



2023 Electric Integrated Resource Plan
Technical Advisory Committee Meeting No. 2 Agenda
Tuesday, February 8, 2022
Virtual Meeting

Topic	Time	Staff
Introductions	9:00	John Lyons
Process Update	9:10	John Lyons
Demand & Economic Forecast	9:30	Grant Forsyth
Load and Resource Balance Update	11:00	James Gall
Adjourn	11:30	

Microsoft Teams meeting

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2023 IRP Introduction

2023 Avista Electric IRP

TAC 2 – February 8, 2022

John Lyons, Ph.D. Senior Resource Policy Analyst

Meeting Guidelines

- IRP team is working remotely and is available for questions and comments
- Stakeholder feedback form
 - Responses shared with TAC at meetings, by email and in Appendix
 - Would a form and/or section on the web site be helpful?
- IRP data posted to web site – updated descriptions and navigation are in development
- Virtual IRP meetings on Microsoft Teams until able to hold large meetings again
- TAC presentations and meeting notes posted on IRP page
- This meeting is being recorded and an automated transcript made

Virtual TAC Meeting Reminders

- Please mute mics unless speaking or asking a question
- Raise hand or use the chat box for questions or comments
- Respect the pause
- Please try not to speak over the presenter or a speaker
- Please state your name before commenting for the note taker
- This is a public advisory meeting – presentations and comments will be documented and recorded

Integrated Resource Planning

The Integrated Resource Plan (IRP):

- Required by Idaho and Washington* every other year
 - Washington requires IRP every four years and update at two years
- Guides resource strategy over the next twenty + years
- Current and projected load & resource position
- Resource strategies under different future policies
 - Generation resource choices
 - Conservation / demand response
 - Transmission and distribution integration
 - Avoided costs
- Market and portfolio scenarios for uncertain future events and issues

Technical Advisory Committee

- The public process piece of the IRP – input on what to study, how to study, and review of assumptions and results
- Wide range of participants involved in all or parts of the process
 - Please ask questions
 - Always soliciting new TAC members
- Open forum while balancing need to get through topics
- Welcome requests for new studies or different modeling assumptions.
- Available by email or phone for questions or comments between meetings

2023 IRP Process Update

- Draft Work Plan sent with today's presentations
 - Are any days of the week better or worse for future meetings?
 - Based on feedback from last TAC – aiming for shorter and more frequent meetings
- Intend to file 2023 IRP on June 1, 2023 – allow time to incorporate results of 2022 All-Source RFP
- Idaho Extension
 - Filed request under Docket No. [AVU-E-22-01](#) to file the next IRP on June 1, 2023, instead of April 1, 2023
 - January 25, 2022: Staff recommendation to set a public comment deadline of February 24, 2022, and Company reply due by March 5, 2022
- Washington IRP update on January 1, 2022, with 3 of the 4 requirements – only Preferred Resource Strategy will not be ready with RFP results

2023 IRP TAC Meeting Schedule

- TAC 3: Wednesday, March 9, 2022
 - Preliminary Natural Gas Market Overview and Price Forecast
 - Preliminary Wholesale Electric Price Forecast
 - Non-Energy Impact Study (DNV)
 - Existing Resource Overview
- TAC 4: August 2022
 - Conservation Potential Assessment (AEG)
 - Demand Response Potential Assessment (AEG)
 - Energy Efficiency Inclusion of Social Cost of Greenhouse Gas (WA Only)
- TAC 5: Early September 2022
 - IRP Generation Option Transmission Planning Studies
 - Distribution System Planning with the IRP
 - Western Resource Adequacy Program update

2023 IRP TAC Meeting Schedule

- TAC 6: End of September 2022
 - Supply Side Resource Cost Assumptions, including DERs
 - Ancillary Services and Intermittent Generation Analysis
 - All-Source RFP Update
 - Energy and Peak Forecast update
 - Load & Resource Balance update
- TAC 7: October 2022
 - Hydro Impacts from Global Climate Change studies
 - Load Impacts from Global Climate Change studies
 - DER Study Scope for 2025 IRP
 - Clean Energy Implementation Plan update
 - Final Wholesale Natural Gas and Electric Price Forecasts
 - Discuss portfolio and market scenario options

2023 IRP TAC Meeting Schedule

- Technical Modeling Workshop October 2022
 - PRiSM model overview
 - Risk Assessment overview
 - Washington use of electricity modeling
- TAC 8: February 2023
 - Wholesale Market Scenario results
 - RFP update
 - Jurisdictional allocation update
 - Draft Preferred Resource Strategy
 - Washington 100% clean energy planning standard modeling
 - Market risk assessment

2023 IRP TAC Meeting Schedule

- Virtual Public Meeting – Natural Gas & Electric IRPs (February/March 2023)
 - Recorded presentation
 - Daytime comment and question session
 - Evening comment and question session
- TAC 9: March 2023
 - Final Preferred Resource Strategy
 - Portfolio scenario analysis
 - Final report overview & comment plant
 - Action Items

Key 2023 IRP Dates

- Finalize 2023 IRP Work Plan – February/March 2022
- Due date for study requests from TAC members – October 1, 2022
- Washington IRP Progress Report – January 1, 2023
- External IRP draft released to the TAC – March 17, 2023
- Public comments from TAC due – May 12, 2023
- Final 2023 IRP submission to Commissions and TAC – June 1, 2023

Today's Agenda

- 9:00 Introductions, Lyons
- 9:10 Process Update, Lyons
- 9:30 Demand and Economic Forecast, Forsyth
- 11:00 Load and Resource Balance Update
- 11:30 Adjourn



TAC Meeting
February 8, 2022

2023 IRP: Preliminary Economic Conditions and Forecasts

Grant Forsyth, Ph.D.
Chief Economist
Grant.Forsyth@avistacorp.com

Outline

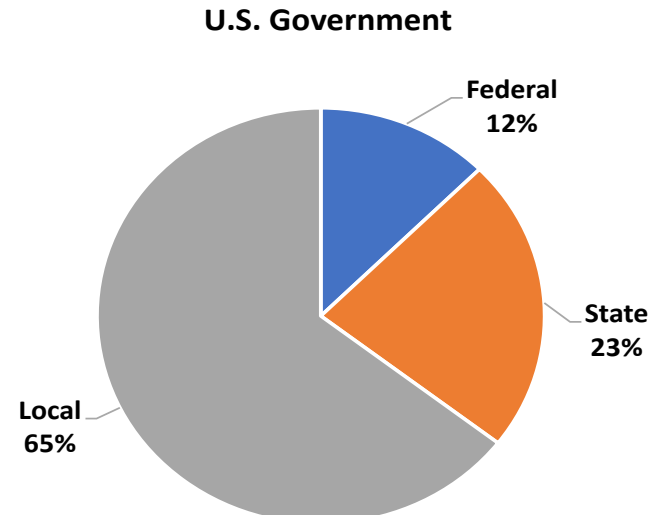
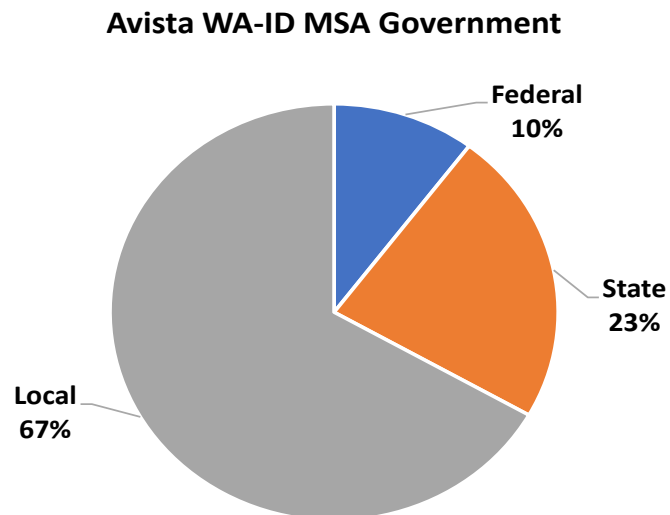
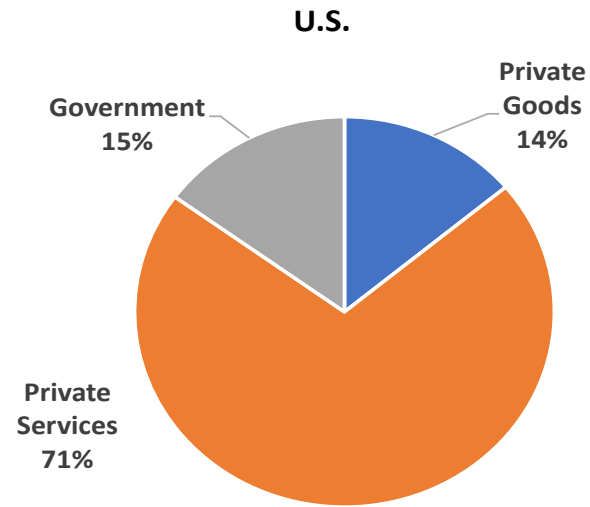
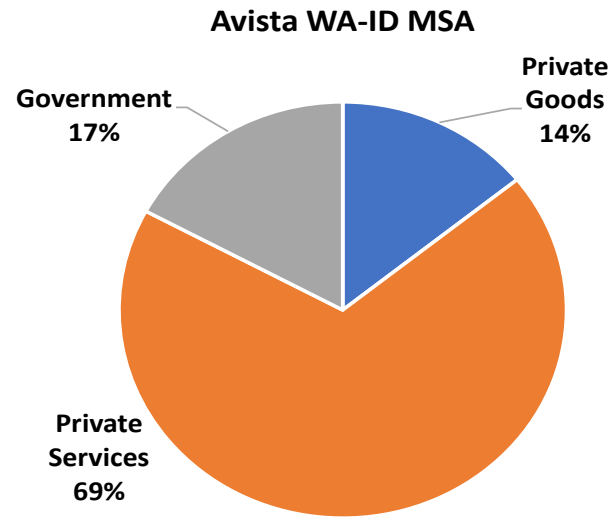
- **Service Area Economy**
- **Long-run Energy Forecast**
- **Peak Load Forecast**

“Models are predicting what’s normal in a world that isn’t normal.”

-Erica Groshen, former head of the BLS and current economic advisor to Cornell University’s Industrial and Labor Relations School.

Quote from: “Here’s another thing the pandemic messed up: economic forecasts,” by David J. Lynch, *The Washington Post*, January 11, 2022

Service Area Economy: Non-Farm Employment Structure

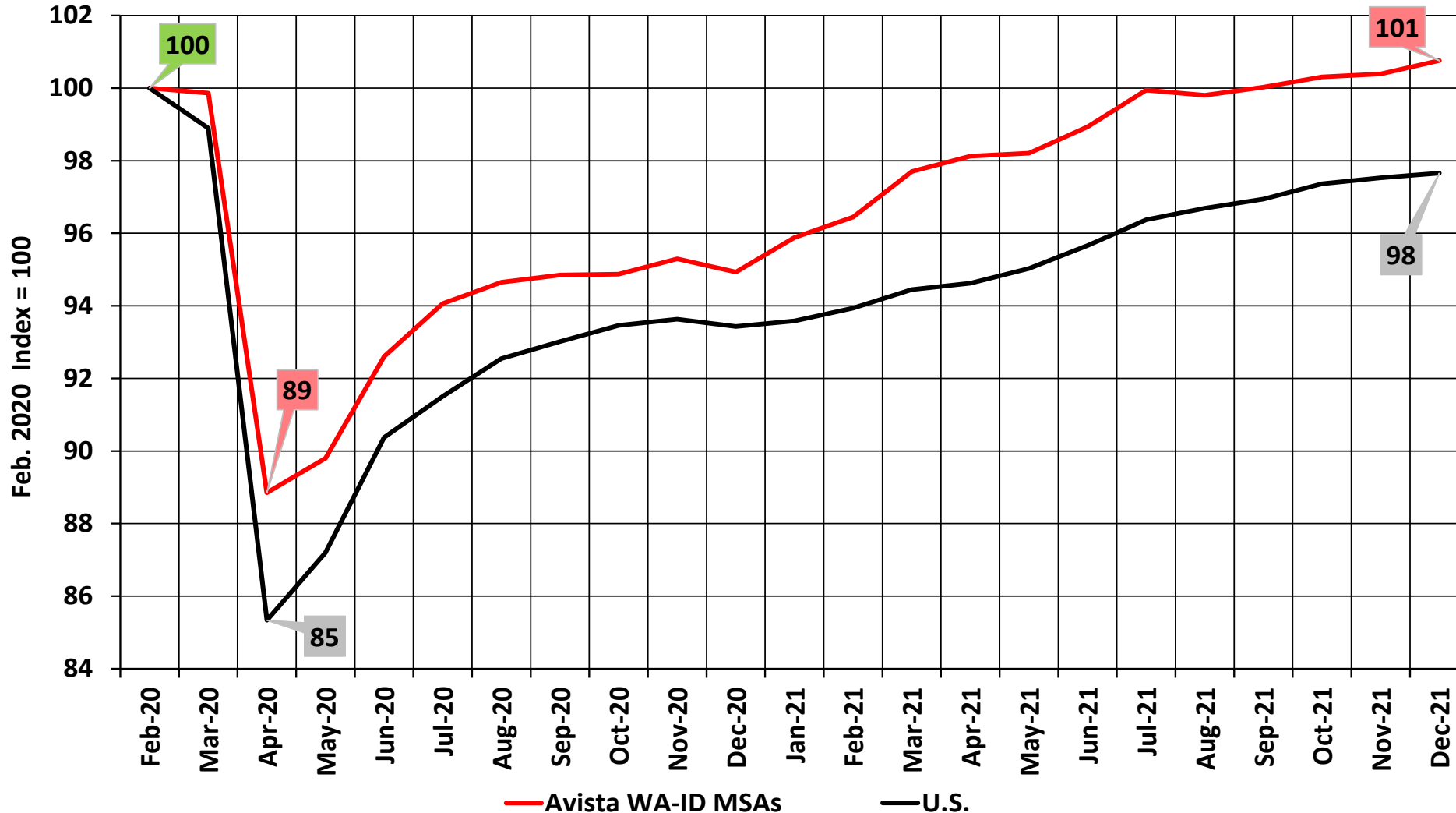


Comments

- Employment structure very similar to the U.S.
- Employment dominated by private services. Without service sector growth, very little employment growth will be generated.
- Majority of public sector employment is local and related to education.
- If agriculture is considered, it would account for about 1% to 1.5% of employment.

Source: BLS and author's calculations.

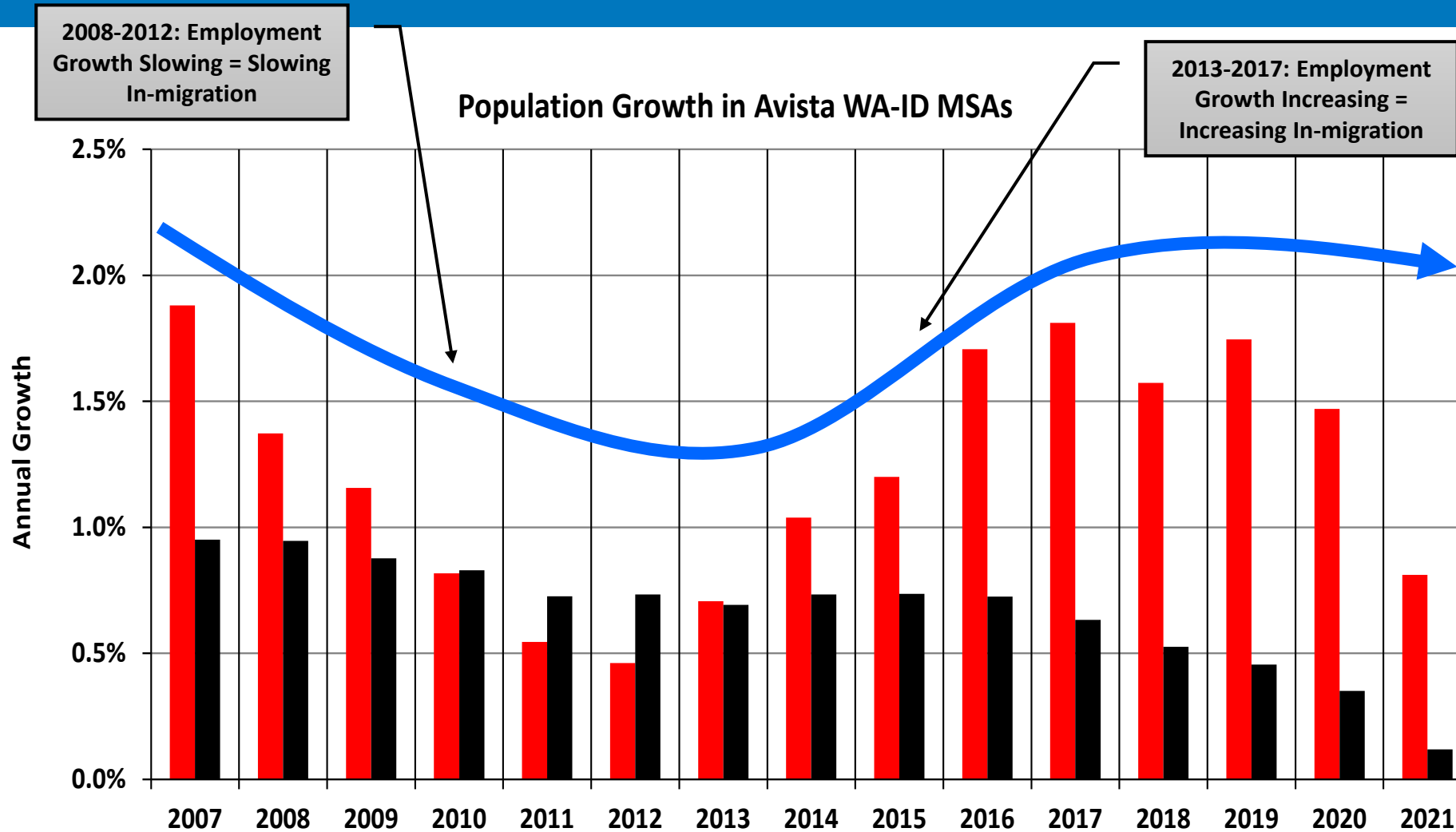
Service Area Economy: Non-Farm Employment



- Comments**
- Region has recovered from the pandemic faster than the U.S.
 - Strong growth in ID and an Amazon expansion in WA were important drivers.
 - However, the region is still suffering many of the same problems seen in the rest of the U.S.: labor shortages, supply disruptions, and inflation. Shelter cost growth has been some of the fastest in the U.S.

Source: BLS, WA ESD, and author's calculations.

Service Area Economy: WA-ID Metro Population Growth

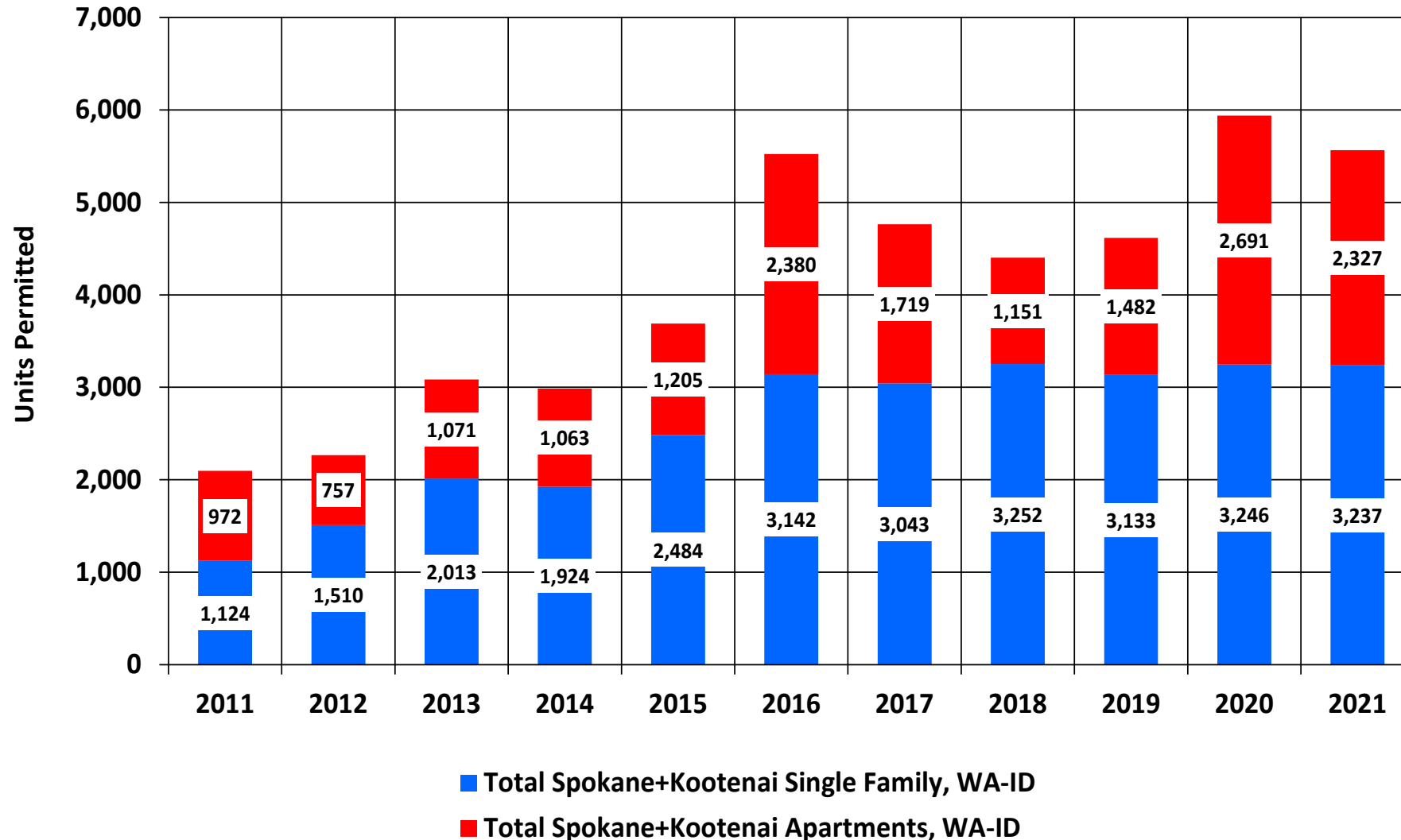


Comments

- Population growth drives most of our customer growth.
- Significantly higher than U.S. growth because of in-migration. Without in-migration, growth would look like U.S.
- Pandemic suppressed growth in 2021. We expect a rebound in service area growth after 2021.
- Growth is highest on the ID side.

Source: BEA, U.S. Census, and author's calculations.

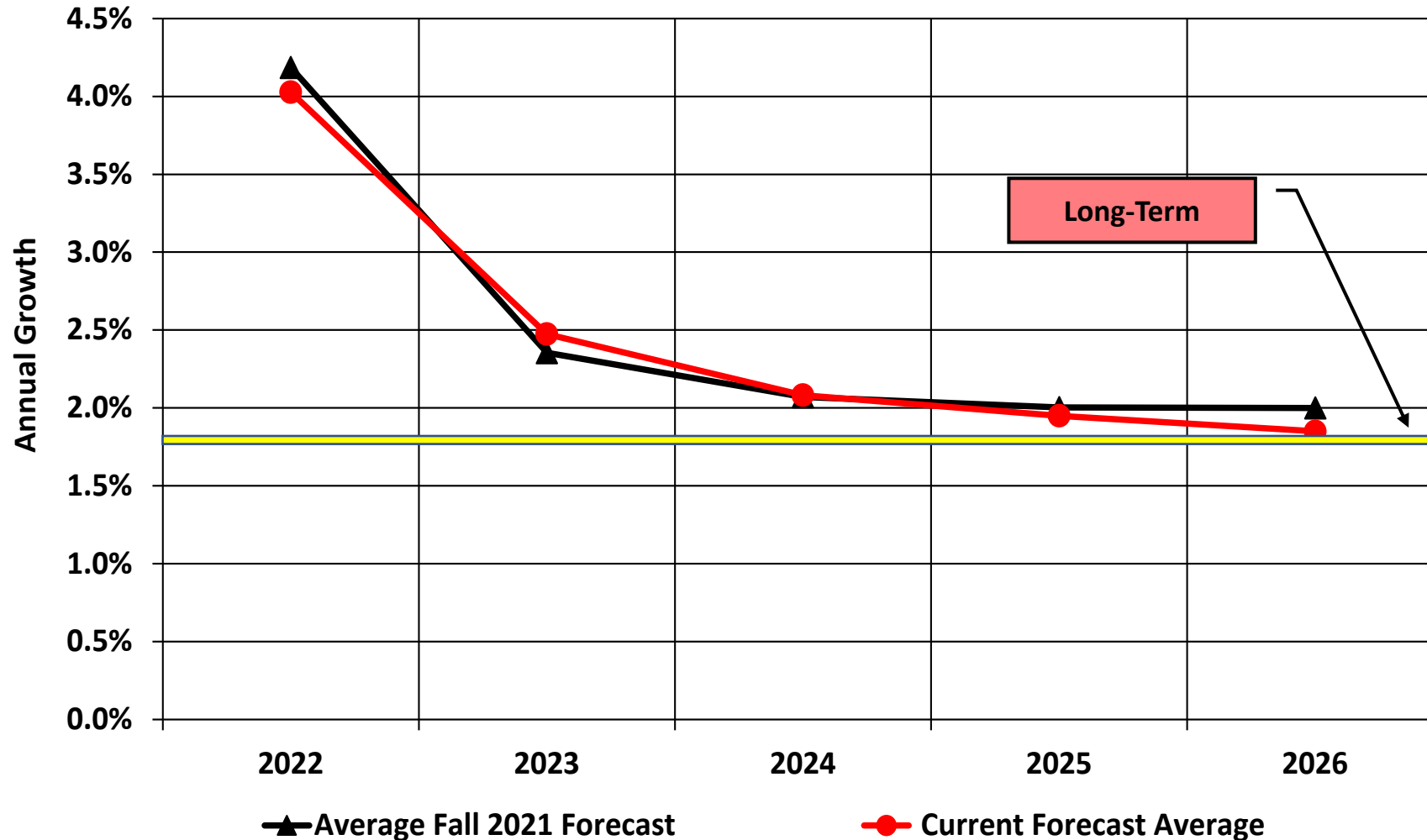
Service Area Economy: Spokane+Kootenai Residential Units Permitted



- Comments**
- Strongly connected to population growth.
 - Held up surprisingly well in the pandemic. Recessions would normally push down permitting.
 - Even with strong permitting, demand has outstripped supply of housing. This has pushed price growth to some of the highest in the U.S.
 - Apartments and duplexes have been an important source of new housing in both WA and ID. Duplexes are counted as “single family” in the graph.

Source: Construction Monitor and author's calculations.

Service Area Economy: U.S. GDP Growth Assumptions



Medium-Term

▲ Average Fall 2021 Forecast

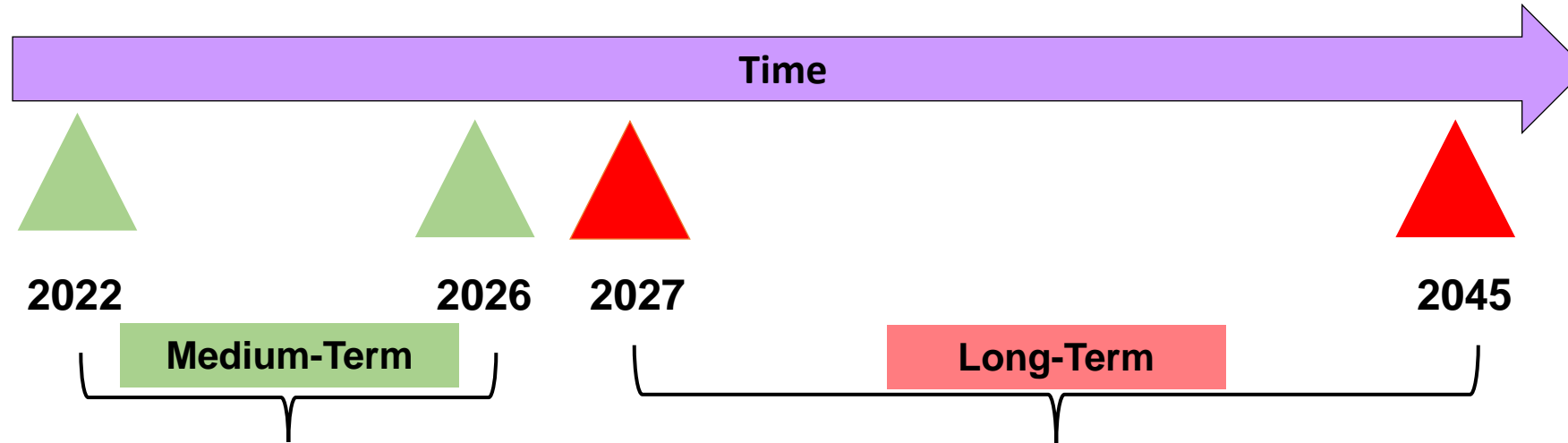
● Current Forecast Average

Comments

- Long-run growth is a function of population growth and labor productivity growth.
- U.S. continues to have weak productivity growth and weak population growth.
- The Fed's long-run expectation for GDP growth has fallen from 2% to 1.8% (yellow line). This is the growth rate assumed from 2027 to 2045.
- The assumed long-run GDP forecast is lower compared to previous IRPs. Long-run GDP growth must exceed 2.3% before forecasted industrial load will grow.

Source: Various and author's calculations.

Long-term Energy Forecast: Basic Approach

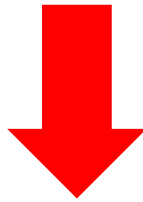


- 1) Monthly econometric model by schedule for each customer class.
- 2) Customer and UPC forecasts.
- 3) 20-year moving average for "normal weather."
- 4) Economic drivers: GDP, industrial production, employment growth, population, price, natural gas penetration, and ARIMA error correction.
- 5) Native load (energy) forecast derived from retail load forecast.
- 6) Current forecast is the Fall 2021 Forecast.

- 1) Boot strap off medium term forecast.
- 2) Apply long-run load growth relationships to develop simulation model for high/low scenarios.
- 3) Include different scenarios for roof top solar penetration with controls for price elasticity, EV/PHEVs, GDP growth, population growth, weather, and natural gas penetration.

Long-term Energy Forecast: Growth Relationships

Load = Customers x Use Per Customer (UPC)



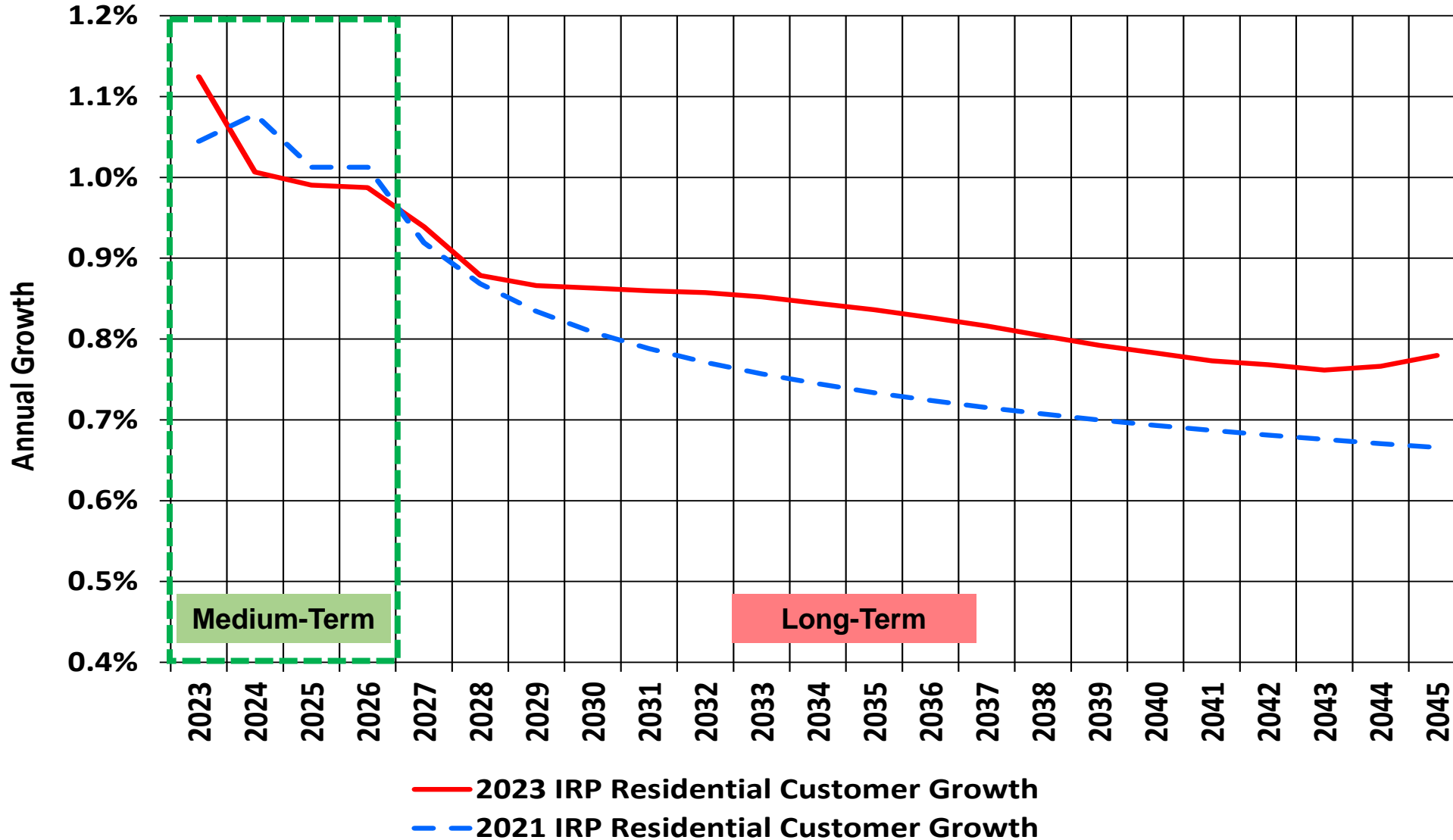
Load Growth \approx Customer Growth + UPC Growth

Population growth is the primary driver of residential customer growth and residential growth is primary driver of commercial customer growth. Industrial customer growth reflects a long-run trend of declining customers.

Assumed to be a function of multiple factors; the major factors can be altered to see impacts.

Long-term Energy Forecast: Residential Customer Growth

Annual Residential Customer Growth Rates



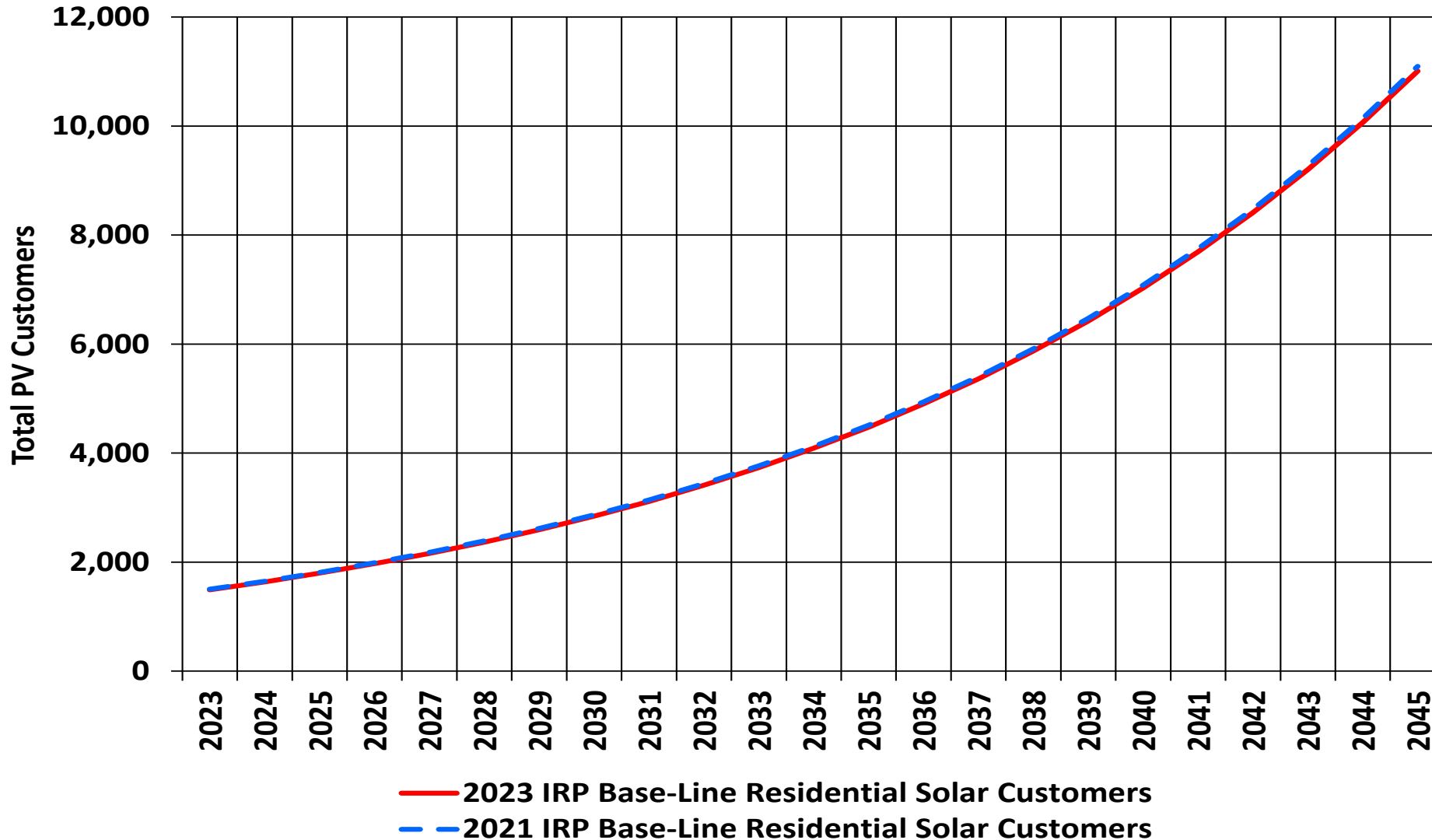
IRP	Avg. Annual Growth
2021 IRP	0.80%
2023 IRP	0.86%
2023 WA	0.69%
2023 ID	1.17%

- Comments**
- From 2027 on, the time-path reflects IHS population forecasts.
 - The higher growth rate in this IRP reflects higher forecasted growth in ID.



Long-term Energy Forecast: Residential Solar Penetration

Projected Base-Line Residential Solar Customers

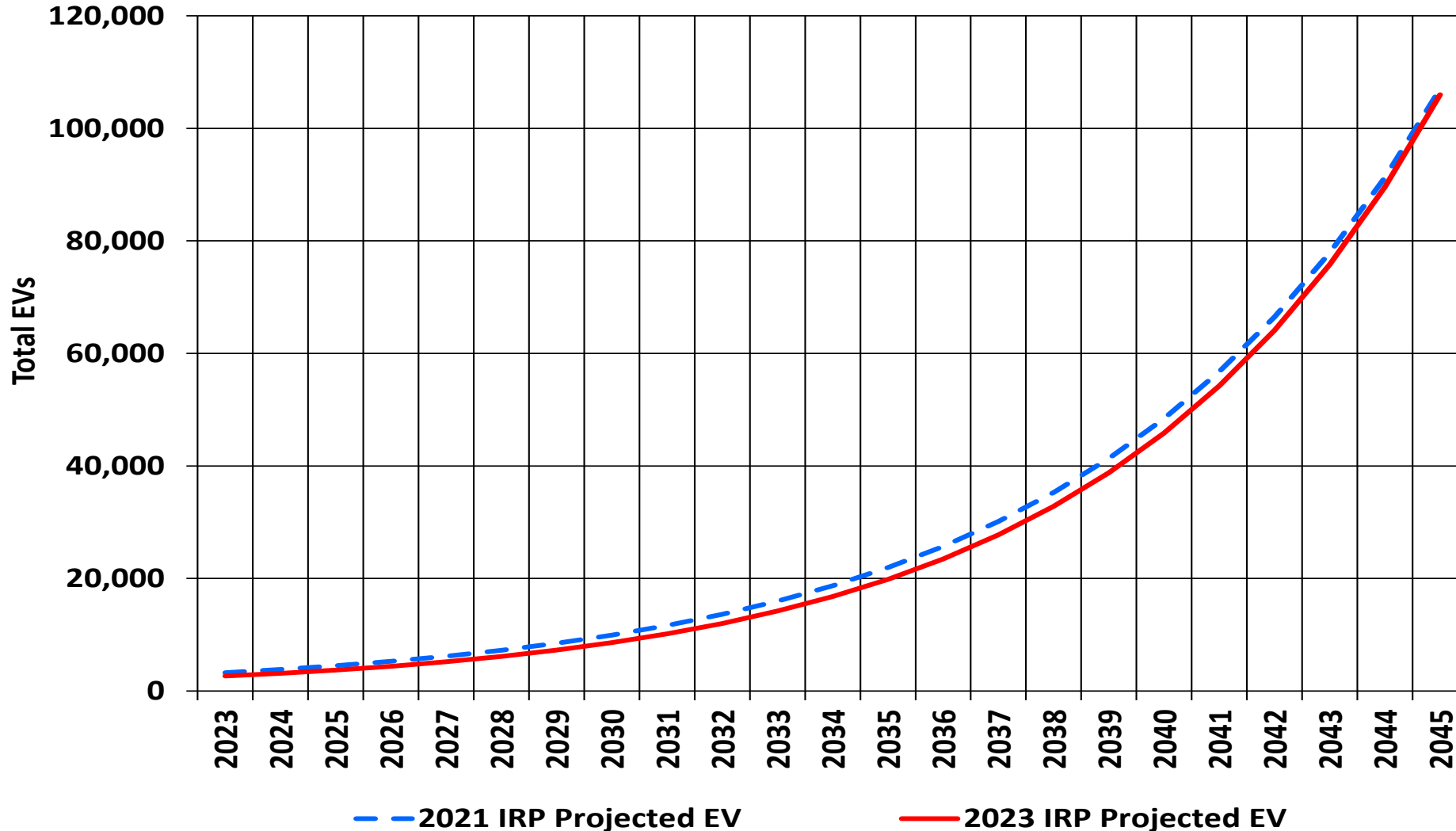


Comments

- Solar penetration similar to 2021 IRP.
- Current penetration is 0.4% of residential customers. This is projected to grow to 2.5% by 2045.
- Current system size is around 7,000 watts, with the assumption of 8,900 watts by 2045
- This remains a highly uncertain projection given on-going changes to public policy.

Long-term Energy Forecast: Light Duty EVs, 2023-2045

Projected Residential EVs

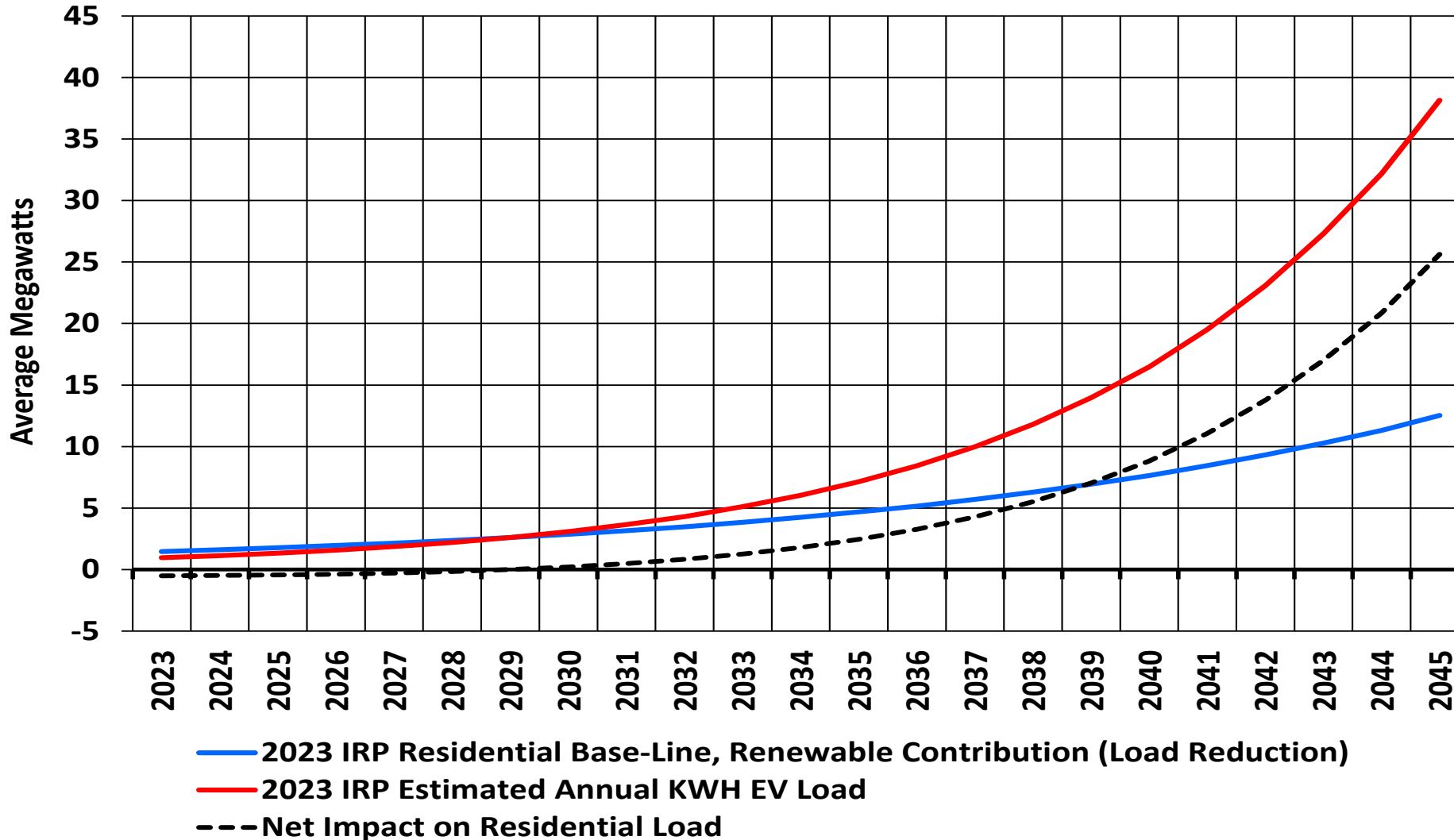


Comments

- Similar to 2021 IRP.
- Current light duty EVs are around 2,600. This is projected to grow to 106,000 by 2045.
- Current penetration is 0.3% of household vehicles. This is projected to grow to 13% by 2045.
- This remains a highly uncertain projection given on-going changes in the EV industry and public policy.

Long-term Energy Forecast: Net Solar and EV Impacts, 2023-2045

Average Megawatt Impact of Solar and EV/PHEV



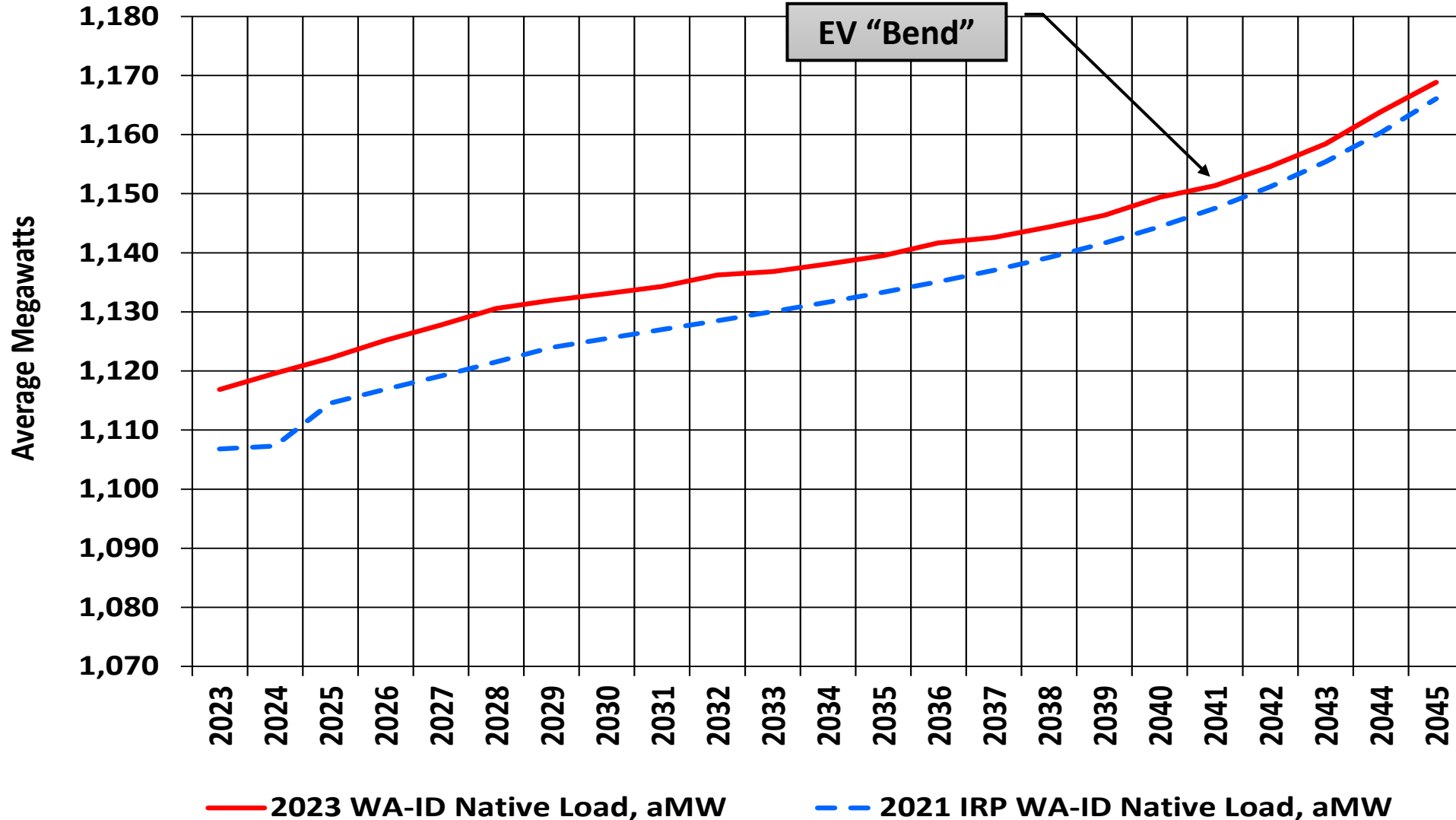
Comments

- EVs start to dominate load impacts in late 2030s.



Long-term Energy Forecast: Native Load

Native Load Forecast, Average Megawatts



IRP	Avg. Annual Growth
2021 IRP	0.24%
2023 IRP	0.21%
2023 WA	0.15%
2023 ID	0.31%

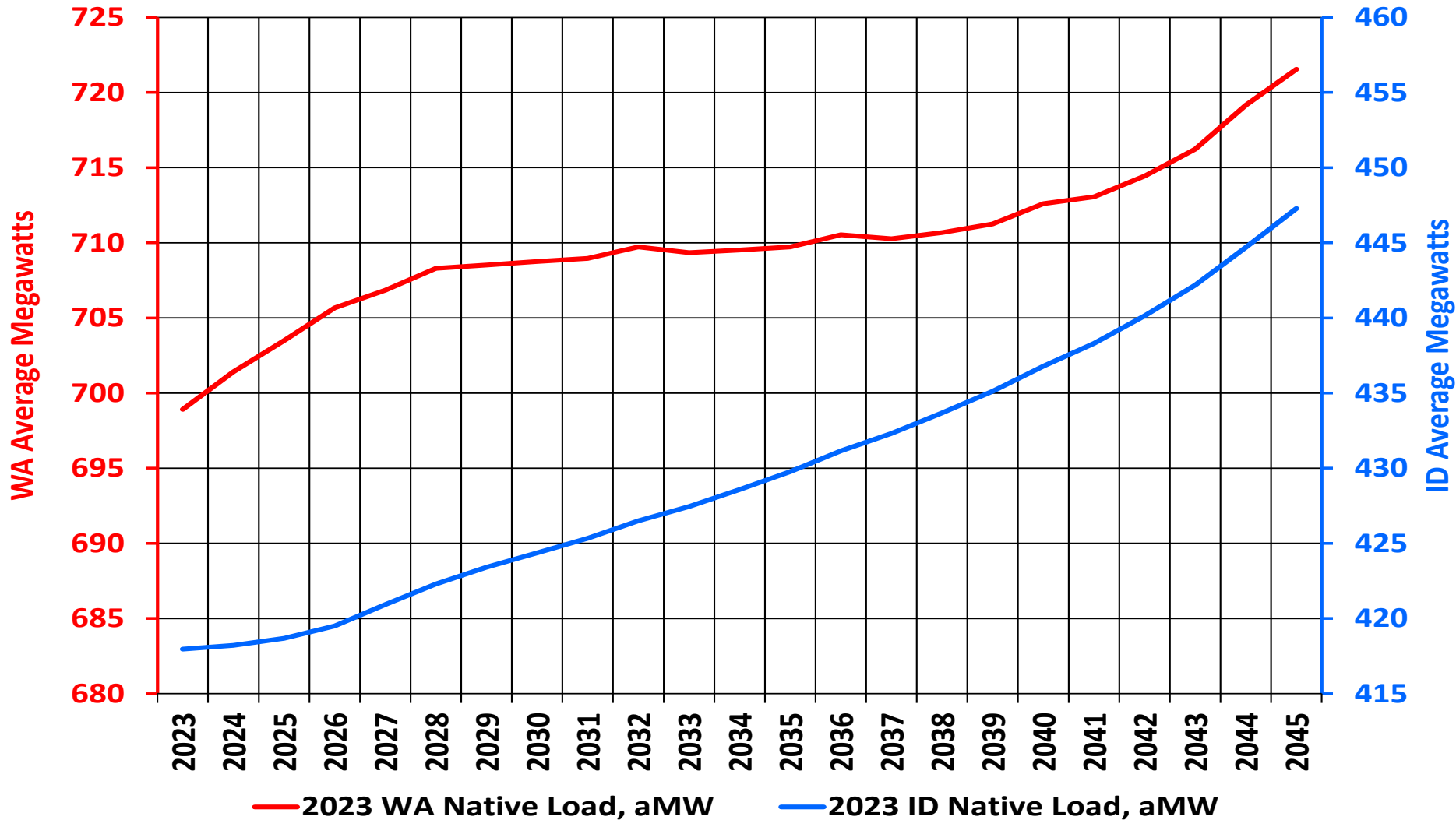
Comments

- The load level is higher because the medium-term forecast in this IRP has stronger economic and population growth assumptions compared with the 2021 IRP.



Long-term Energy Forecast: State Native Load

State Native Load Forecast, Average Megawatts



IRP	Avg. Annual Growth
2023 IRP	0.21%
2023 WA	0.15%
2023 ID	0.31%

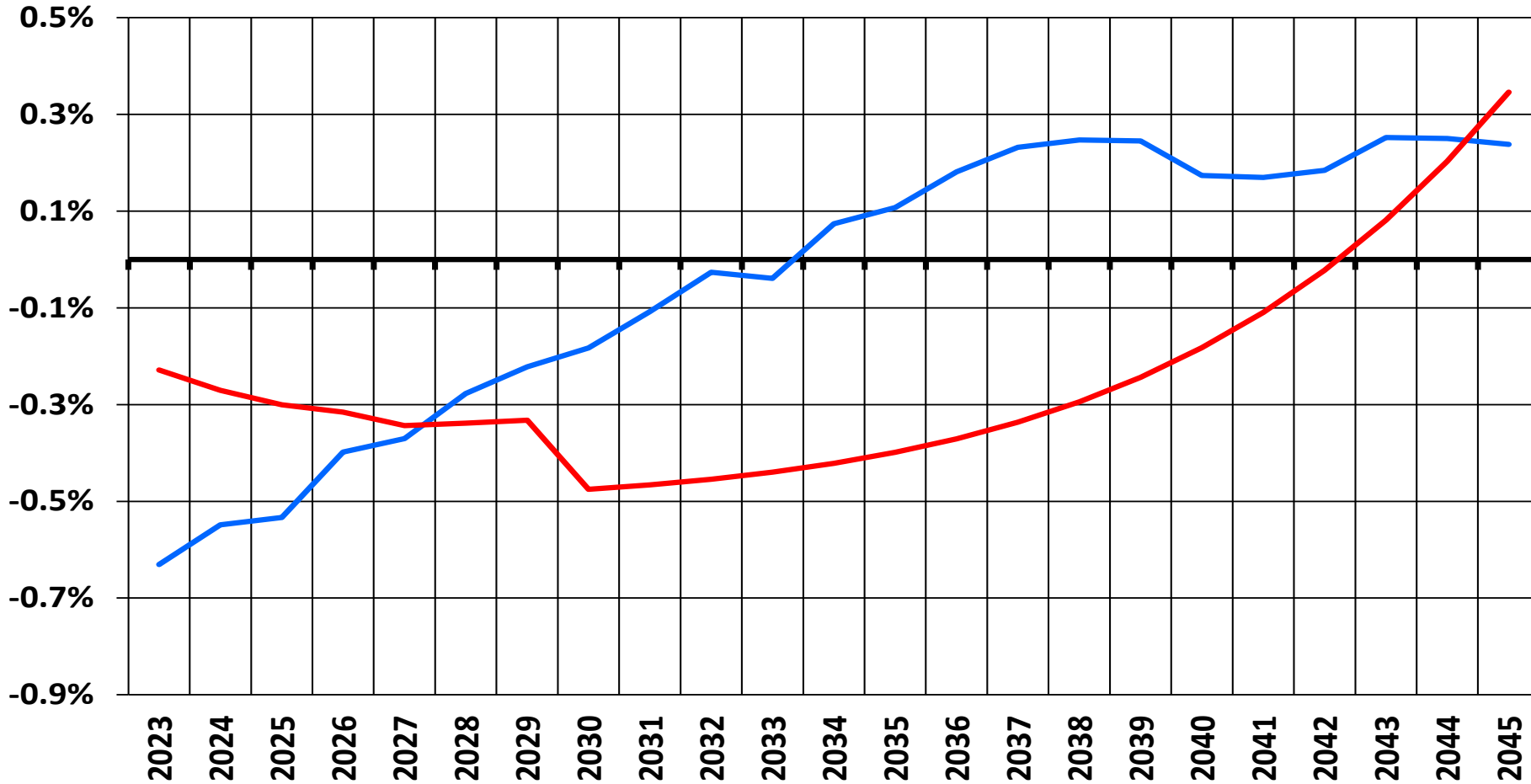
Comments

- ID load growth is higher because (1) its population growth forecast is higher and (2) lower solar penetration compared to WA.
- WA long-term forecast assumes gas penetration (as a share of residential electric customers) is constant. In ID the model assumes a gradual increase.



Long-term Energy Forecast: Annual Residential UPC Growth

Base-Line Scenario: Residential UPC Growth Rate



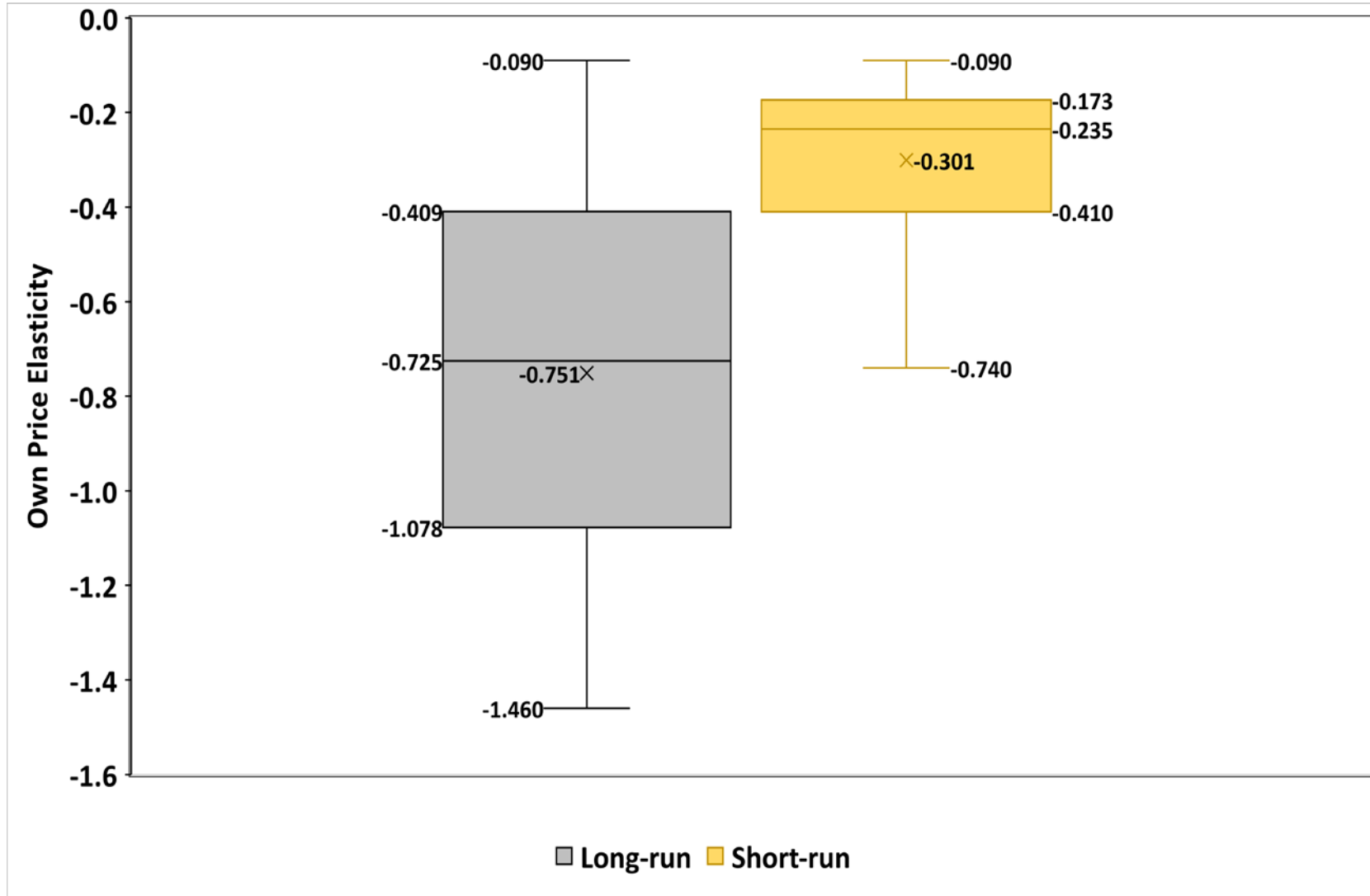
— EIA Reference Case Use Per Household Growth

— 2023 IRP Residential Base-Line UPC Growth

Comments

- Avista and EIA UPC growth look different because of U.S. population shifts to warmer regions.
- Avista UPC dips in 2030 due to the assumption that the annual growth rate in real residential rate will accelerate from 1% growth from 2027 to 2029 to 1.5% until 2045.
- As noted, it's assumed WA's share of residential customers with gas is constant from 2026 to 2045.

Long-term Energy Forecast: Residential Own Price Elasticity



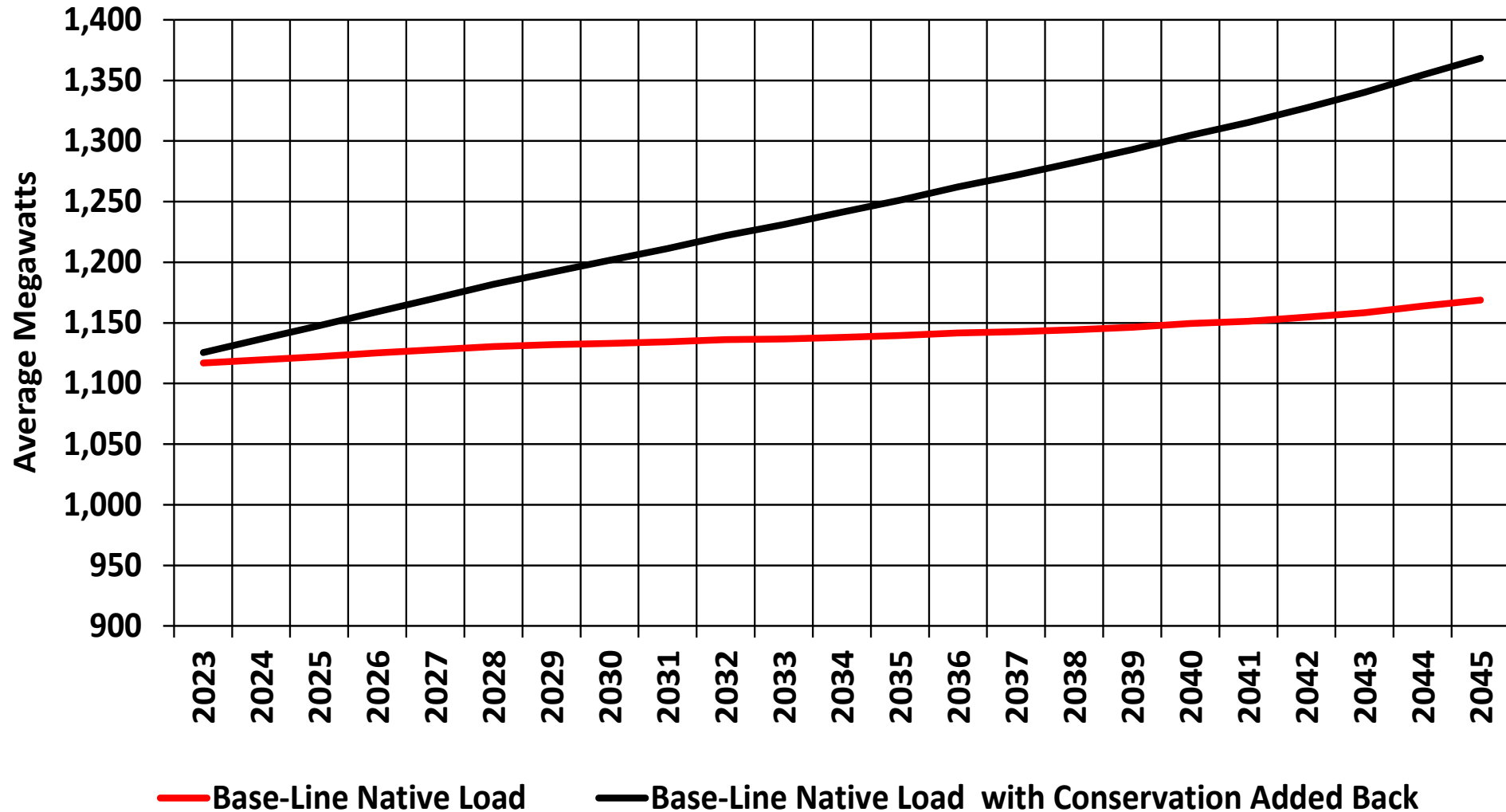
Source: Various sources and author's calculations.

Comments

- Review of individual studies and surveys of studies to get a range of estimates.
- Long-term forecast assumes a residential elasticity of -0.3.
- Restrictions on natural gas and growth of EVs would likely put downward pressure on elasticity.

Long-term Energy Forecast: Conservation Impacts

aMW Load Comparison with Conservation Adjustment



IRP	Avg. Annual Growth
2023 IRP No Conservation	0.89%
2023 IRP	0.21%

Comments

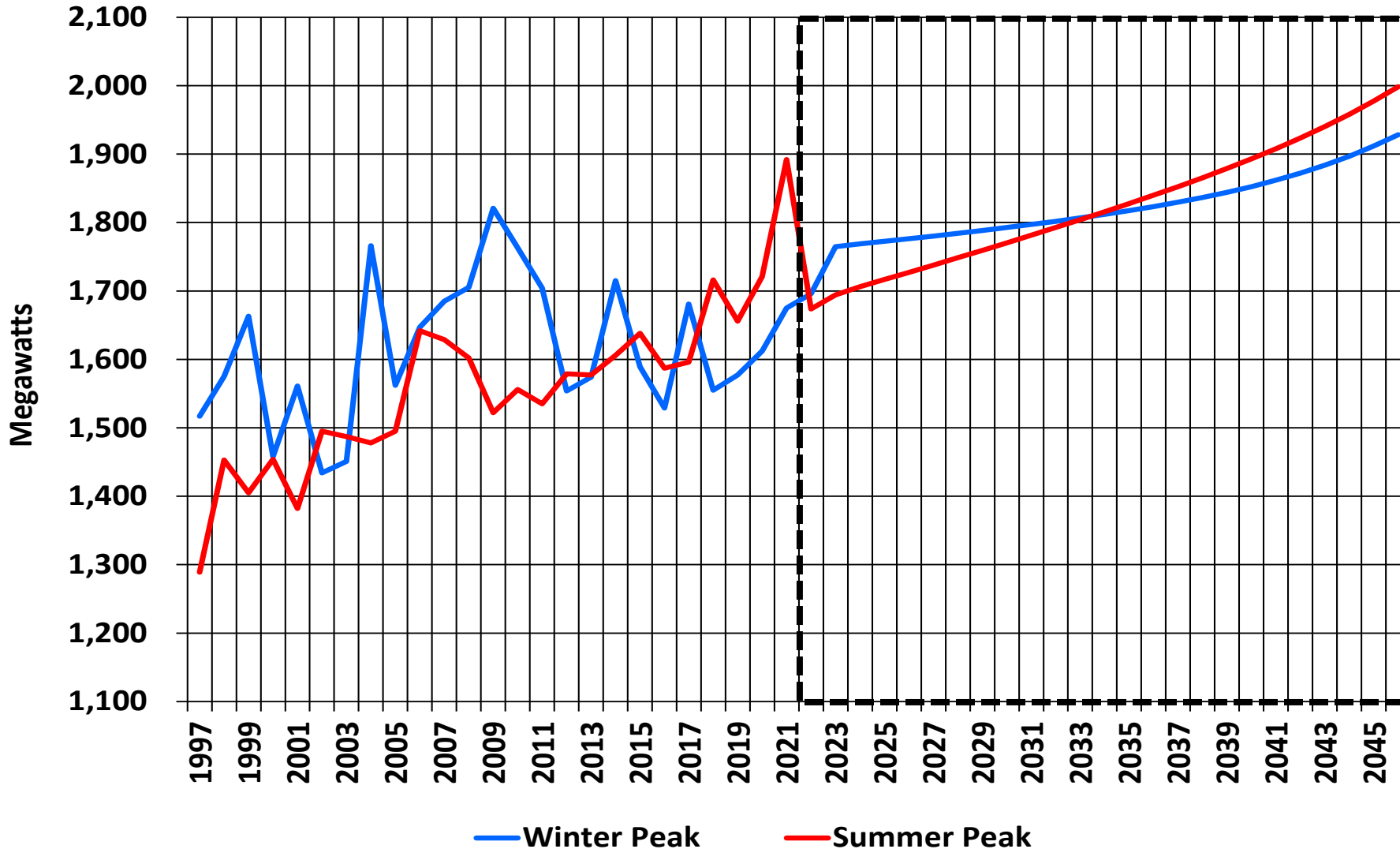
- Based on historical conservation behavior.

Peak Load Forecast: The Basic Model

- Based on monthly peak MW loads since 2004. The peak is pulled from hourly load data for each day for each month. **The model used for this IRP underwent a major revision after the 2021 IRP.**
- Monthly time-series regression model that initially excludes certain industrial loads, EVs, and solar. However, those are added back for the final forecast. **As part of the model revision, the forecasted impact of EVs and solar were improved for this IRP.**
- Explanatory variables include HDD-CDD and monthly and day-of-week dummy variables. The level of real U.S. GDP is the primary economic driver in the model—the higher GDP, the higher peak loads. **The model allows GDP impact to differ between winter and summer. This separation was improved on in the revised model, and it significantly changes the results between winter and summer. The revised model shows Avista is a winter peaking utility until around 2030. This reflects a forecasted summer peak that is expected to grow notably faster than the winter peak.**
- The coefficients of the model are used to generate a distribution of peak loads by month based on historical max/min temperatures since 1890, holding GDP constant. A starting expected peak load is then calculated using the average peak load simulated for that month going back to 1890. **For the 2023 IRP, the starting winter peak average uses data back to 1890; the starting summer peak using a 30-year average.**
- The long-run growth rate of peak loads for summer and winter are calculated using GDP growth under the “*all else constant*” assumption for all other factors in the model.

Peak Load Forecast: Winter and Summer Forecast

Winter and Summer Peak, Megawatts



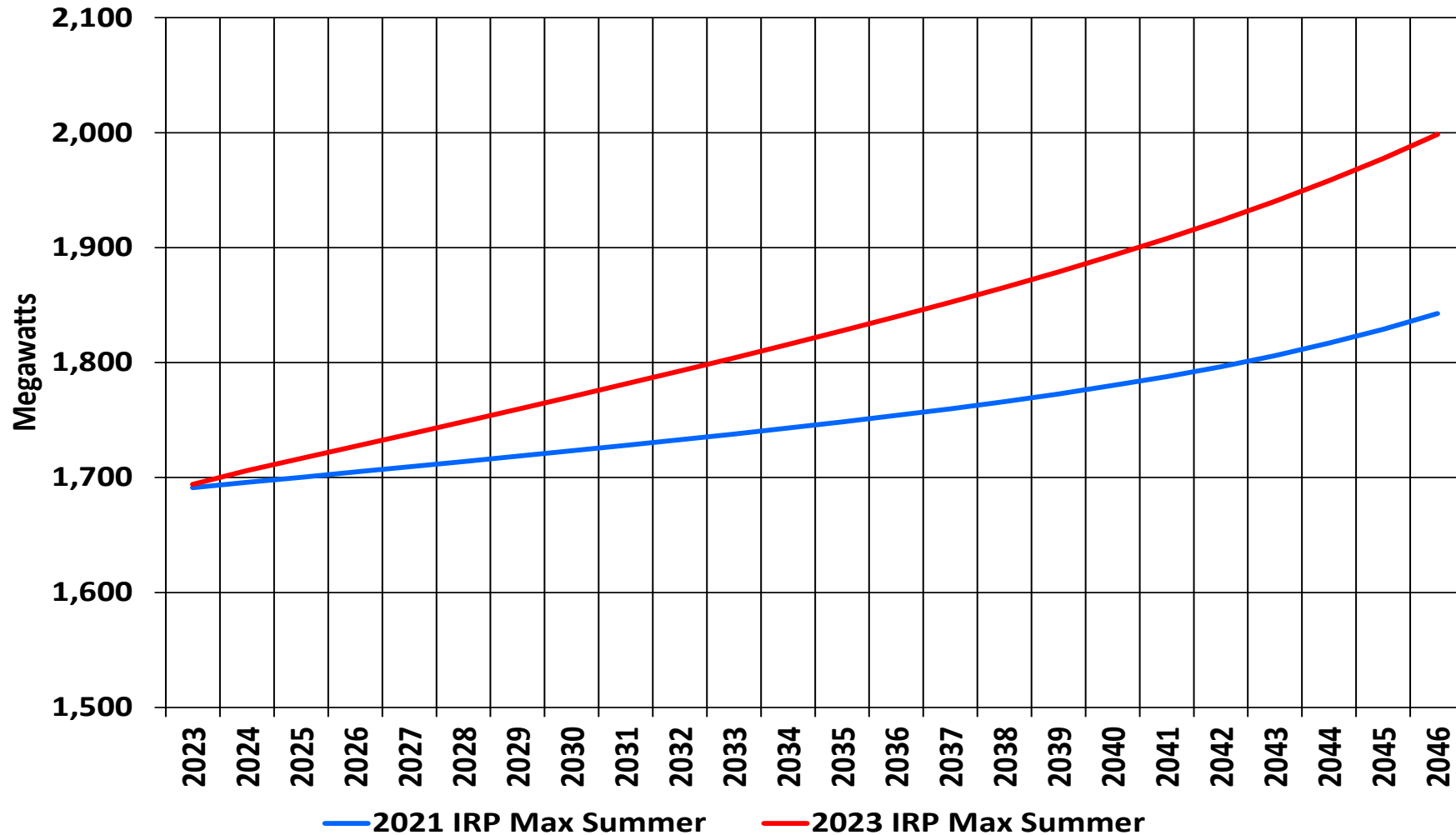
Peak	Avg. Growth 2023-45
Winter	0.37%
Summer	0.73%

- Comments**
- Extreme value of analysis of winter and summer temperatures suggests cold is still a risk.
 - Impacts of electrification policies still being evaluated.
 - There is no trended climate in the current forecast.



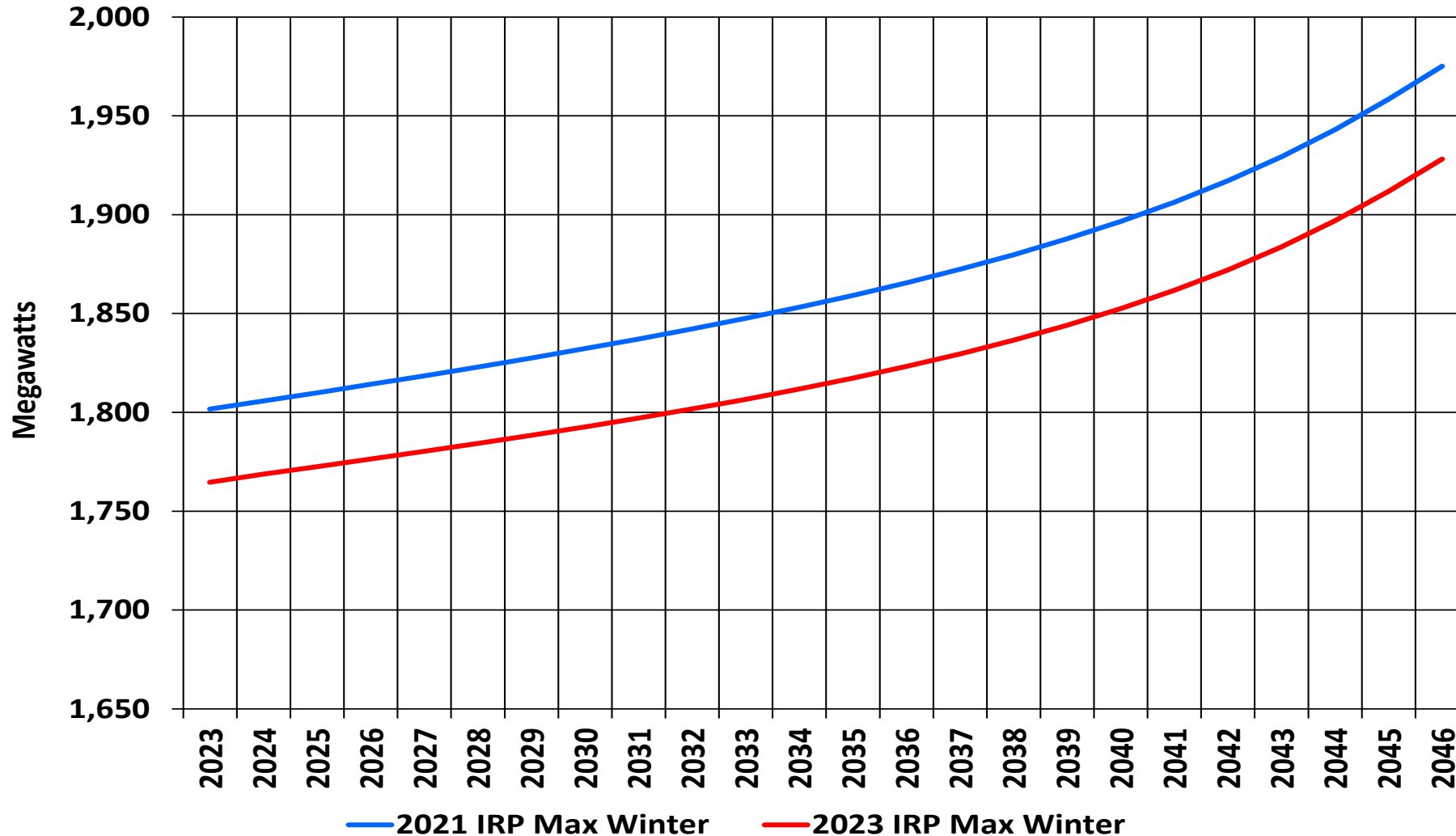
Peak Load Forecast: Change in IRP Summer Peak

Summer Peak: Current and Previous IRP, Megawatts



Peak Load Forecast: Change in IRP Winter Peak

Winter Peak: Current and Previous IRP, Megawatts



Questions?



Load & Resource Balance Update

Avista, Electric Technical Advisory Committee

February 8th, 2022 – TAC 2

James Gall, Electric IRP Manager

Major L&R Changes Since 2021 IRP

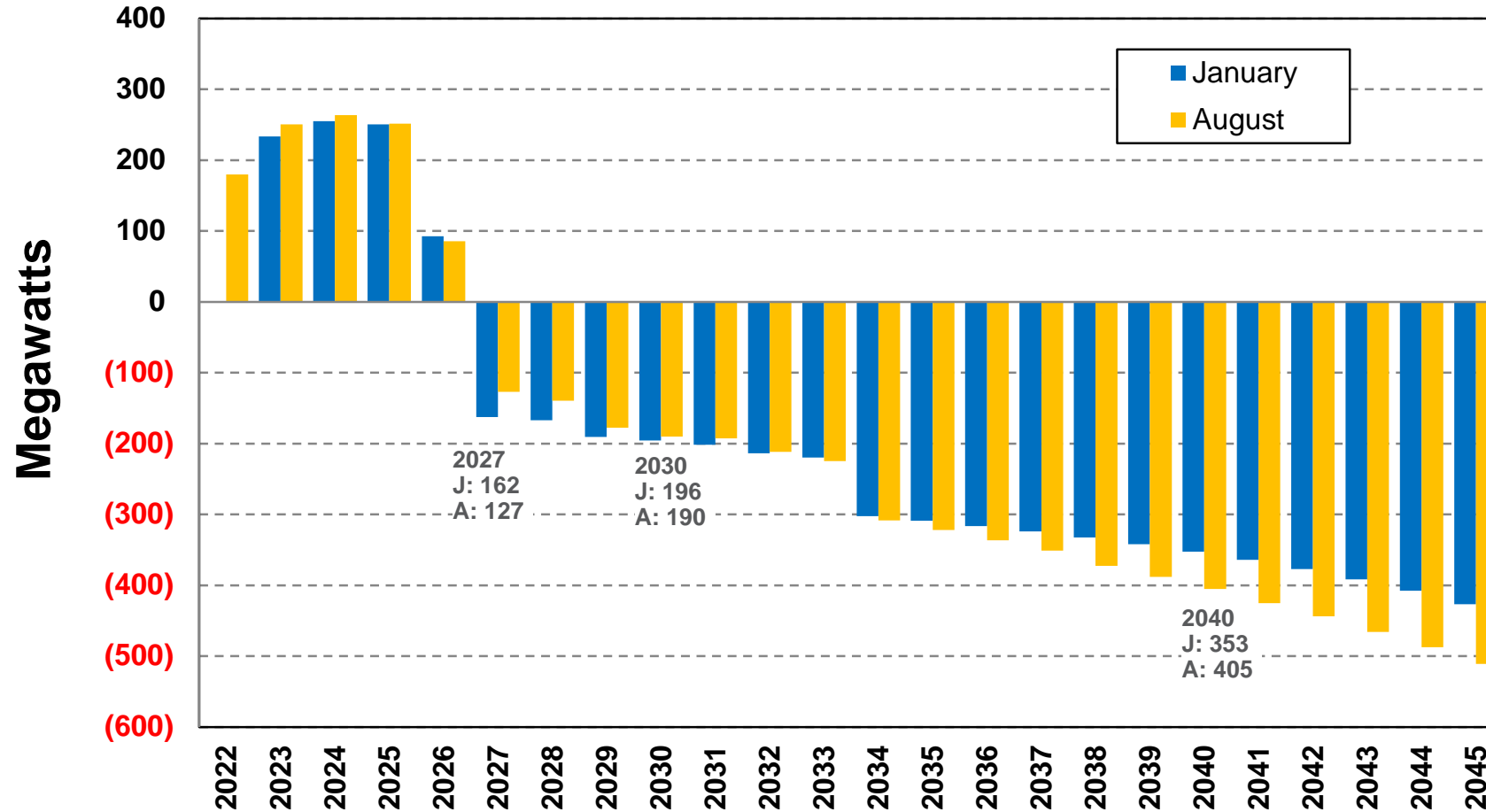
- Load forecast
- 30 MW industrial demand response (Washington Rate Case Settlement)
- Chelan County PUD purchase
 - ~88 MW or ~54 aMW equal to 5% of Rocky Reach and Rock Island projects

	2022	2023	2024	2025	2026-2030	2031-2033	2034-2045
Existing Slice	5%	5%	5%	5%	5%		
April 2021 Contract			5%	5%	5%	5%	
December 2021 Contract					5%	10%	10%

System Capacity Position

Western Resource Adequacy Program not included at this time

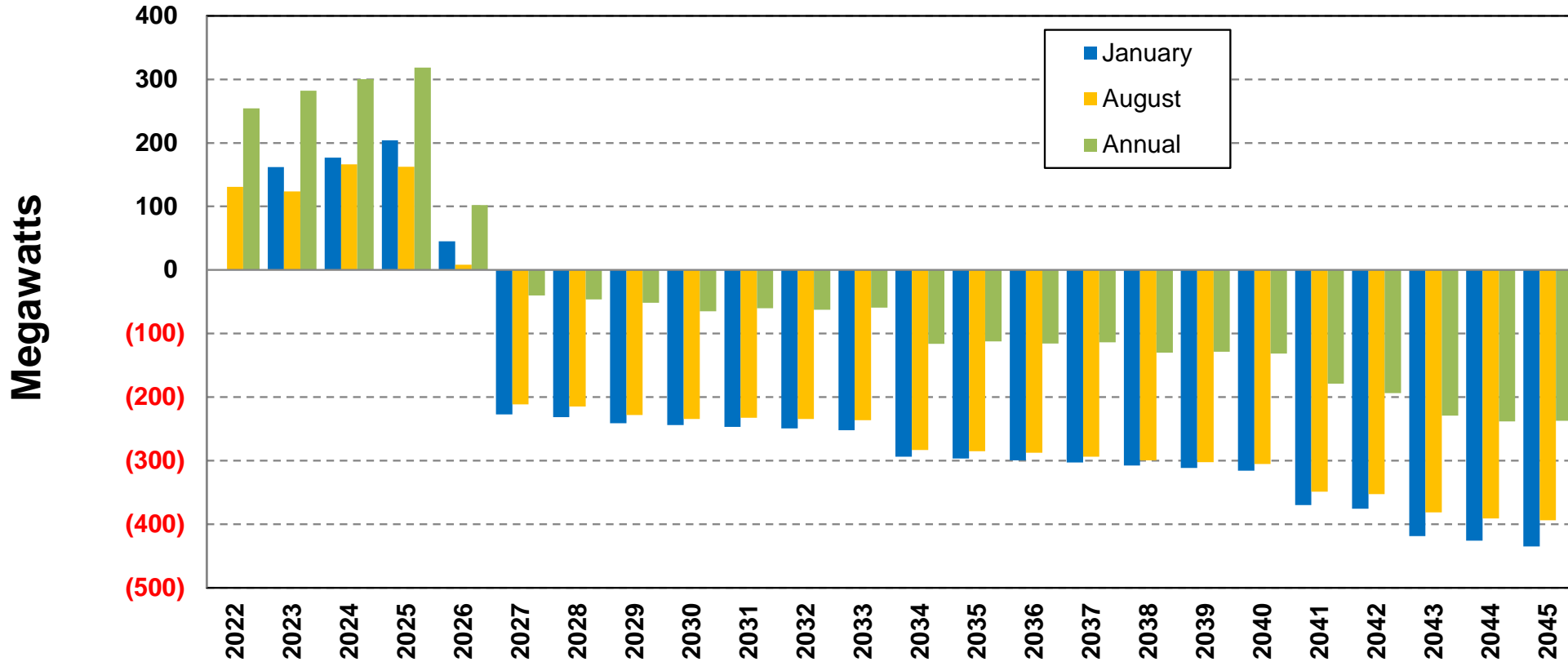
1 Hour Peak Load & Resource Position



Peak Planning Criteria
 16% winter PRM
 7% summer PRM
 Operating reserves (~6%)
 Regulation (16 MW)

System Planning Energy Position

Energy Load & Resource Position



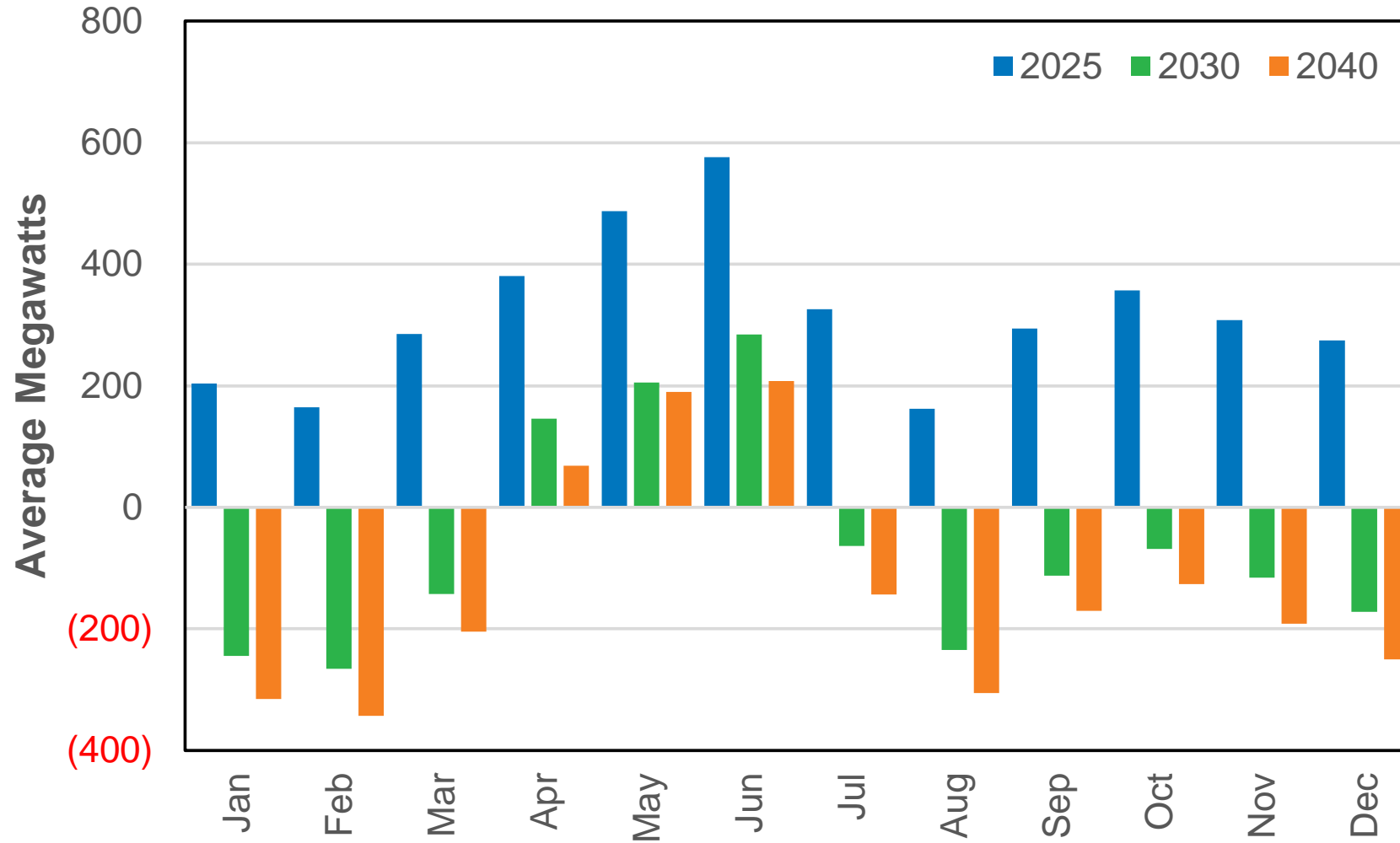
Energy Contingency Metrics

10th percentile hydro
90th percentile load

2023 IRP will update contingency metrics for wind/solar variability (TBD in future TAC meeting)

2023 IRP will energy planning constraint beyond annual

Monthly Planning Energy Position



2030 Washington CETA Planning

- Draft rules were released January 19th, 2022
- Creates a planning standard for renewable energy using two compliance mechanisms
 - Must plan for renewable generation equal to or greater than 80% of retail load to qualify as primary compliance by 2030
 - Remaining retail load must be offset using Alternative Compliance
 - Alternative compliance could be an unbundled REC, energy transformation project, compliance payment
- Planning standard time step and risk level is not defined in the draft rule

Avista Clean Energy Position for Planning Standard (strawman)

- Monthly retail load vs generation comparison
- Renewable generation exceeding monthly retail load qualifies as alternative compliance
 - On/off peak estimates could be used
- Expected Case Methodology
 - Median Hydro
 - Expected Loads
 - Historical average wind/solar if available
- Resource allocation
 - Existing hydro (PT Ratio)
 - Wind (PT Ratio + WA purchase hourly Idaho share of energy)
 - Solar (allocated to WA)
 - Kettle Falls (PT Ratio + WA purchase hourly Idaho share of energy, 95.4% qualifying)
 - New Chelan PUD contracts (PT Ratio + WA purchase hourly Idaho share of energy)

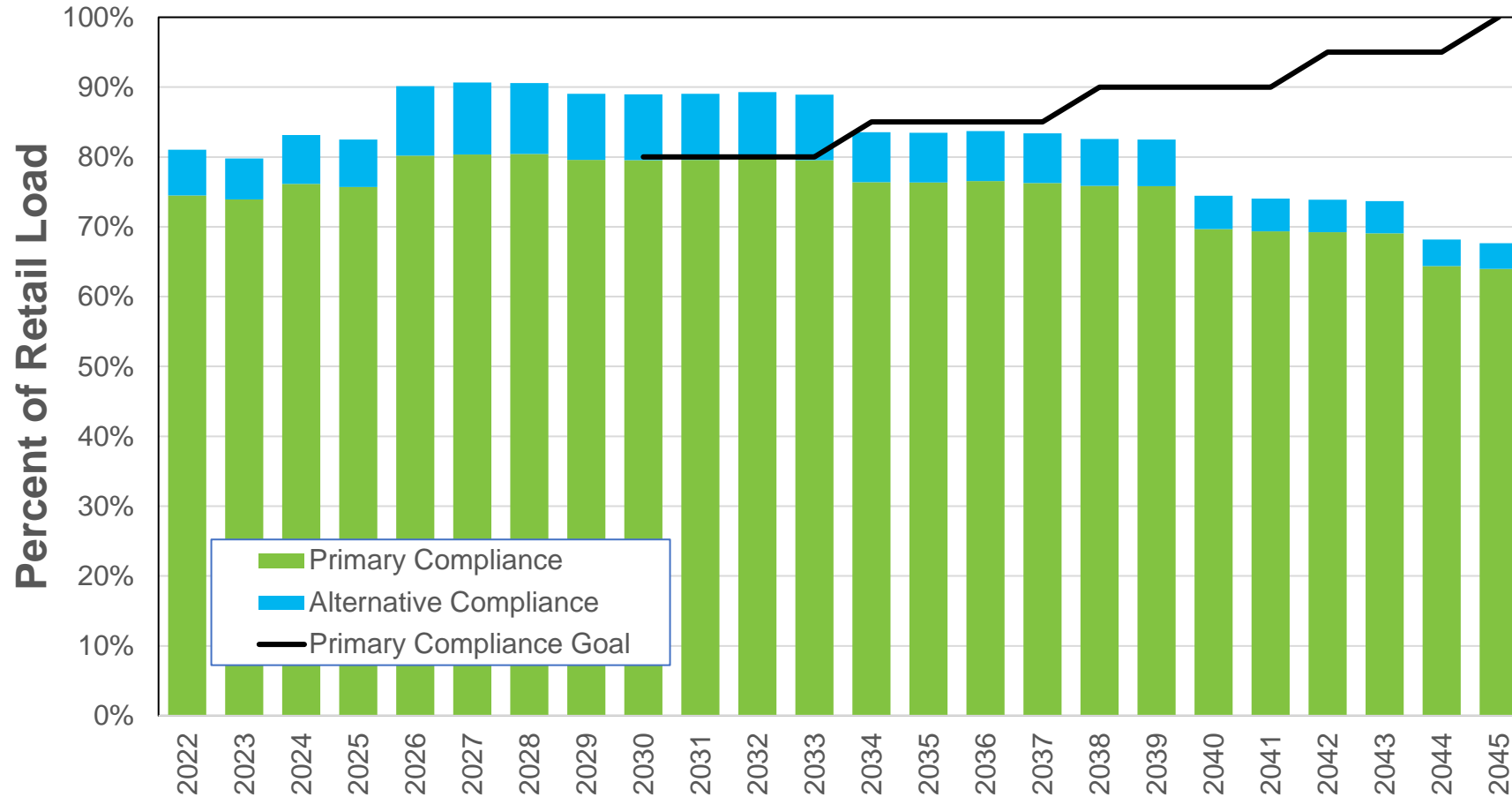
2030 Monthly Accounting Illustration (WA Only)

Illustration Purposes Only

Month	Sales Forecast	WA PURPA	Net Retail Load	Washington Share				Energy Exchange from Idaho	Total Renewable Generation	Primary Compliance	Alternative Compliance
				Hydro	Wind	Solar	Biomass				
Jan	801	21	780	362	62	2	27	84	537	537	-
Feb	822	24	798	333	66	4	26	80	508	508	-
Mar	688	27	661	348	70	5	23	78	524	524	-
Apr	647	28	620	519	66	7	15	81	688	620	68
May	582	25	558	706	55	8	0	78	847	558	289
Jun	600	19	580	730	58	8	10	82	888	580	307
Jul	600	17	583	498	45	9	23	74	650	583	67
Aug	668	15	653	279	46	8	26	70	429	429	-
Sep	664	16	648	252	49	6	28	63	399	399	-
Oct	583	19	564	259	60	4	27	69	419	419	-
Nov	636	19	617	308	68	2	27	79	484	484	-
Dec	752	21	730	377	63	1	29	80	549	549	-
Avg	669	21	649	414	59	5	22	77	577	516	61
										79.6%	9.4%

Note: "Energy Exchange from Idaho" includes wind, biomass, and "new" Chelan PUDs contracts

Current Annual CETA Energy Position



Compliance Window CETA Energy Position

