Draft Savings Projection*
Residential	15,204,642	13,442,065	13,179,722	9,012,951
Commercial	6,576,079	5,627,220	5,451,669	4,771,648
Industrial	659,579	560,642	530,695	792,664*
Total	22,440,299	19,629,927	19,162,086	**14,577,215**

Previous IRP – Comparison

2023 IRP Total	27,632,901	22,324,557	21,604,916	15,368,375
% Change	*-19%*	*-12%*	*-11%*	***-5%***

***Draft Projections include exogenous savings. As such, they can exceed the 20-year cost-effective achievable totals**

Draft Avista Deployment, Cost-Effective Achievable Potential

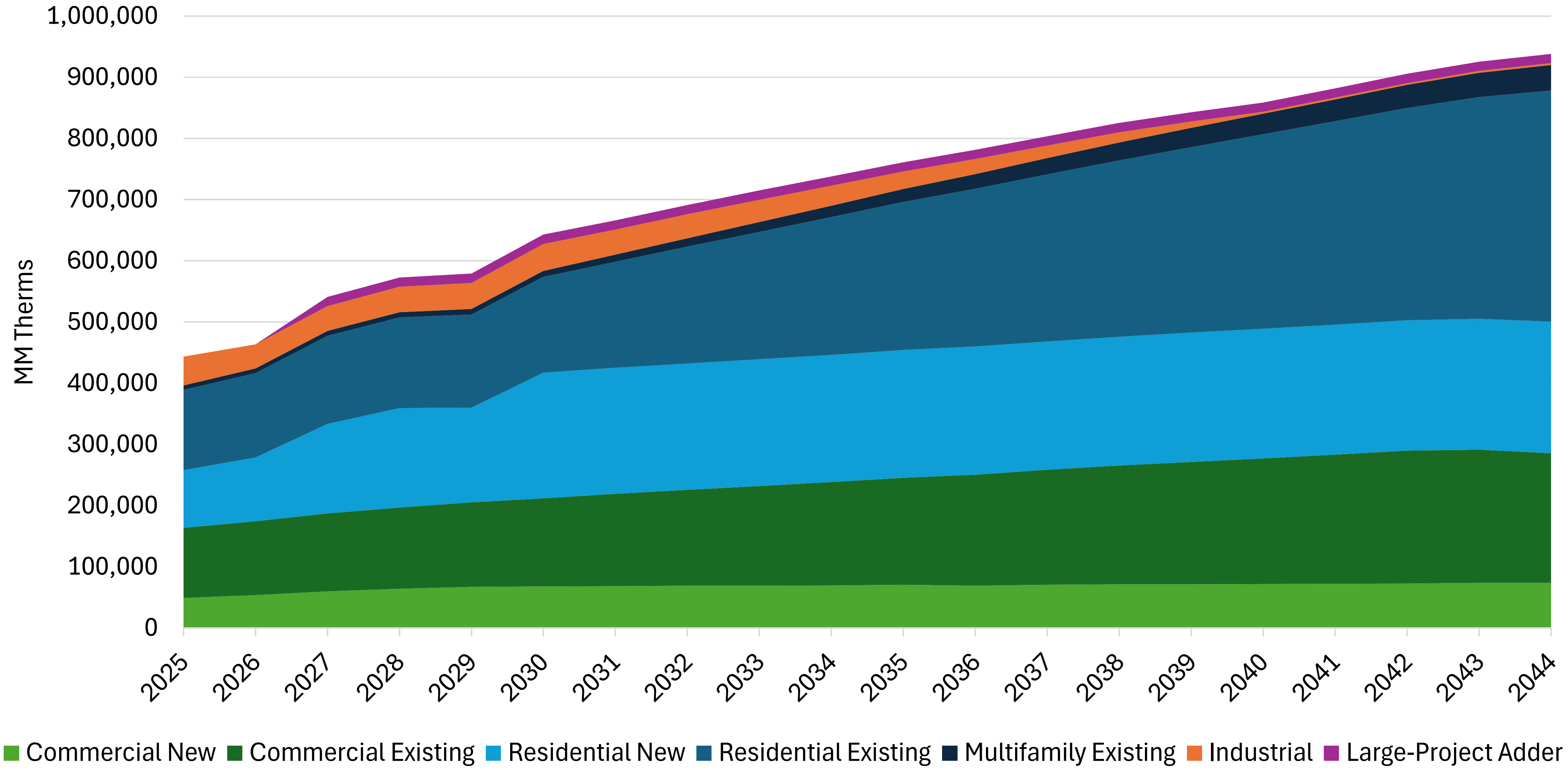
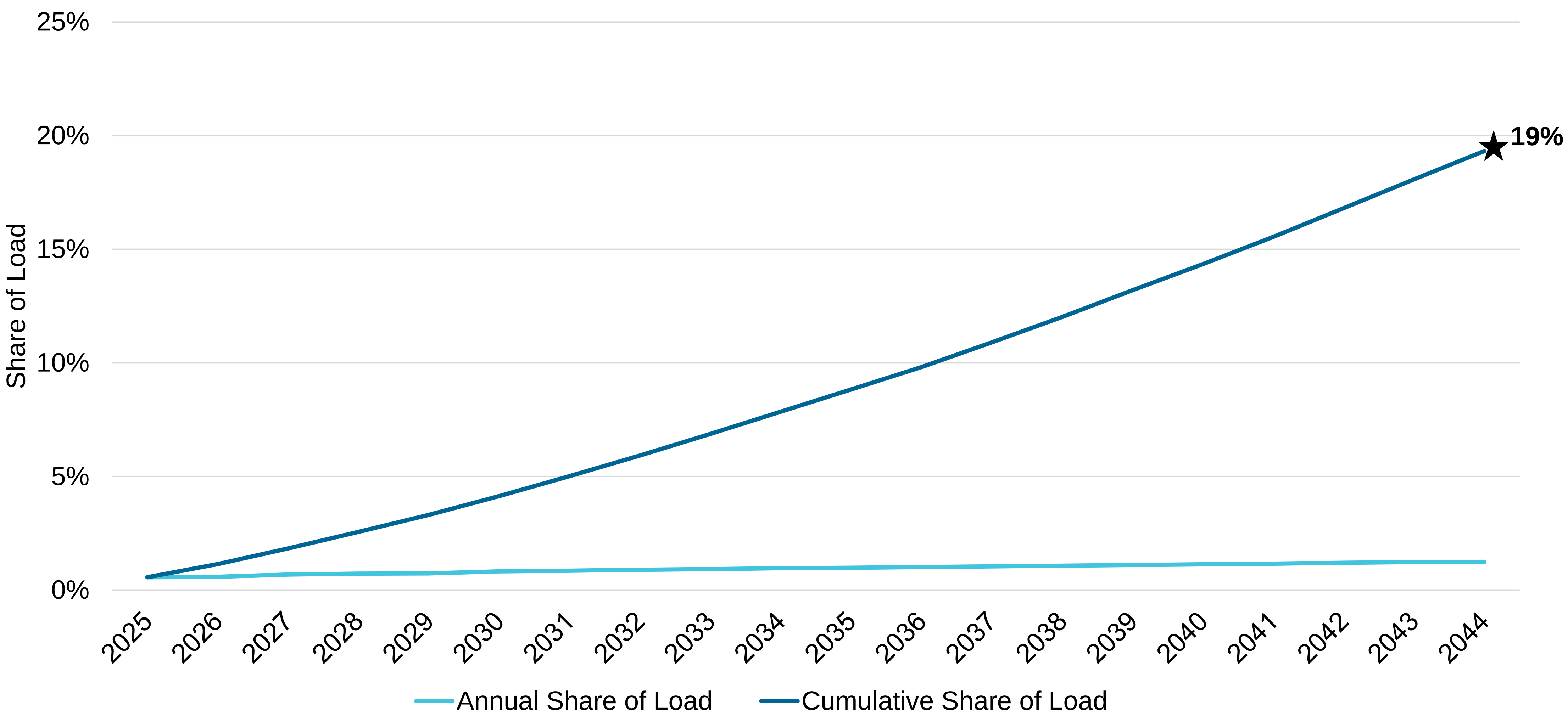


Chart shows total expected efficiency and includes savings from codes and standards. Energy Trust may not claim the entirety of savings depicted above

Draft Deployed Savings Compared to Load Forecast



Average Annual Share of Load Saved: 0.95%

Questions?

Thank you!

Willa Perlman, Planning Project Manager

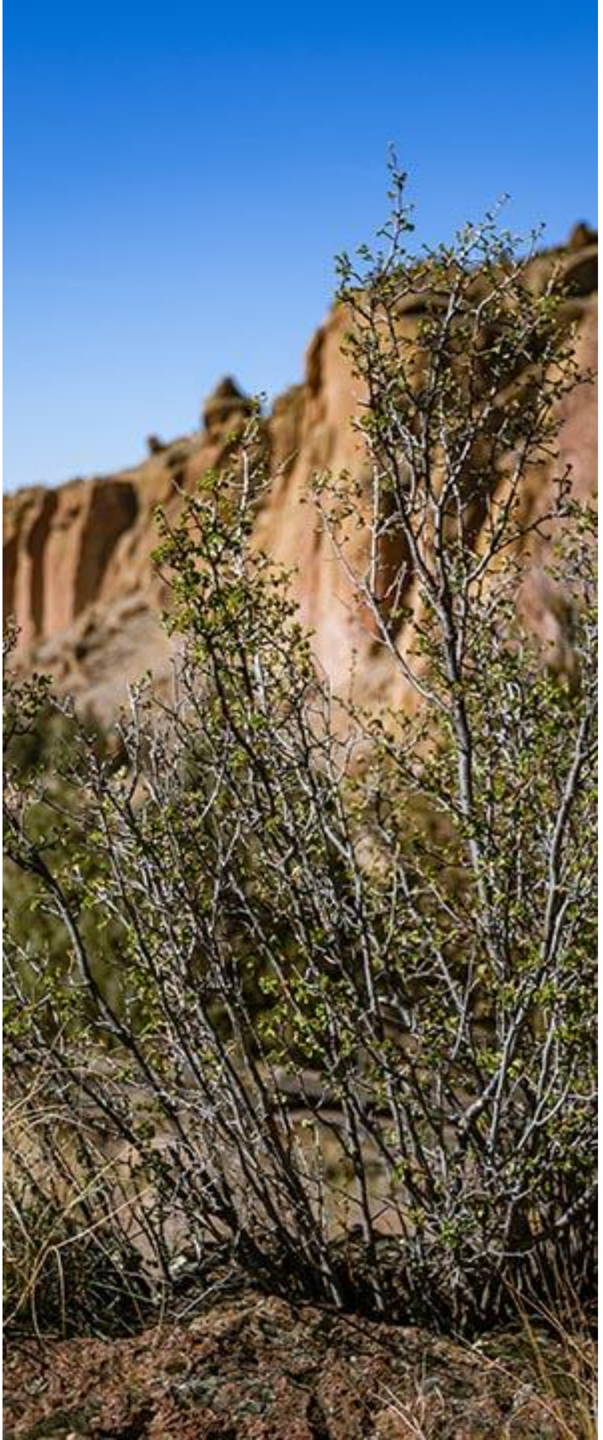
willa.perlman@energytrust.org

Dual fuel (Hybrid) Heat Pump Pilot

Avista IRP Meeting

January 9, 2025

Energy Trust of Oregon



Agenda

- What is Dual Fuel HVAC (Hybrid HVAC)
- Research objectives
- High-level description of pilot design
  - Demographic focus, education and support
  - Home criteria
  - Pilot delivery, installation, quality assurance
  - Technical specifications and utility/geographic scope
- Current Pilot milestones
- Pilot considerations
- Timing
- Next steps

Dual Fuel (Hybrid) HVAC (HHVAC)

Definition of Hybrid (dual fuel) HVAC

- For this pilot, Hybrid HVAC is a dual fuel system where a ducted single-speed heat pump and programmable thermostat are added to an existing gas furnace.
- The pilot application is in single-family homes without air conditioning and with gas furnaces that are five years old on average.
  - Homes have been previously weatherized
  - Homes do not have deferred maintenance that would prohibit successful installation or operation of HVAC system
  - Homes do not need major duct repair
  - Homes do not need major electrical service upgrades such as a new panel or braker box

Research Objectives

Research Objective 1

Determine the utility system costs and benefits of hybrid HVAC system installations.

- Fuel use – gas and electric
- Load/demand – gas and electric
- Carbon intensity – gas, electric and overall

Research Objective 2

Determine the customer costs and benefits of hybrid HVAC system installations.

- Energy costs – gas, electric and overall
- Added cooling value
- Comfort and living conditions
- Backup auxiliary-fuel
- Maintenance and upkeep

Research Objective 3

Determine the costs and process considerations associated with installing Hybrid HVAC systems in low-income households.

- Other necessary infrastructure changes – electric panels, ducts, etc.
- Homes served and homes disqualified
- Geographic regions served well and those we had difficulty serving – customer base size, installation contractors, supply chain
- Cost of installations – Hybrid HVAC system, other infrastructure, Energy Trust costs
- Timeline for installations – customer recruitment to successful implementation and use

Description of Pilot

Pilot Description

- Energy Trust to pay full cost of installs
- Income-qualified households, previously served by low-income weatherization services
- Homes must be weatherized and have a gas furnace no older than ~5 years, and no existing central AC
- House triage and customer education and support provided by Energy Trust staff
- Installation contractors selected through RFQ projects awarded on a rolling basis
- Post install QA provided by Energy Trust in every home

Heat Pump Specifications and Cost

- Heat pump size determined through Manual J, and cooling needs of the home (in alignment with ACCA2 Standard)
- Cross-over temperature
  - Energy Trust will leverage our installation Contractor RFQ to solicit more professional feedback on best practices
    - Goals - avoid customers experiencing no-heat conditions when heat pump switches to defrost mode
    - Follow manufacturer requirements depending on make/model
    - Stay within technical capabilities of equipment selection and controls
- Thermostat selection also to be explored through RFQ
- Cost range between $10,000 - $12,000 (not to exceed $13,000) per home

Geographic Assumptions

- Prioritize overlapping gas and electric territories
- Concentrate efforts regionally to maximize delivery resources
- Leverage utility insights to support customer acquisition

Utility	Units
Pacific Power	20
PGE	20
NW Natural	26
Avista	12
Cascade Natural Gas	12
	90

Gas	Electric	Quantity	Geography
NWN	PGE	50	Portland Metro
AVI	PAC	20	S. Oregon / Klamath
CNG	PAC	20	Central / Eastern

Marketing

Total number of homes included in marketing lists: 2,038 customers

What is the breakdown of these per gas utility?

- AVI - 164 customers
- CNG - 34 customers
- NWN - 1,840 prior Energy Trust gFAF participants

- What is the breakdown of these per electric utility?
  - PGE - 1,530 customers
  - PAC - 508 customers

*Recruitment tactics include emails, postcards, a letter, follow-up phone calls, event tabling.

Installations

Installations Compete

- Avista - 2
- Cascade Natural Gas - 1
- NW Natural - 21

Pilot criteria re-design considerations

- Age of existing furnace
- Presence of central air conditioning (cooling)
- Income qualification requirement

Evaluation

Energy Trust recently completed a solicitation to select a contractor for the first phase of the pilot evaluation.

- This first phase will be focused on the pilot process including successes and places to grow and shift, customer choices and value associated with the system, and an added market assessment with trade allies installing these sorts of systems outside of the Energy Trust pilot in market-rate environments. This work will be conducted by Apex Analytics and Ideal Community Strategies and is expected to be completed in Q4 2025.

- The second phase of the pilot evaluation is expected to begin in Q1 2026. Another public solicitation for a contractor will be conducted to select an evaluation firm to perform an impact analysis, including electric and gas usage, carbon accounting, and peak system impacts observed by installed pilot systems.

Timeline

High Level Project Timeline

May 2023– August 2023
- Implementation planning
- Stakeholder engagement
- Measure development
- Installer recruitment

January 2024 – June 2025
- Customer recruitment
- Site eligibility verification

April 2024- July 2025
- Installations & site treatment
- Post-install verification & QA

July 2025– December 2025?
- Project Evaluation

Thank You

Andrew Shepard

Andrew.shepard@energytrust.org

TAC 10 – 2025 Avista Gas IRP

Edited Alternative Fuel Volumes

January 9, 2025

Alternative Fuel Prices

Alternative Fuel Prices Inputs

Model Restriction

- Selection for any physical products will not be available in the model until 2030
- Average prices above $75 per Dth will not be modeled

Capital Costs

- Equipment
- Pipeline Costs
- Installation and Owners Costs

O&M – Fixed and Variable

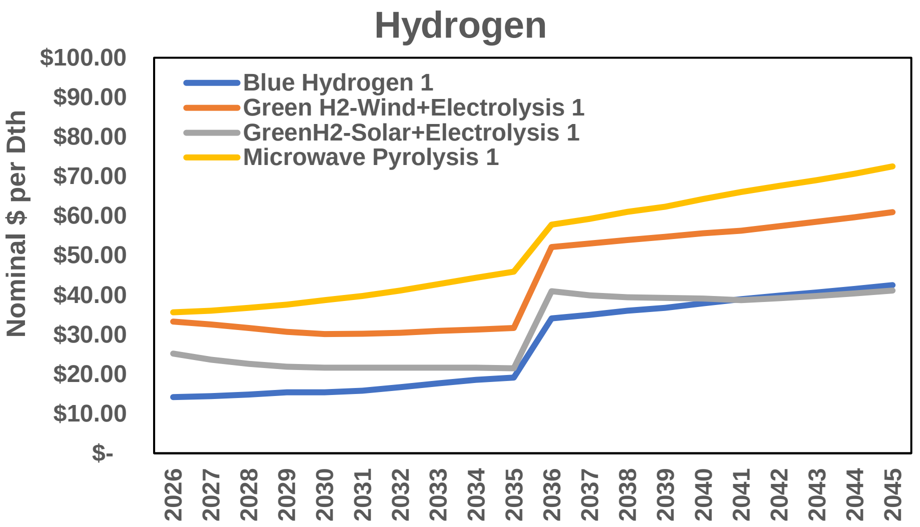
- Electricity rates
- Gas rates

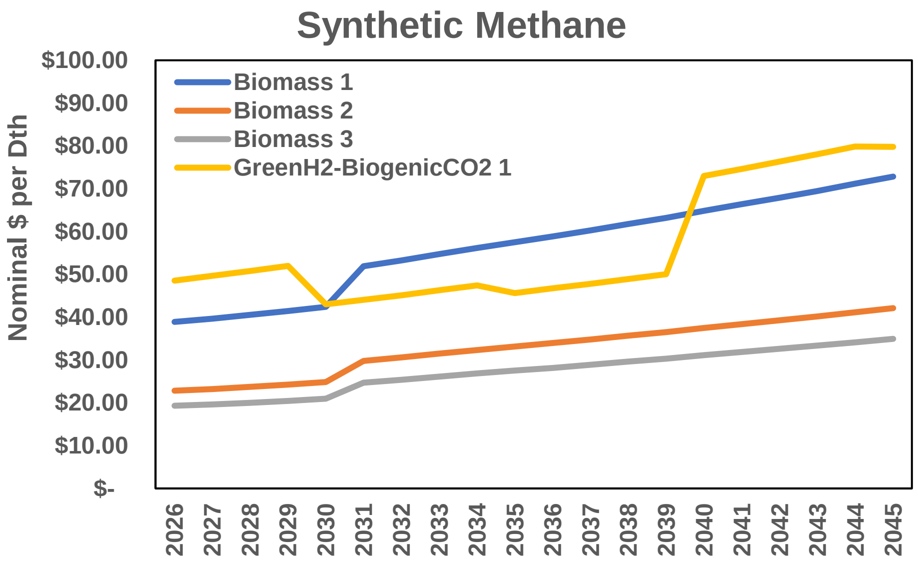
AVISTA

Prices

- Expected prices are broken down between northwest and national technical potential (ICF)
  - All prices consider Inflation Reduction Act (IRA) incentives where applicable
  - These prices assume a first mover access to alternative fuels
  - Prices are from the Northwest for each alternative fuel and National for Renewable Thermal Credits (RTC)
  - Hydrogen (H2) & Synthetic Methane (SM) prices will be treated as a purchase gas agreement where Avista would sign a term contract, each year, with the producer for these prices through the forecast.
  - Renewable Natural Gas (RNG) assumes a proxy ownership with costs levelized over 20 years
  - RTC considers a production cost plus, where prices cover all costs
    - These exclude Investment Tax Credit (ITC) or Production Tax Credit (PTC) and consider a higher capital rate
  - Prices are in nominal dollars

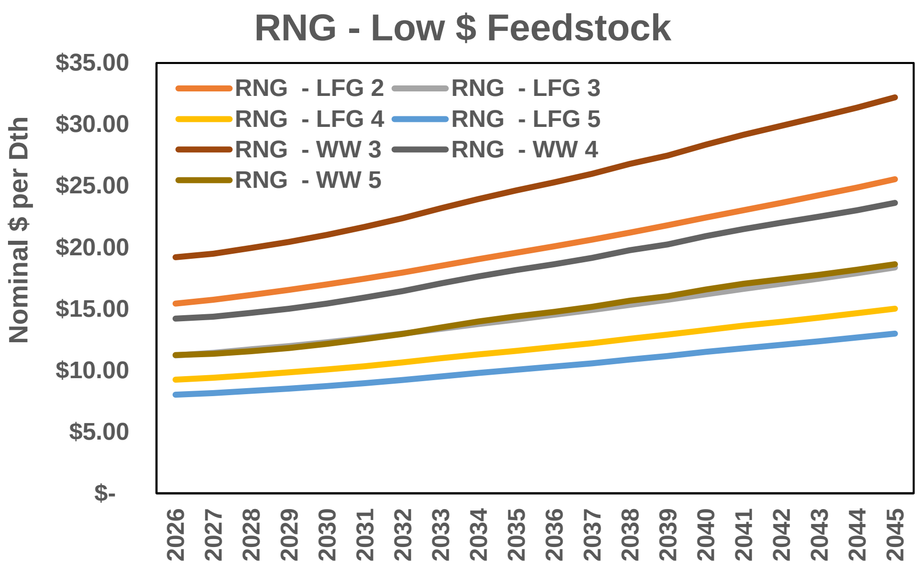
Hydrogen (H2) and Synthetic Methane (SM)

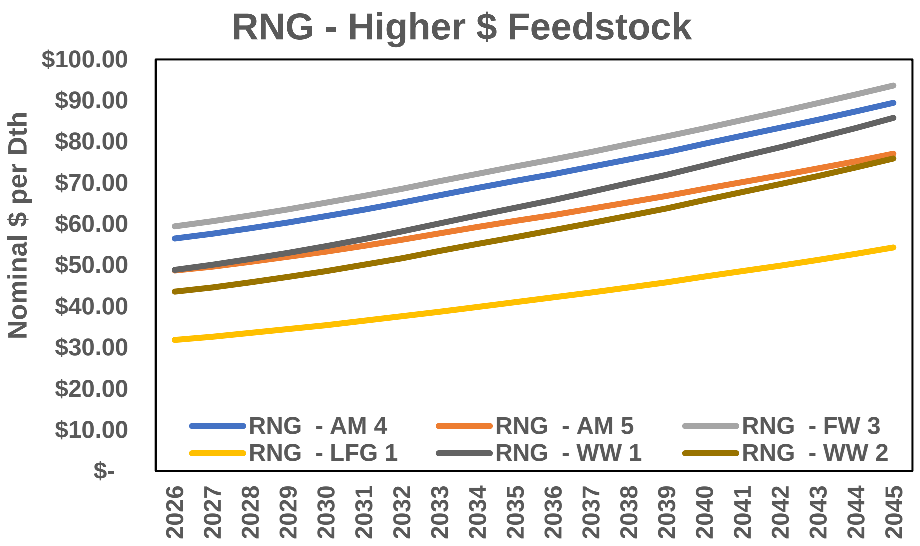




ICF levelized the Section 45V tax credit over 20 years. Since hydrogen projects must be under construction by the end of 2032 to qualify for 45V credits, the 45V tax credits were modeled until 2035 as a conservative estimate assuming every new hydrogen facility beginning construction after 2032 may not qualify for the tax credit. ICF assumed EAC requirements and other requirements for 45V credits are met to minimize the CI which doesn't include embodied emissions and receive the maximum credit amount of $3/kg.

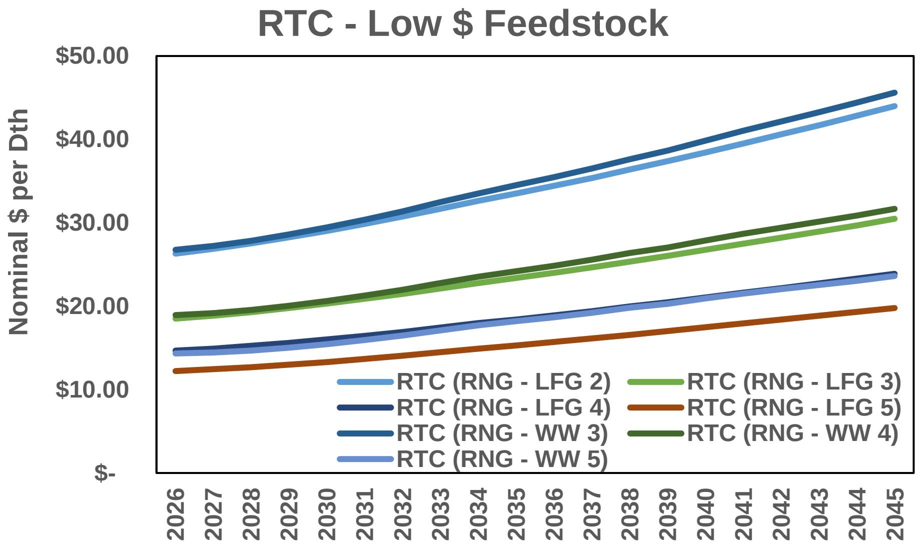
Renewable Natural Gas (RNG)

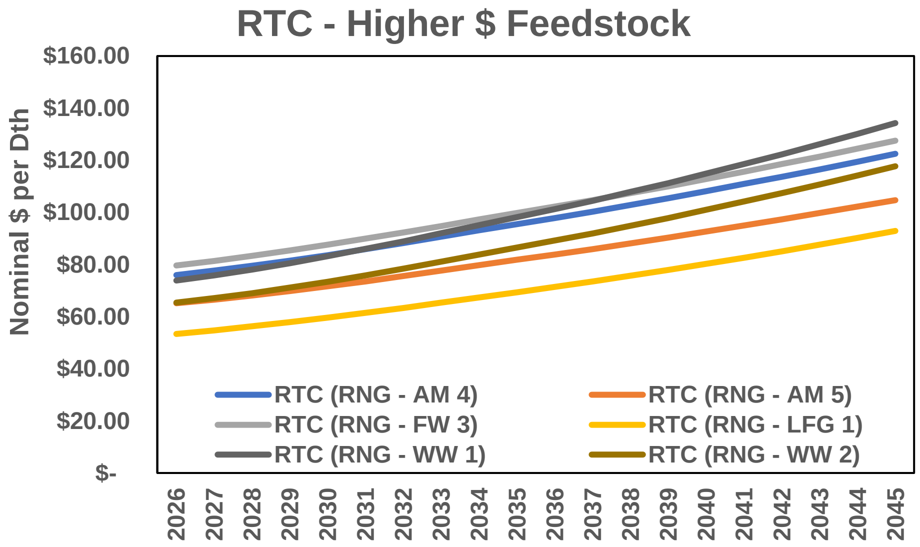




*Blend of national and NW estimated costs for RNG facilities
**Includes ITC/PTC until 2030

Renewable Thermal Certificate (RTC)

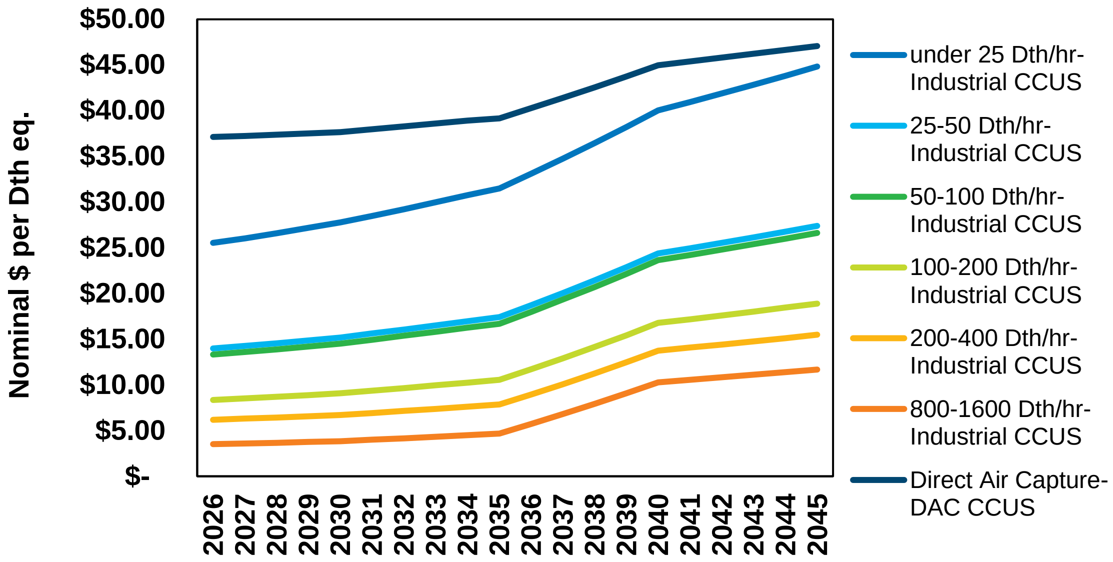


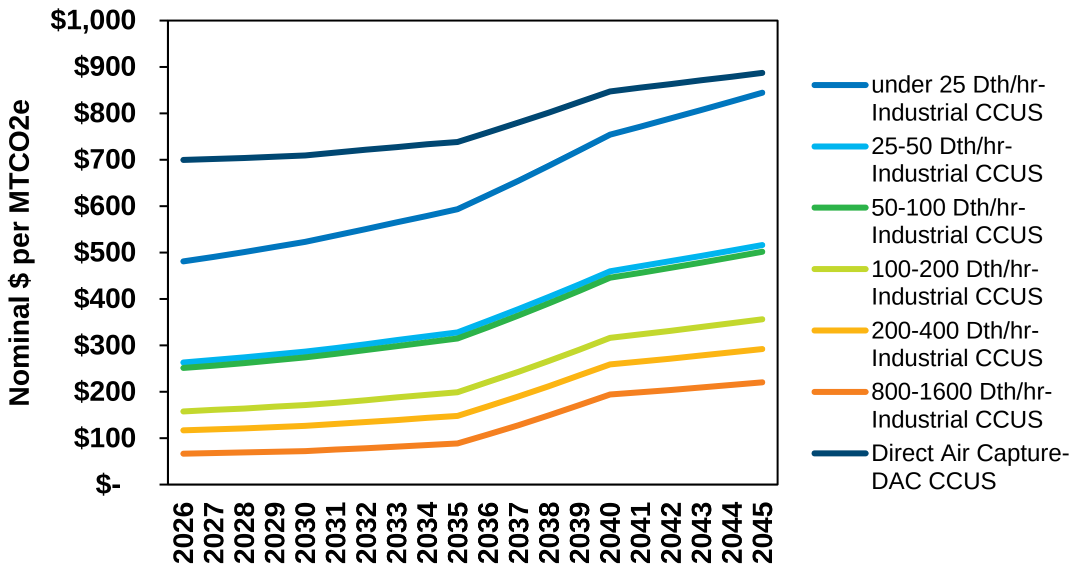


1-No ITC, considers price from producer to create RTC and cover costs (production prices)

2-Not tied to market actual prices

Carbon Capture, Utilization and Storage (CCUS)





*Avista specific high-volume customers

**Includes ITC/PTC to 2030

Alternative Fuels Technical Potential Volumes (ICF)

Updated Technical Potential Volumes

- Total Technical Potential Volumes have been updated from the final version of TAC 9 (12/18/2024)

- These volumes were overestimated based on interpretations of math provided by ICF
  - Clarification was given by ICF on January 3rd and Impacted deterministic runs
    - The "output Excel files list a unit of 1x10e9 Btu for various resources. This is equivalent to billion Btu. If one were to enter 1x10E9 into an Excel file, you will get 10 billion (10,000,000,000). However, this is because the number should be interpreted as $1x10^9$. The "e" is meant to stand for "exponent" whereas entering the sequence 10E9 in Excel is interpreted as 10×10^9."
  - The good news is the final number matched closely to those Avista adjusted for estimated volumes, so now all volumes for alternative fuels are from ICF study directly
  - These deterministic alternative scenarios will be reviewed along with final content in TAC 11
  - The deterministic PRS will be discussed further in TAC 10

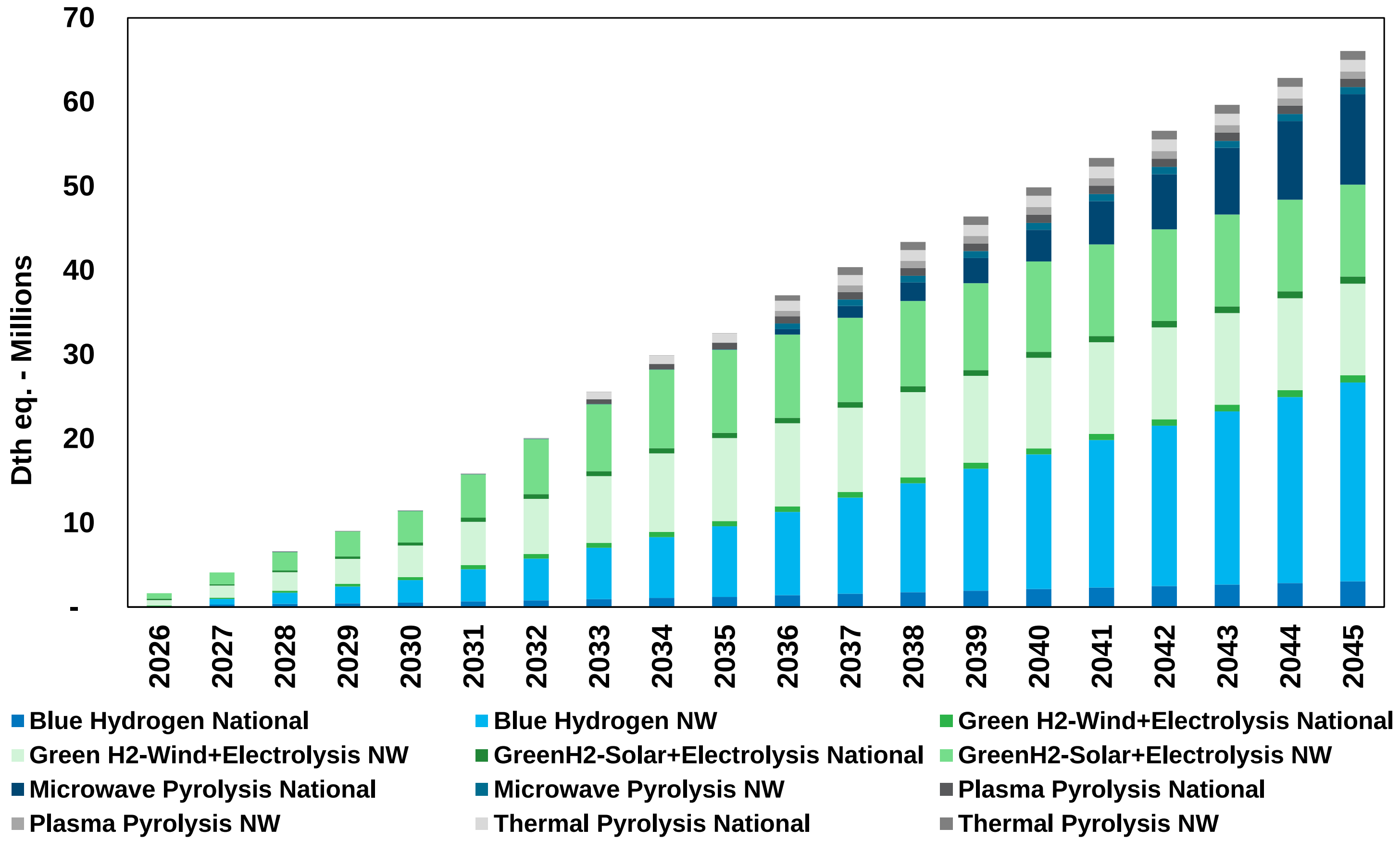
Volumes

- Expected volumes are broken down between Northwest and National technical potential
  - These volumes assume a first mover access to alternative fuels
  - Weighted by US population for states where some form of climate policy is in place or demand is expected
  - Modeled physical potential volumes are from Avista's weighted share in the Northwest and intended to represent all volumes available to Avista in the United States
    - RTC are the only National potential volumes considered and assumes physical pipeline accessibility to meet CCA and CPP program rules
    - Broken out by 2023 number of meters between LDCs in Oregon and Washington

Company	2023 # of Meters	Share
AVA	379,223	15.831%
CNG	316,929	13.231%
NWN	799,250	33.366%
PSE	900,000	37.572%
Total NW	2,395,402	100.000%

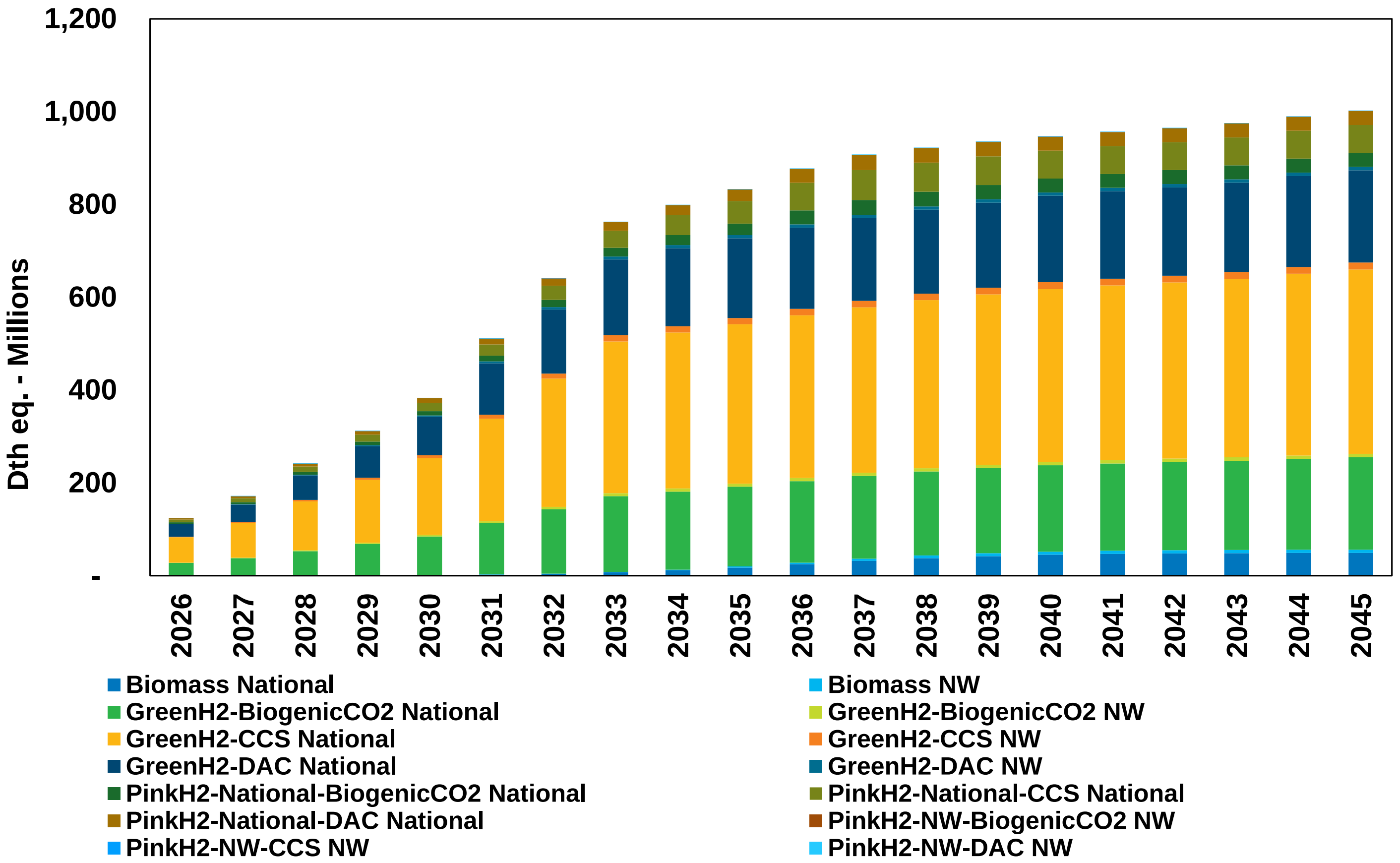
*Renewable Energy Technical Potential - The renewable energy technical potential of a technology is its achievable energy generation given system performance, topographic, environmental, and land-use constraints.

Hydrogen – Avista’s Share
Technical Potential Volumes (2026-2045)



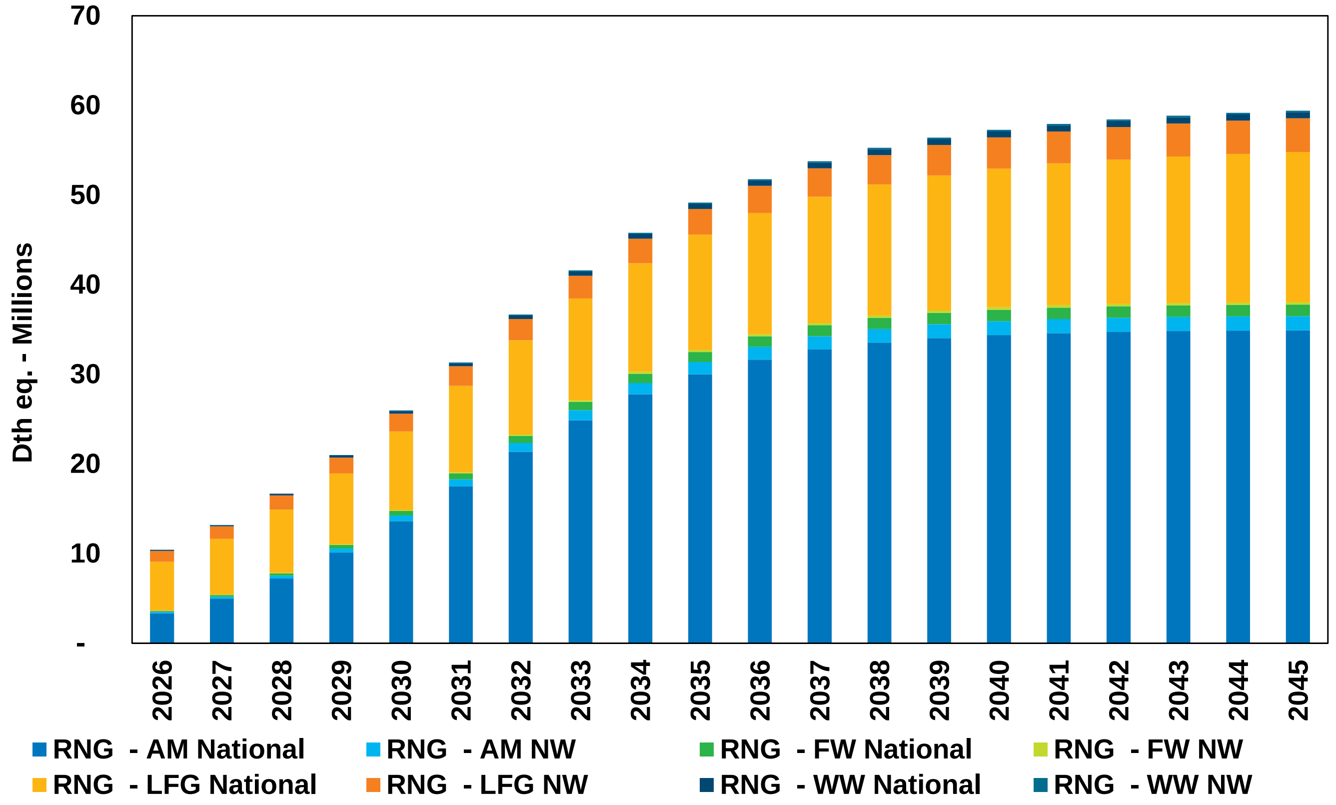
*H2 will be limited by volume to 20%
**No volumes will be available until 2030

Synthetic Methane – Avista's Share Technical Potential Volumes (2026-2045)



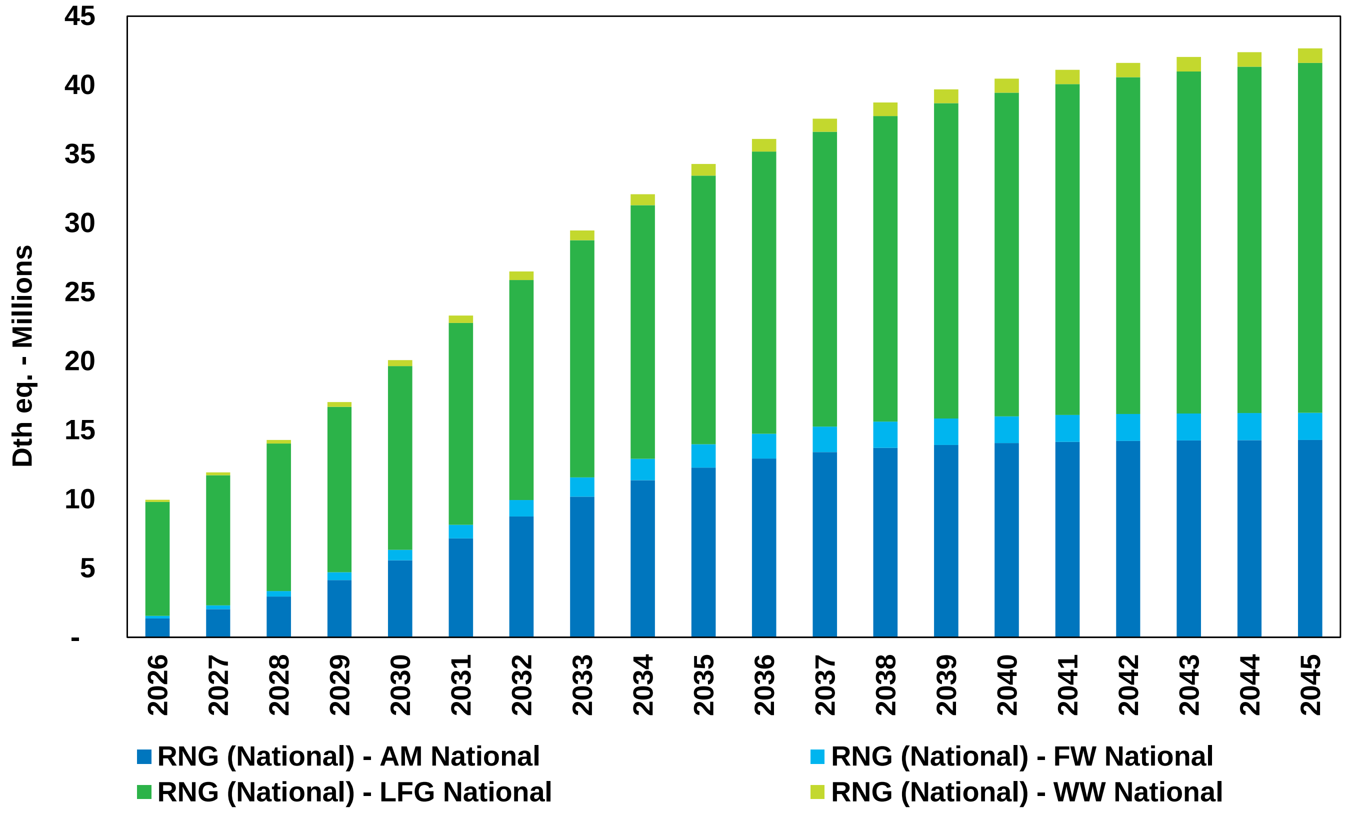
*No volumes will be available until 2030

Renewable Natural Gas – Avista's Share Technical Potential Volumes (2026-2045)



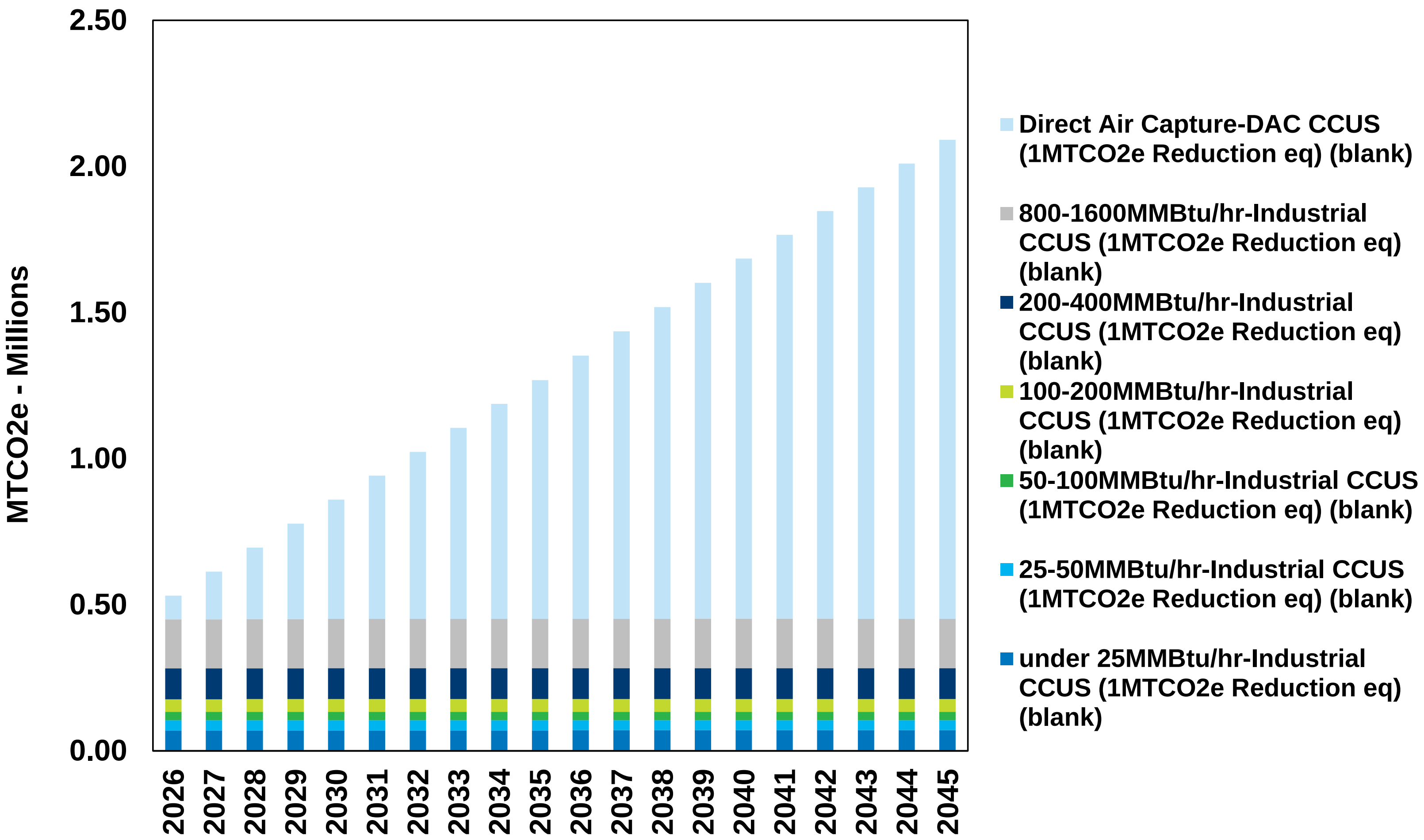
*No volumes will be available until 2030

Renewable Thermal Certificate – Avista's Share Technical Potential Volumes (2026-2045)



*Volumes are available to the model in 2026

CCUS (2026-2045)



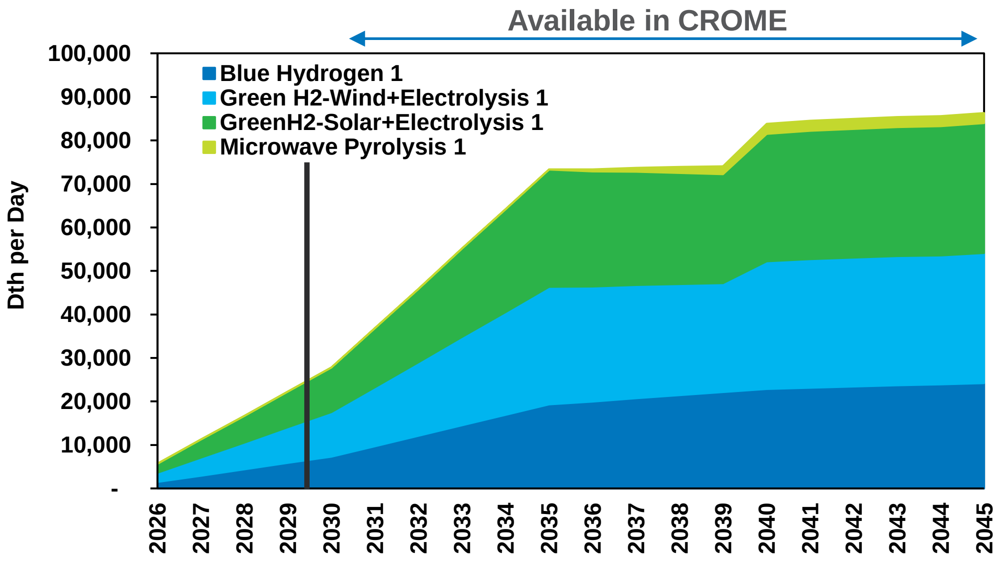
*Years 2025-2045

**No Volumes will be available until 2030

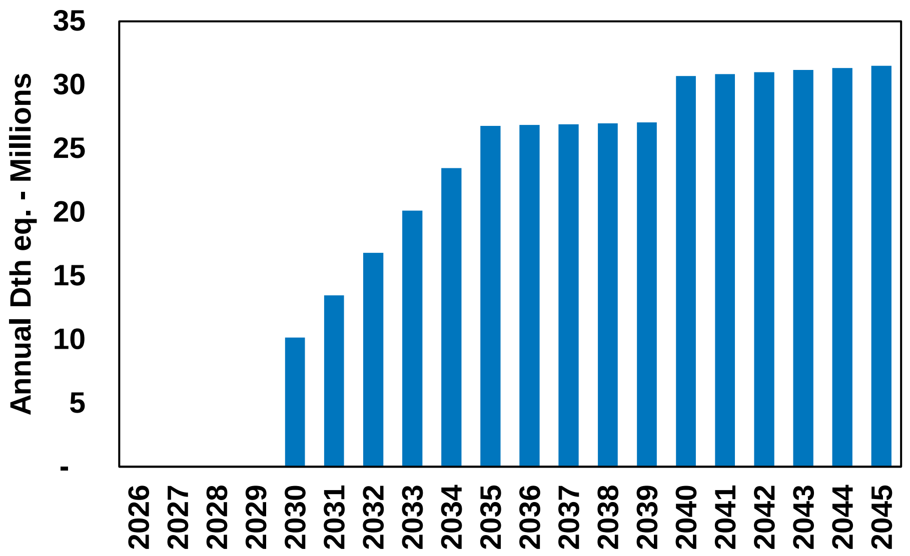
Daily Modeled Volumes

H2 – Modeled Volumes NW Only

Daily Volumes



Annual Volumes

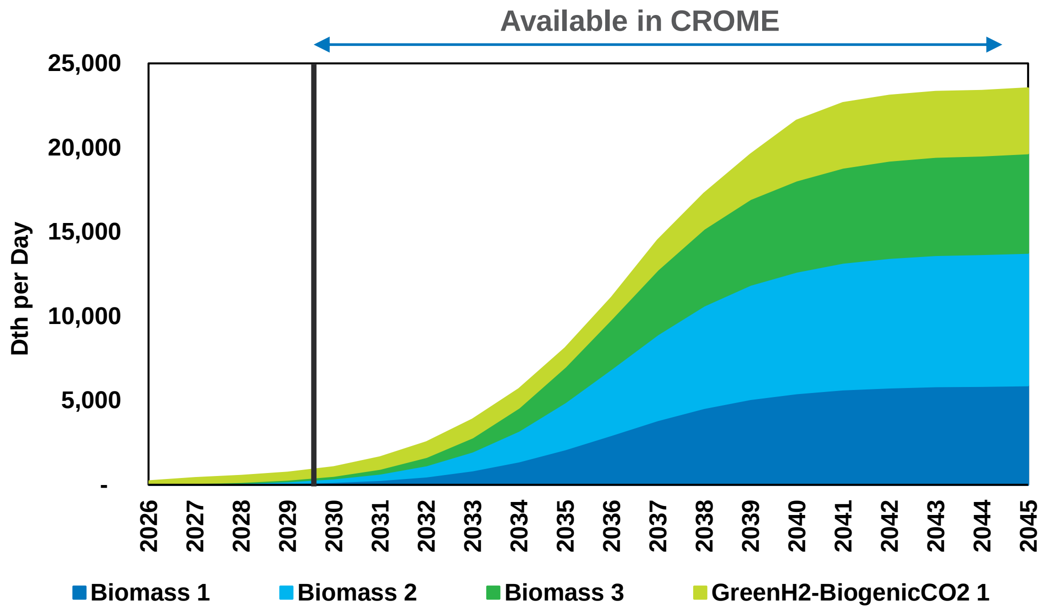


*H2 will be limited by volume to 20% regardless of availability

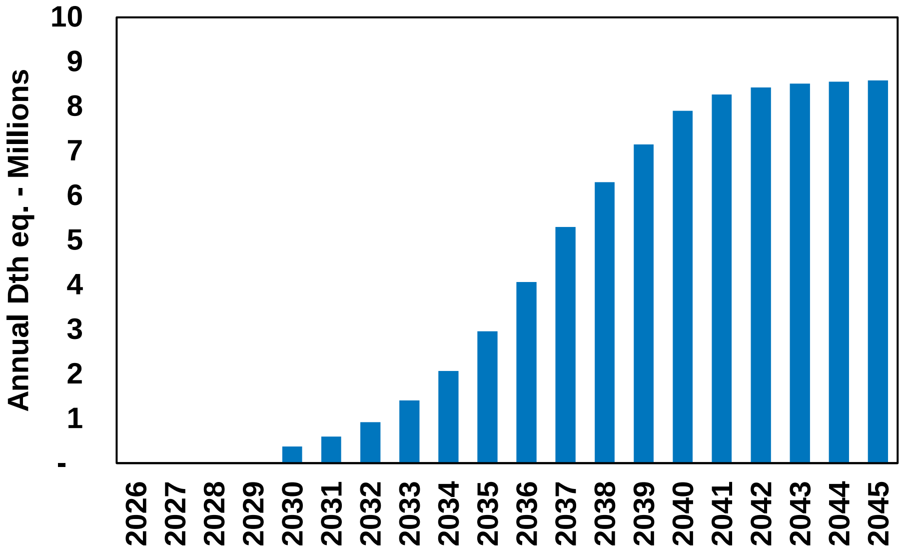
**No volumes will be available until 2030

SM – Modeled Volumes NW Only

Daily Volumes



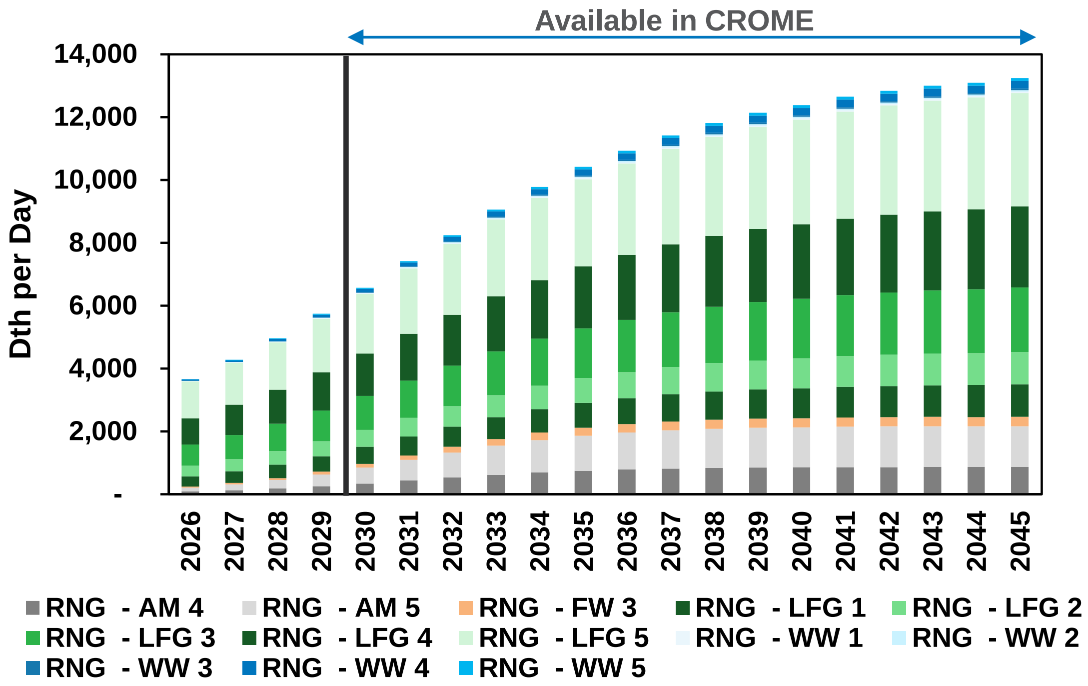
Annual Volumes



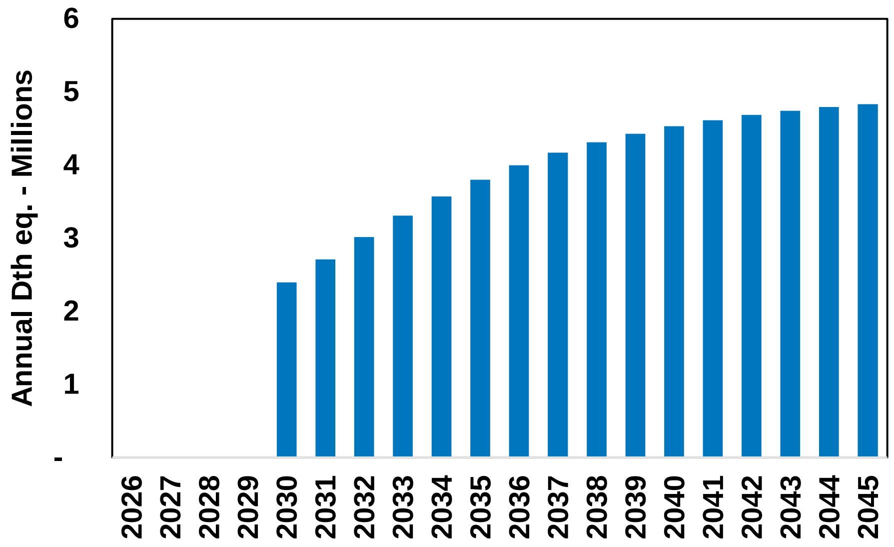
*SM is limited to NW Technical Potential availability & Avista share based on # of LDC meters
**No volumes will be available until 2030

RNG – Modeled Volumes
NW Only

Daily Volumes



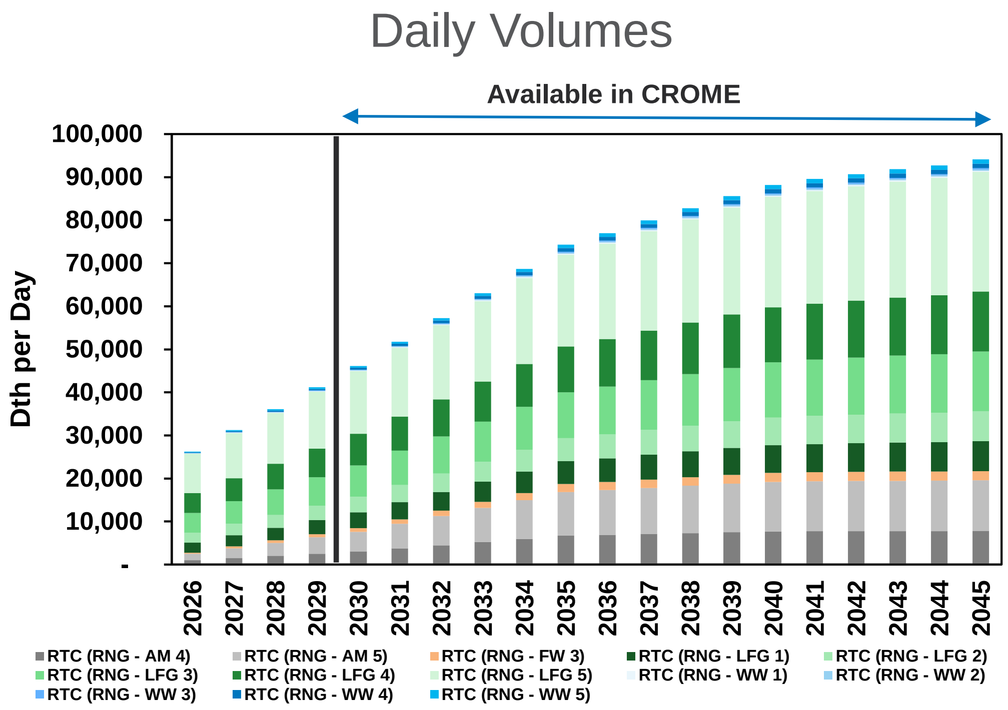
Annual Volumes

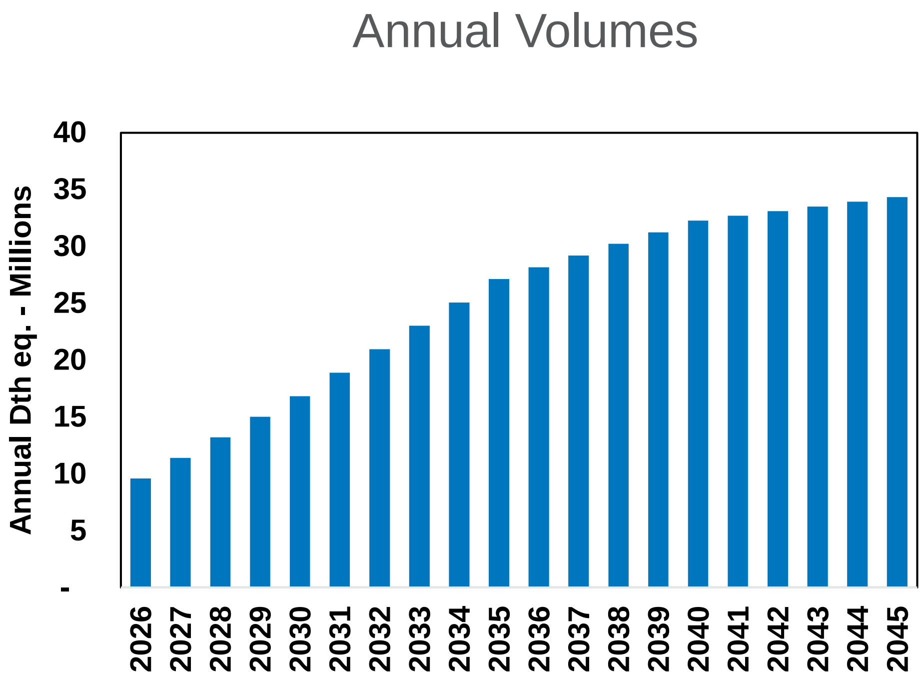


*Quantities not available until 2030

**Removal of high priced RNG prior to modeling (AM1-3, FW1-2)

RTC – Modeled Volumes
NW Only

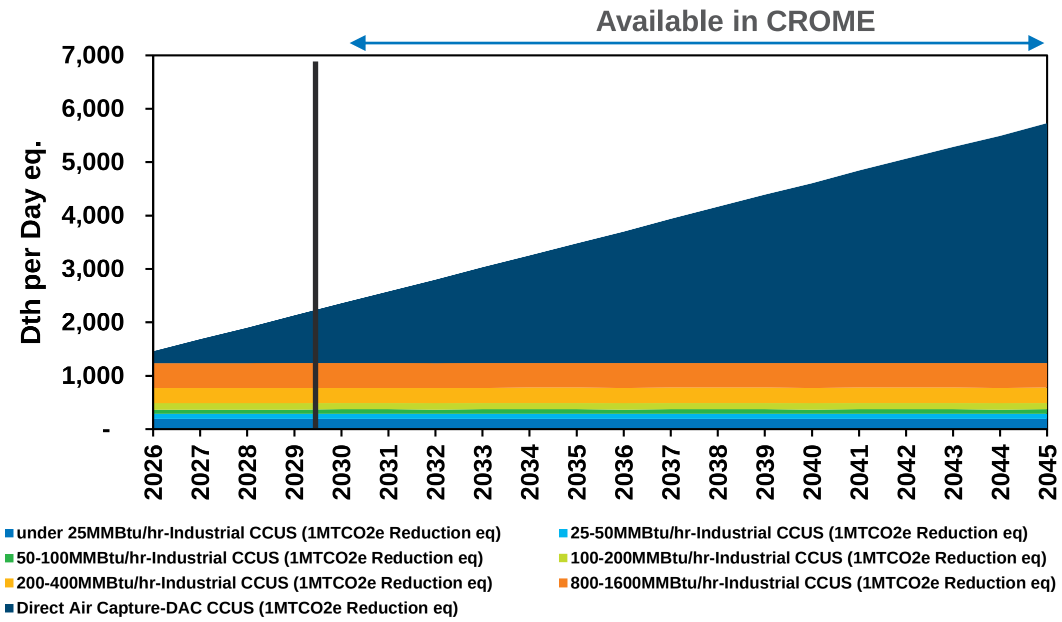




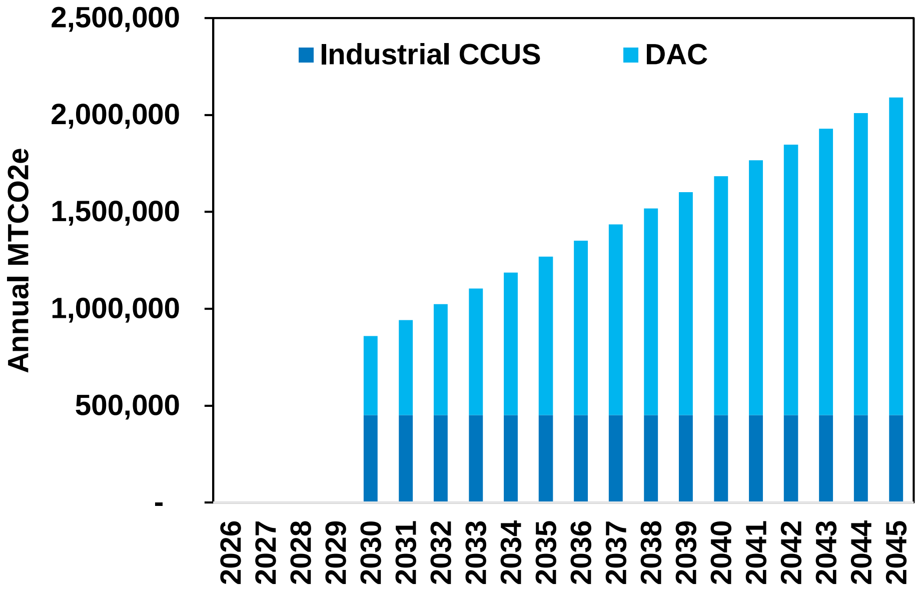
*Quantities are available to the model in 2026
**Removal of high priced RTCs prior to modeling (AM1-3, FW1-2)

CCUS
NW Only

Daily Volumes



Annual Volumes (MTCO2e)

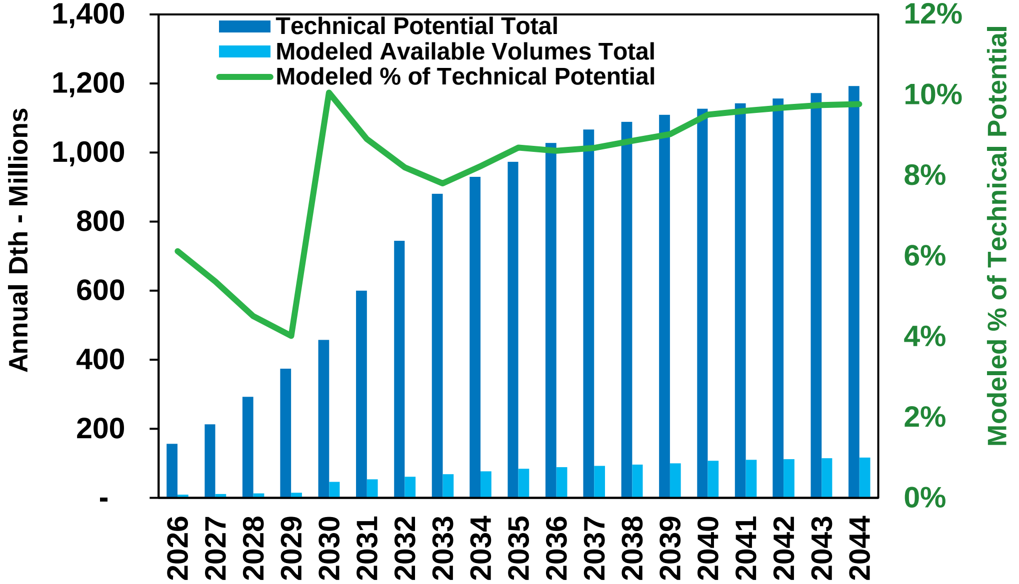


*No Volumes will be available until 2030

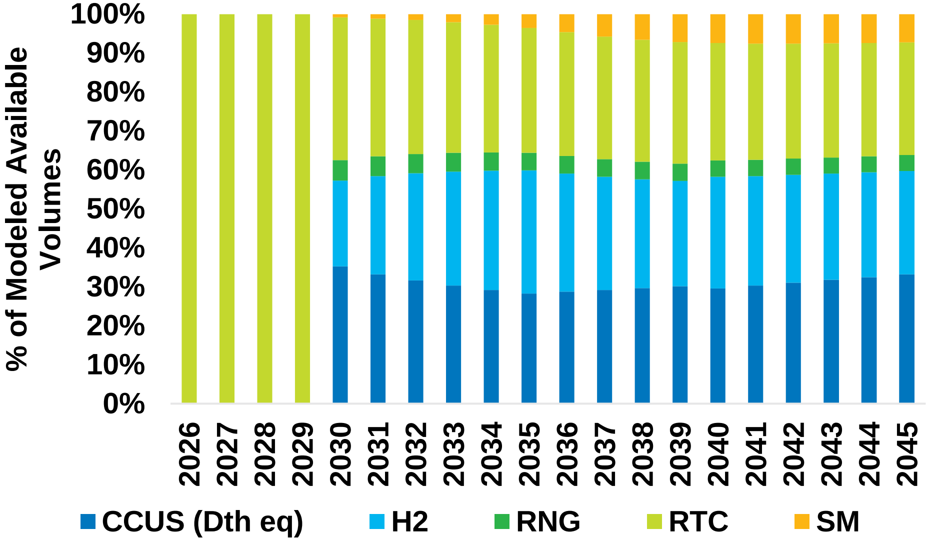
**CCUS “Industrial” is based on Avista specific high-volume customers

Annual - Modeled Volumes vs. Technical Potential Volumes

% of Modeled Volumes vs. Technical Potential**



% of Modeled Available Volumes in CROME by Type*

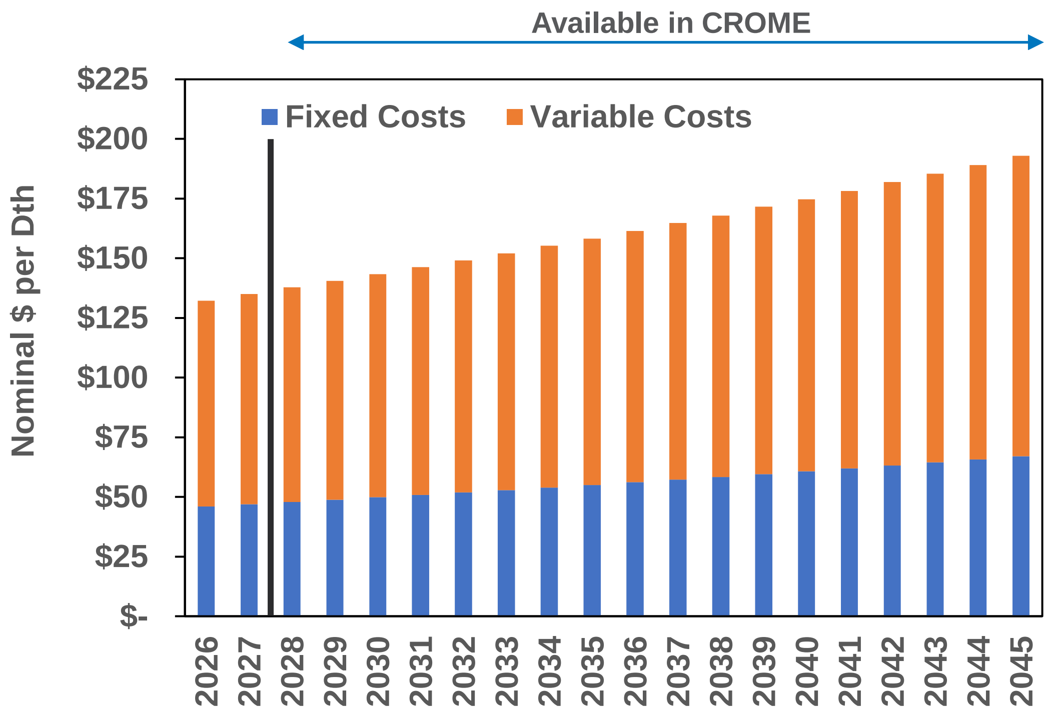


*Technical Potential Volumes are from ICF and weighted to % share of LDC # of customers for National and NW volumes, meaning this would be Avista's share of those volumes

Other Supply Side Resource Options

Propane Storage

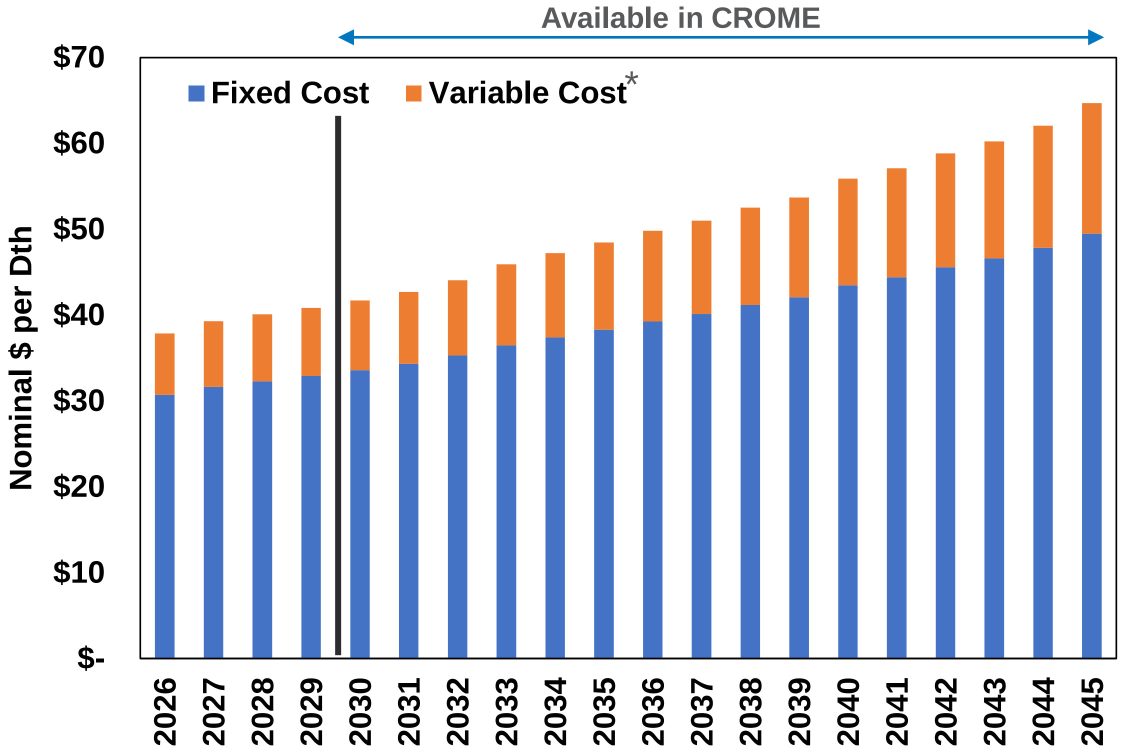
- CapEX - $14.7MM (20 Year Asset Life)
- Plant Size – 30M Dth (1 cycle)
- Installation + Owners costs – 5% of capital cost
- Delivery Cost is included
- Plant electricity and air injection
- Siting, permitting and build - 2 years
- Propane costs per gallon are included in estimated nominal $ per Dth – Variable Costs



*Cycling of plant reduces overall cost per Dth
**No volumes will be available until 2028

Liquified Natural Gas (LNG) Peak Storage

- CapEX - $200MM (50 Year Asset Life – Avista Rev. Req)
- Plant Size – 1 Bcf
- Max volume per day – 103,700Dth
- Pipeline - $2MM
- Utility Interconnect - $3.12MM
- Installation + Owners costs – 30% of capital
- Liquefaction Costs
- Days of peak supply – 10
- Liquefier capacity per day – 7,000 Dth
- Siting, permitting and build - 4 years
- Gas commodity costs included in CROME and combined with estimated nominal $ per Dth



*Example only as costs are modeled directly in CROME

*Cycling of plant reduces overall cost per Dth
**No volumes will be available until 2030

Constraints of Resource options in CROME

Resource Type	Volumetric Restriction	First Year of Availability
Allowances	10% of Market per program rules (CCA)	2026
Community Climate Investments	15% (2025-2027), 20% 2028+ (CPP)	2026
Demand Response	CPA from AEG for potential	2026
Electrification	No constraints, up to total energy demanded on LDC by area/class/year	2026
Energy Efficiency	CPA from AEG and ETO	2026
Renewable Thermal Credit	NW Technical Potential (ICF) – Avista Share (16%)	2026
Propane Storage	30,000 Dth	2028
Hydrogen	NW Technical Potential (ICF) & Avista Share (16%) & 20% by volume	2030
Synthetic Methane	NW Technical Potential (ICF) & Avista Share (16%)	2030
Renewable Natural Gas	NW Technical Potential (ICF) & Avista Share (16%)	2030
Liquified Natural Gas	1 Bcf Total & 0.1 Bcf Daily W/D	2030
Carbon Capture, Utilization and Storage	Constraints to Avista high volume customers (ICF)	2030