2021 Electric Integrated Resource Plan

Technical Advisory Committee Meeting No. 5 Agenda

Thursday, January 21, 2021
Virtual Meeting

Topic	Time	Staff
Introductions	9:00	Lyons
Review Draft 2021 IRP	9:15	Lyons
Draft Resource Plans and Scenarios	9:45	Gall
2021 IRP Action Items	10:45	Lyons
Lunch	11:30	
ARAM Model Overview	12:30	Gall
Break	1:30	
Clean Energy Implementation Plan and Clean Energy Action Plan Discussion	1:45	Gall/Lyons
Draft IRP Comments from TAC	2:15	
Adjourn	3:30	

→ Join Skype Meeting

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Join by phone

509-495-7222 (Spokane) English (United States)

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2021 Electric IRP
TAC Introductions and IRP Process Updates

John Lyons, Ph.D.
Fifth Technical Advisory Committee Meeting
January 21, 2021

Updated TAC Meeting Guidelines

- IRP team working remotely through the rest of this IRP, but still available by email and phone for questions and comments
- Some processes are taking longer remotely
- Virtual IRP meetings until able to hold large group meetings again
- Joint Avista IRP page for gas and electric: https://www.myavista.com/about-us/integrated-resource-planning
  - TAC presentations
  - Documentation for IRP work
  - Past IRPs

Virtual TAC Meeting Reminders

- Please mute mics unless speaking or asking a question
- Use the Skype chat box to write questions or comments or let us know you would like to say something
- Respect the pause
- Please try not to speak over the presenter or a speaker who is voicing a question or thought
- Remember to state your name before speaking for the note taker
- This is a public advisory meeting – presentations and comments will be recorded and documented

Integrated Resource Planning

- Required by Idaho and Washington* every other year
- Guides resource strategy over the next twenty + years
- Current and projected load & resource position
- Resource strategies under different future policies
  - Resource choices
  - Conservation measures and programs
  - Transmission and distribution integration for electric
  - Gas and electric market price forecasts
- Scenarios for uncertain future events and issues
- Key dates for modeling and IRP development are available in the Work Plans

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
  - Ask questions
  - Help with soliciting new members
- Open forum while balancing need to get through all of the topics
- Welcome requests for studies or different assumptions.
  - **August 1, 2020** was the electric study request deadline for the 2021 IRP, new requests will be taken up in the 2023 IRP
- Planning team is available by email or phone for questions or comments outside of TAC meetings

2021 Electric IRP TAC Schedule

- TAC 1: Thursday, June 18, 2020
- TAC 2: Thursday, August 6, 2020 (Joint with Natural Gas TAC)
- TAC 2.5: Tuesday, August 18, 2020 Economic and Load Forecast
- TAC 3: Tuesday, September 29, 2020
- TAC 4: Tuesday, November 17, 2020
- TAC 4.5: Wednesday, December 16, 2020 – PRS & Scenarios
- **TAC 5: Thursday, January 21, 2021**
- Public Outreach Meeting: February 2021 (Do we still need this?)
- WUTC Public IRP Open Meeting: February 23, 2021
- TAC agendas, presentations, meeting minutes and IRP files available at:

  https://myavista.com/about-us/integrated-resource-planning

IRP Documentation Available

- Draft 2021 IRP
- Avista Resource Emissions Summary
- Load Forecast
- CPA Measures
- Avista 2020 Electric CPA – Summary and IRP Inputs
- Home Electrification Conversions
- Named Populations
- Natural Gas Prices
- Social Cost of Carbon
- High and Low Natural Gas Prices
- Market Modeling Results
- Climate Shift Scenario Inputs
- 2021 IRP New Resource Options
- 1 – Preferred Resource Strategy
- 2 – Baseline 1 No CETA Renewable Targets
- 3 – Baseline 2 No CETA Renewable Targets/SCC
- 4 – Baseline Portfolio 3 No Additions
- 5 – Clean Resource Plan (2027)
- 6 – Clean Resource Plan (2045)
- 7 – Social Cost of Carbon Idaho
- 8 & 9 – High and Low Load Forecasts
- 10 – RA Program
- 11 – 13 – Electrification 1, 2 & 3
- 14 – 2x SCC
- 15 – Colstrip Serves Idaho through 2025
- 16 – Colstrip Serves Idaho through 2035
- 17 – Colstrip Serves Idaho through 2045
- 18 – Clean Energy Delivery by Hour
- 19 – SCC on Net Power Supply
- 20 – Use Average Market for EE & SCC
- PRiSM Draft Results (12/7/20)

Process Updates

- January 4, 2021 – draft IRP released to TAC
- February 23, 2021 – WUTC hearing about draft IRP
  - Discussion about need for another public outreach meeting
- March 1, 2021 – Comments from TAC on draft IRP due
- March 2021 – final IRP editing, printing and compilation of Appendices
  - Inclusion of 2020 Renewable RFP results?
- April 1, 2021 – publication and submission of the 2021 Electric IRP with the Idaho and Washington Commissions
  - IRP and appendices will also be available on the Avista web site
- Commissions will schedule hearings and accept comments about 2021 IRP

Today's TAC Agenda

9:00	Introductions, Lyons
9:15	Review Draft 2021 IRP, Lyons
9:45	Draft Resource Plans and Scenarios, Gall
10:45	2021 IRP Action Items, Lyons
11:30	Lunch
12:30	ARAM Model Overview, Gall
1:30	Break
1:45	Clean Energy Implementation Plan and Clean Energy Action Plan Discussion, Gall and Lyons
2:15	Draft IRP Comments from TAC
3:30	Adjourn

2021 Electric IRP Document Overview

John Lyons, Ph.D.
Fifth Technical Advisory Committee Meeting
January 21, 2021

2021 Electric IRP Chapters

1. Executive Summary
2. Introduction, IRP Requirements, and Stakeholder Involvement
3. Economic and Load Forecast
4. Existing Supply Resources
5. Energy Efficiency
6. Demand Response
7. Long-Term Position
8. Transmission & Distribution Planning
9. Supply-Side Resource Options
10. Market Analysis
11. Preferred Resource Strategy
12. Portfolio Scenarios
13. Energy Equity
14. Action Plan
15. Clean Energy Action Plan

2021 Electric IRP Chapters 1 – 3

- Chapter 1: Executive Summary
  - High level summary of 2021 IRP and PRS
- Chapter 2: Introduction, IRP Requirements, Stakeholder Involvement
  - TAC overview and rules guiding IRP development
  - Major changes from the 2017 and 2020 IRPs
- Chapter 3: Economic and Load Forecast
  - Economic conditions in Avista's service territory
  - Avista's energy and peak forecasts
  - Load forecast scenarios

2021 Electric IRP Chapters Ch. 4 – 6

- Chapter 4: Existing Supply Resources
  - Avista's resources
  - Contractual resources and obligations
  - Avista's natural gas pipeline rights overview
- Chapter 5: Energy Efficiency
  - Conservation Potential Assessment
  - Energy efficiency modeling and selection
- Chapter 6: Demand Response
  - Demand response potential study
  - Overview of past demand response pilot programs

2021 Electric IRP Chapters Ch. 7 – 8

- Chapter 7: Long-Term Position
  - Reliability adequacy and reserve margins
  - Resource requirements
  - Reserves and flexibility requirements

- Chapter 8: Transmission and Distribution Planning
  - Overview of Avista's Transmission System
  - Future Upgrades and Interconnections
  - Transmission Construction Costs and Integration
  - Merchant Transmission Plan
  - Overview of Avista's Distribution System
  - Future Upgrades and Interconnections (includes project evaluated with DER alternative)

2021 Electric IRP Chapters Ch. 9 – 10

- Chapter 9: Generation and Storage Resource Options
  - New resource option costs and operating characteristics
  - Potential Avista plant upgrades

- Chapter 10: Market Analysis
  - Fuel price forecasts
  - Regional resource additions
  - Regional greenhouse gas emissions forecast
  - Market price forecast
  - Scenario analysis

2021 Electric IRP Chapters Ch. 11 – 13

- Chapter 11: Preferred Resource Strategy
  - Resource Selection Process
  - Preferred Resource Strategy
  - Avoided cost

- Chapter 12: Portfolio Scenarios
  - Portfolio Scenarios
  - Portfolio cost, risk and environmental comparisons

- Chapter 13: Energy Equity
  - Vulnerable populations
  - Highly impacted communities
  - Equity Advisory Group

2021 Electric IRP Chapters Ch. 14 – 15

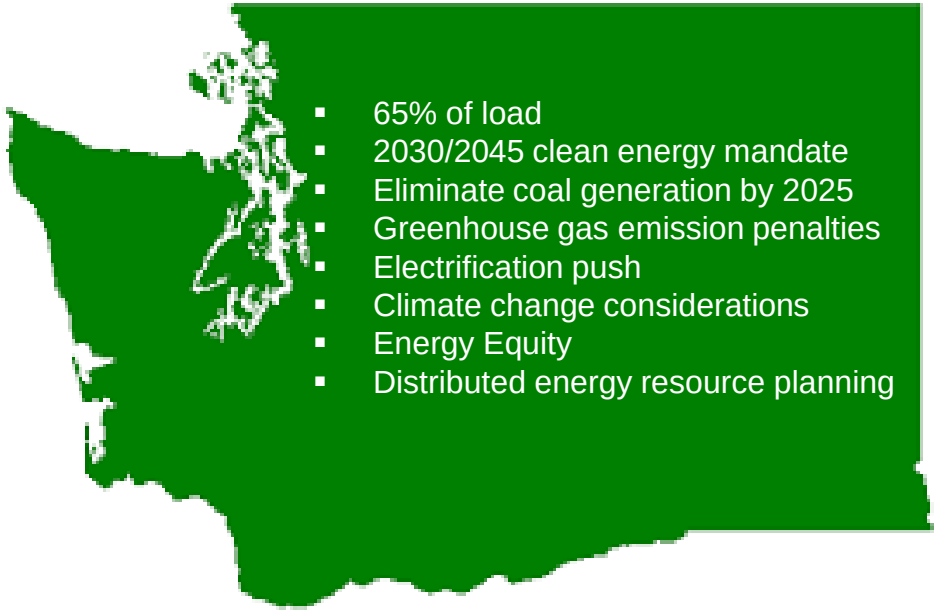
- Chapter 14: Action Plan
  - Progress made on Action Items from the 2017 and 2020 IRPs
  - IRP projects identified for the 2023 IRP

- Chapter 15: Clean Energy Action Plan
  - Action items for CETA compliance between this and the 2023 IRPs

2021 Electric Integrated Resource Plan Overview

James Gall, Electric IRP Manager
Fifth Technical Advisory Meeting, 2021 IRP
January 21, 2021

Planning Environment



- 65% of load
- 2030/2045 clean energy mandate
- Eliminate coal generation by 2025
- Greenhouse gas emission penalties
- Electrification push
- Climate change considerations
- Energy Equity
- Distributed energy resource planning

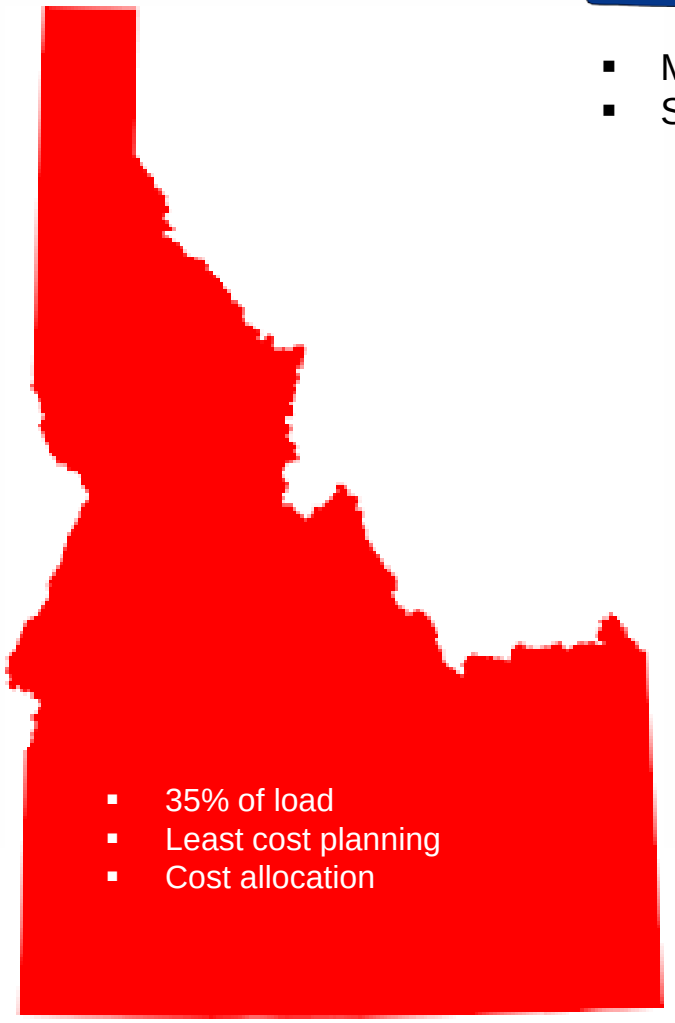
Environment

Risk

Cost

Reliability

Rates

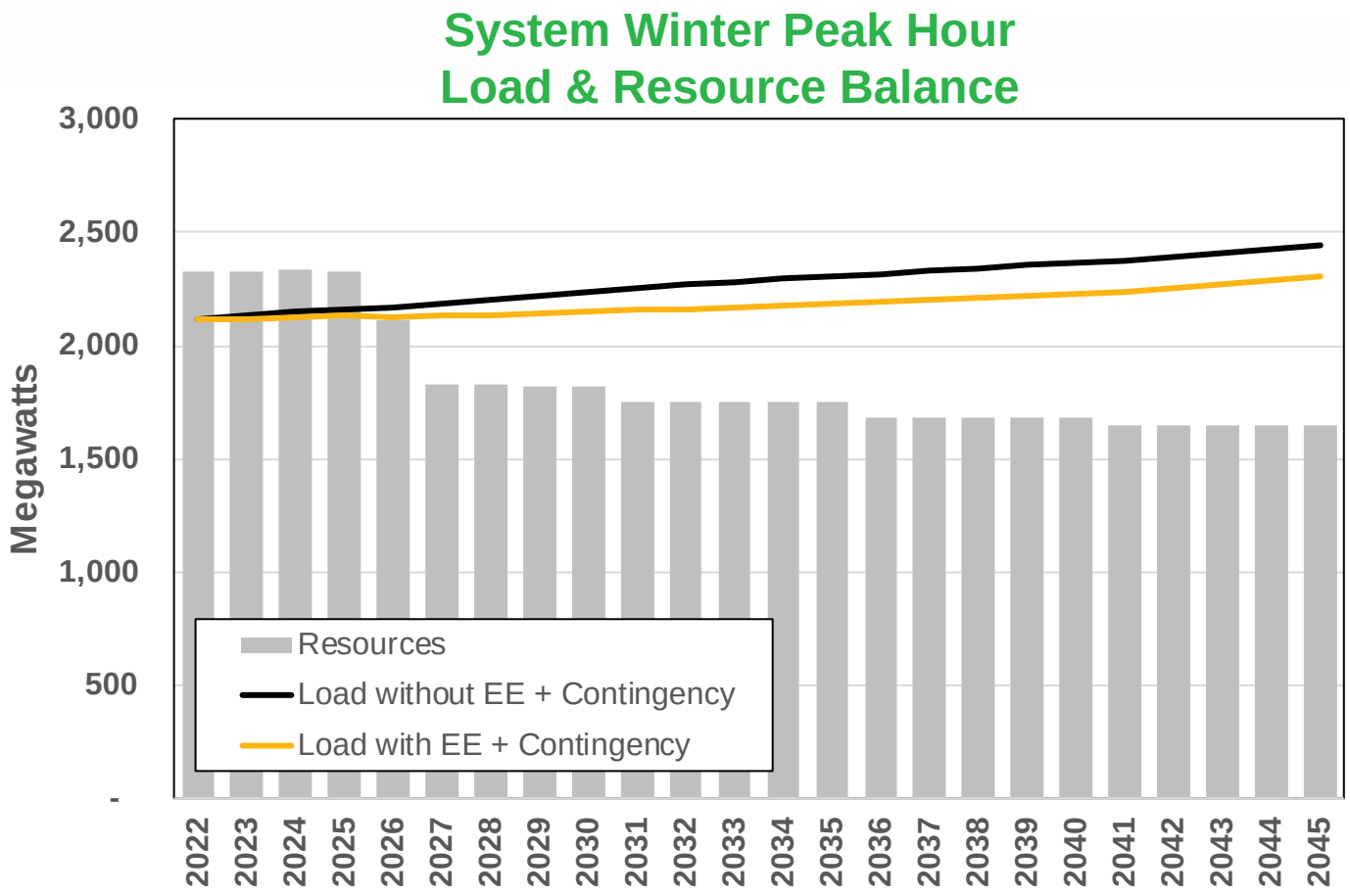


- 35% of load
- Least cost planning
- Cost allocation

- Market effects
- State policy on Avista's resources

Avista Reliability Needs

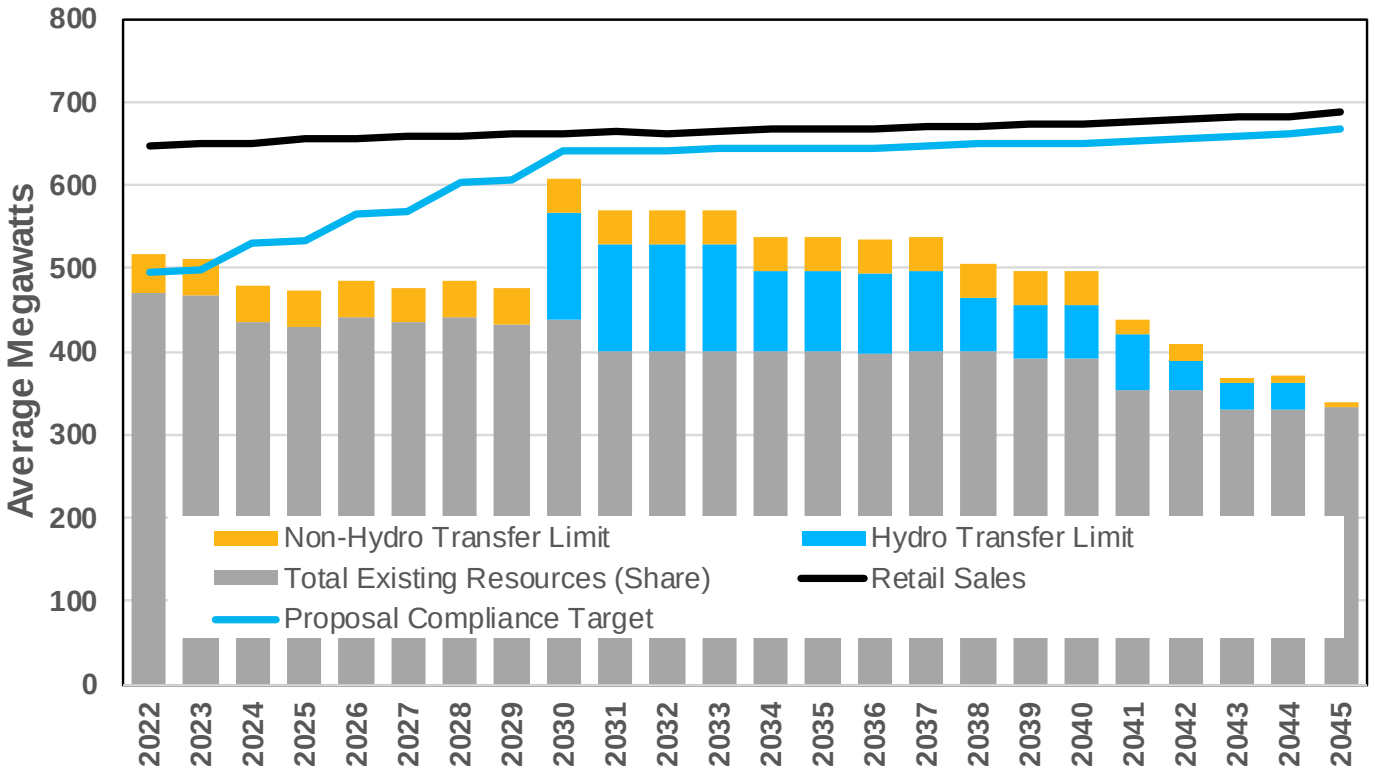
- Meet average coldest day's peak hour load, required reserves, and a 16% planning margin.
  - Maintain 5 percent Loss of Load Probability.
  - Regional effort to "pool" resources by creating resource adequacy market may lower resource need.
- ~300 MW needed Nov-2026 (expiration of Lancaster PPA)
  - Additional 200 MW by 2036
- Aging Infrastructure & state policy pressuring existing resources to close:
  - Colstrip: 2025 (WA)
  - Northeast CT: 2035
  - Boulder Park: 2040
  - Coyote Springs 2 CCCT/Rathdrum CTs ???
- Load growth & changes
  - 0.3% annual average growth.
  - Large potential increases with electrification.
  - Climate change might lower winter and increase summer peak growth. (required study in next IRP)



Washington Clean Energy Requirements

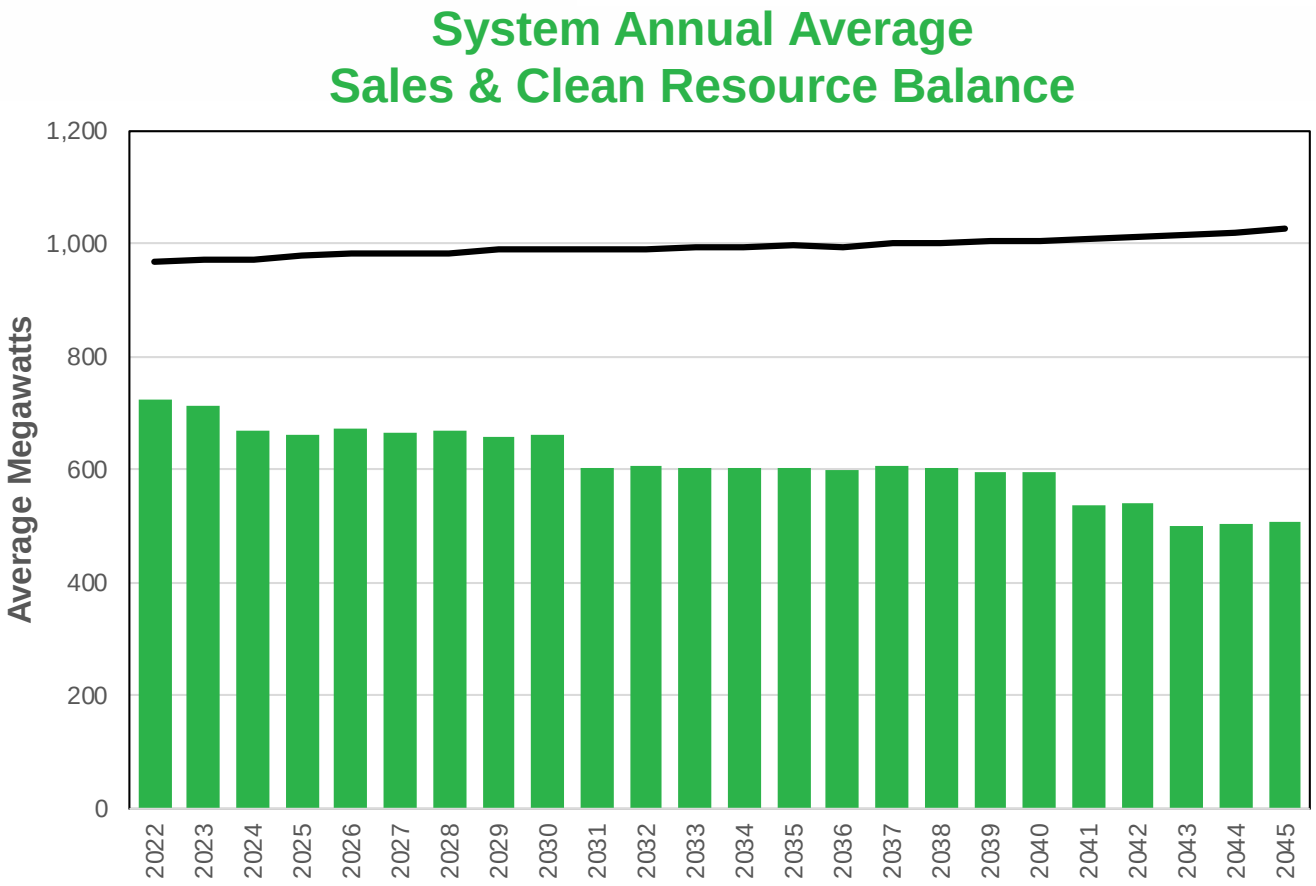
- Avista must create glidepath to 2030 clean energy requirements.
- By 2030, 100% of "net" Washington retail sales must "use" clean energy.
  - 20% can be met with unbundled RECs.
  - might require real-time clean energy delivery.
- Resource Allocation
  - Washington customers "buy" Idaho clean energy share.
    - Assumes Idaho's wind/biomass may be sold to WA without limitation.
    - Assumes Idaho's hydro purchases limited to 20% of sales beginning in 2030, then declining.
- By 2045, 100% of Washington sales must be served with clean energy.
  - May require real-time clean energy delivery.

Washington Retail Sales & Clean Resource Balance



Avista's Clean Energy Targets

- In 2022, Avista generates clean energy equal to 75% of retail sales.
- To meet 100% clean energy by 2027, Avista must acquire ~320 aMW.
  - 800-1,000 MW of wind or 1,800 MW solar (DC).
- Increases to over 510 aMW by 2045.
  - Driven by load growth and expiring contracts
- Avista goal is 100% real-time clean energy delivery by 2045.
  - Requires substantial investments in energy storage to meet winter loads.
  - Electrification of space & water heating compound these issues.



Resource Options

- Multiple factors drive resource selection
  - Cost or price
  - Clean vs. fossil fuel
  - Capacity value or “peak credit”
  - Storage vs. energy production
  - Location
  - Availability (new vs. existing)
- Resource retirements
  - Future capital investment
  - Operating & maintenance cost/availability
  - Fuel availability
  - Carbon pricing risk

Clean Resources

Wind
Solar
Biomass
Hydro
Geothermal
Nuclear

Fossil Fuel Resources

Natural gas peaker
Natural gas baseload
Coal (retention)
Customer generation

Demand Resources

Energy efficiency
Conservation
Load control
Rate programs
Fuel switching
Co-generation

Storage

Pumped hydro
Lithium-ion batteries
Liquid air energy storage
Flow batteries
Hydrogen

Resources in italics were not directly modeled for this IRP

IRP's Preferred Resource Strategy - Supply Resources

- IRP focuses on state goals and system reliability to find lowest reasonable cost to serve customer load.
- Develop resource needs assessment for each state.
  - State policies drive resource choices.
  - Cost allocation based on state policies.
  - Rate forecasts.
- Does not include resources in current RFP.
- Limits existing resources acquisition to 75 MW of additional regional hydro after 2031.
- Resources are selected either as system resource (65%/35%) or state resource.
- Resources economically or contractually expected to leave the Avista resource mix are in green, natural gas-fired are in orange, energy storage are in blue and clean resources are in black.

Supply-Side Resource Changes

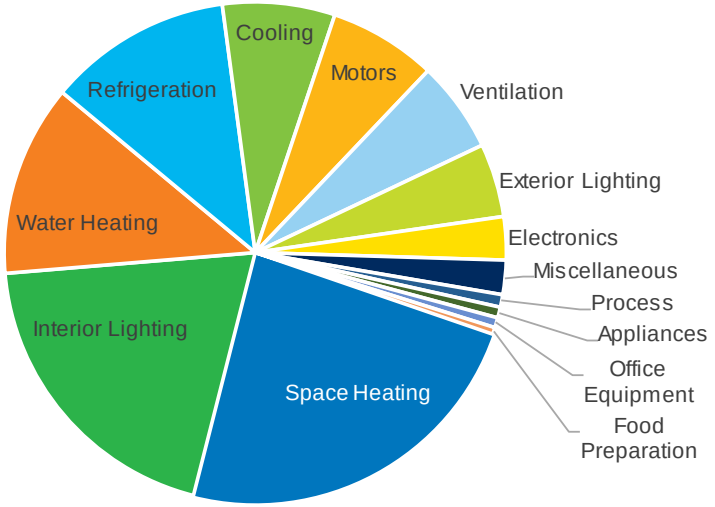
Resource Type	Year	State	Capability (MW)
Colstrip	2021	System	(222)
Montana wind	2023	WA	100
Montana wind	2024	WA	100
Lancaster	2026	System	(257)
Kettle Falls upgrade	2026	System	12
Natural gas peaker	2027	ID	85
Natural gas peaker	2027	System	126
Montana wind	2028	WA	100
NW Hydro Slice	2031	WA	75
Rathdrum CT upgrade	2035	System	5
Northeast	2035	System	(54)
Natural gas peaker	2036	System	87
Solar w/ storage	2038	System	100
4-hr storage for solar	2038	System	50
Boulder Park	2040	System	(25)
Natural gas peaker	2041	ID	36
Montana wind	2041	WA	100
Solar w/ storage	2042-2043	WA	239
4-hr storage for solar	2042-2043	WA	119
Liquid air energy storage	2044	WA	12
Liquid air energy storage	2045	ID	10
Solar w/ storage	2045	WA	149
4-hr storage for solar	2045	WA	75
Supply-side resource net total (MW)			1,024
Supply-side resource total additions (MW)			1,581

IRP's Preferred Resource Strategy - Demand Resources

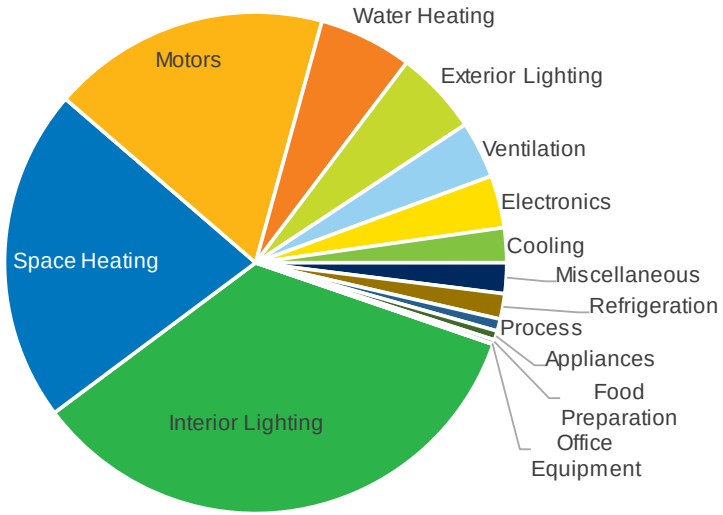
- 63% of EE programs are C&I.
- 77% of EE savings are from Washington.
- Washington avoided cost are $106/MWh plus $151/kW-year for capacity.
  - Driven by social cost of carbon and clean energy avoided costs.
- Idaho avoided cost are $30/MWh plus $137/kW-year for capacity.
- EE reduces winter peak by a 101% ratio to energy savings and 97% ratio for summer.
- Washington 2022-23 target is 89,000 MWh; 50% higher then previous biennium and higher than the IRP's two year cost effective acquisition amount.
- 10-year target is 651 GWh or 74 aMW.
- Time of use and variable peak pricing requires significant rate design effort leveraging metering infrastructure.
- Demand response has limited reliability benefits due to duration and call limitations.

Energy Efficiency End Use Targets

Washington



Idaho



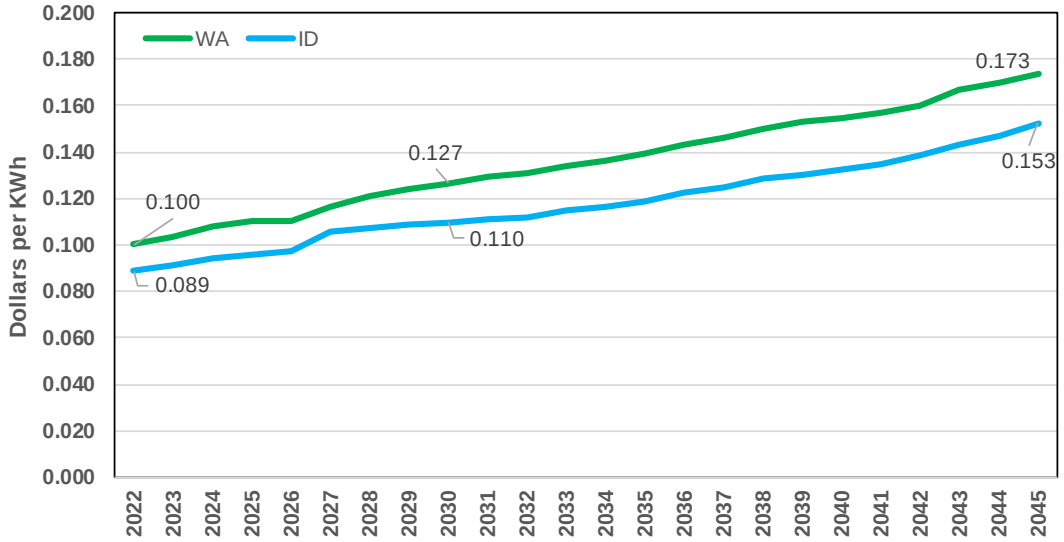
Demand Response

Program	Washington	Idaho
Time of Use Rates	2 MW (2024)	2 MW (2024)
Variable Peak Pricing	7 MW (2024)	6 MW (2024)
Large C&I Program	25 MW (2027)	n/a
DLC Smart Thermostats	7 MW (2031)	n/a
Third Party Contracts	14 MW (2032)	8 MW (2024)
Behavioral	1 MW (2041)	n/a
Total	**56 MW**	**15 MW**

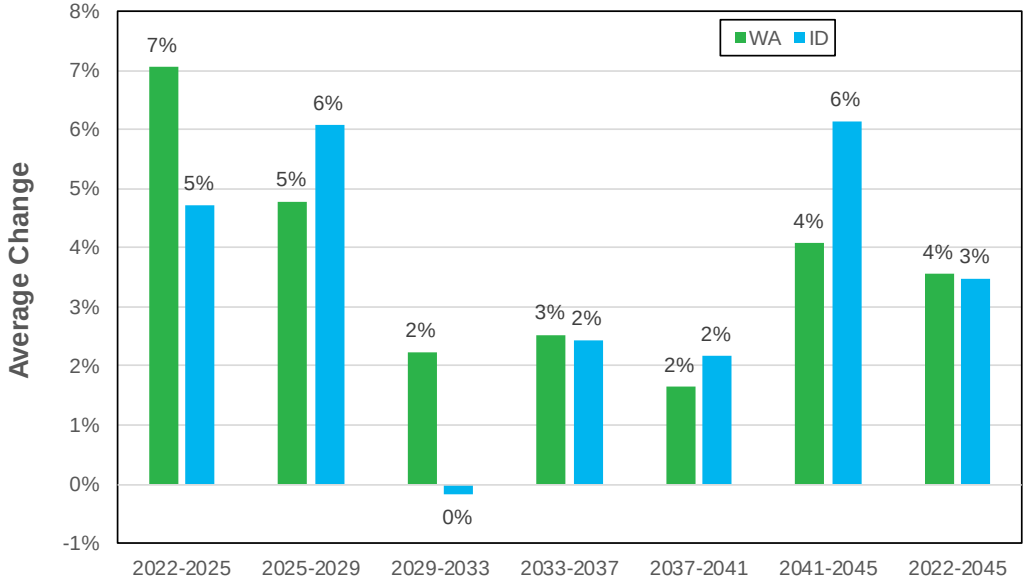
Preferred Resource Strategy Costs and Rates

- Existing and new costs are allocated between the states Avista serves.
- Washington rates are ~1 cent (12%) higher per kWh today.
  - Spread increases to 1.7 cents (15%) by 2030 and 2.0 cents by 2035.*
- Power costs rise well above inflation over first 8 years due to clean energy and capacity additions.

Overall Energy Rates



Power Cost Rate Change



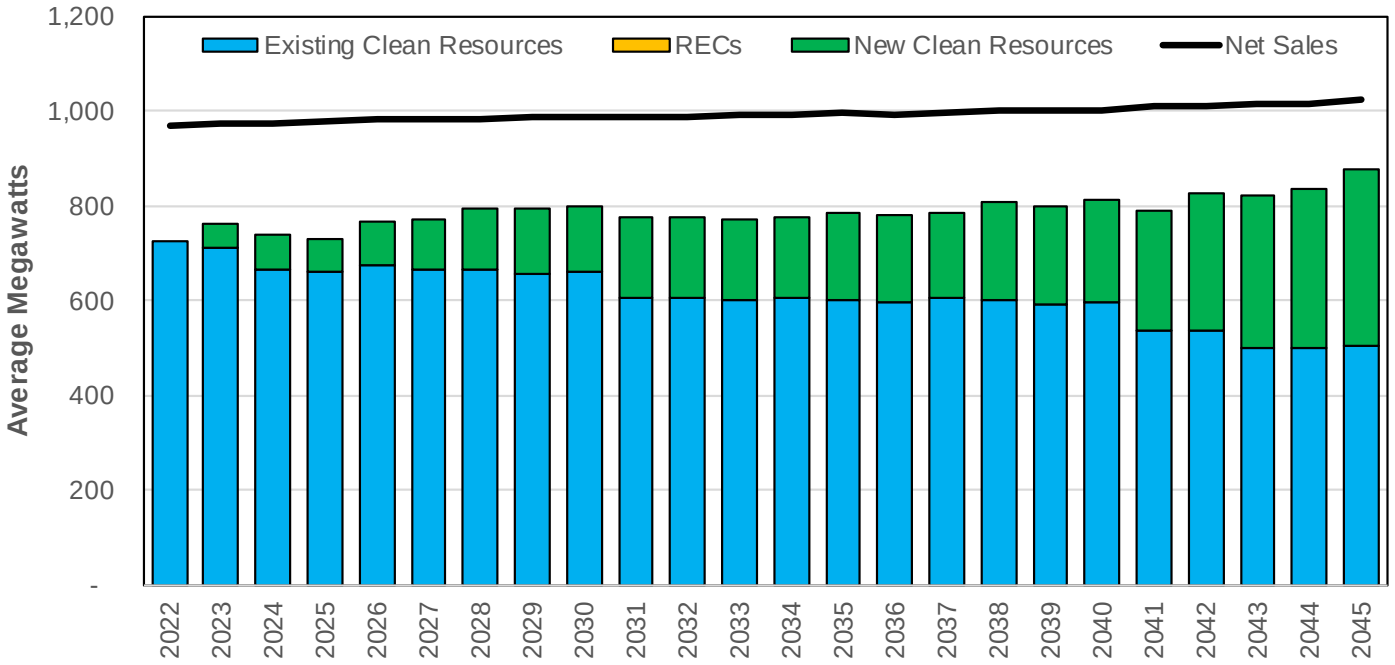
* Non-power related cost such as non-generation transmission, distribution, and administration, are not directly modeled in the IRP and assume a 2% annual growth rate.

Clean Energy Shares (aMW)

DRAFT

- By 2030, Washington customers will have clean energy equal to 100 percent of its retail sales.
- Idaho's clean energy share will lower both Idaho and Washington rates.
  - 46% clean by 2030 and 60% clean by 2045.
- Clean energy as percent of system sales increase to 78% by 2027 and 86% by 2045.
- Short-term clean energy purchase may increase these estimates.
- Avista could purchase RECs to meet 2027 goals.
- Idaho customers have opportunity to sell excess hydro RECs to reduce rates.

Clean Energy Forecast



Greenhouse Gas Emissions Forecast

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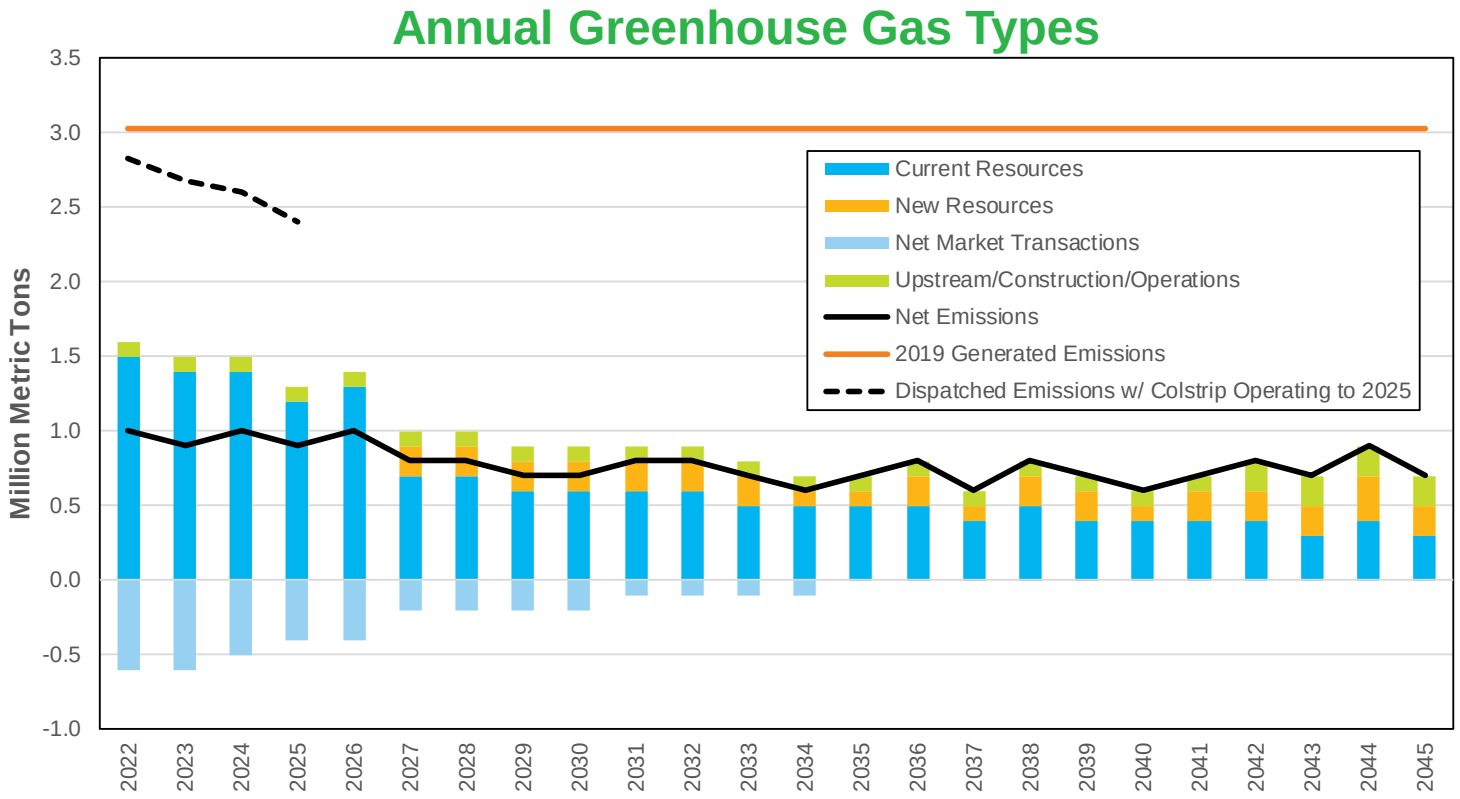
- 2020 emissions were ~2.7 million metric tons.
- Colstrip responsible for >1 million tons.
  - Colstrip emissions would fall regardless as the plant dispatch decreases over time.
- By 2030, emissions fall by 76 percent.
- Emissions from natural gas upstream operations and construction are included in this IRP.
  - Washington load portion includes these emissions priced at the social cost of carbon.
  - WUTC recently ruled these emissions accounting is encouraged but not required.
- Net emissions include market purchases and sales at the regional emission intensity rate.



IRP Insights given uncertainty

- WUTC's rulemaking regarding "use" of energy may require significant market transformation and require additional clean and storage resources.
- Electrification of Washington's space and water heat will significantly increase winter peak (up to ~700 MW) and annual energy (155 aMW) needs.
  - New winter load will require significant investment in winter capacity- such as natural gas turbines or long-duration storage.
  - Energy rates from power acquisition rise 8% excluding non-power costs such as T&D and home owner costs.
- Water heater load control may offer opportunities if program costs decline (55+ MW).
  - AC control is low cost option if summer peaks significantly increase.
  - Electric vehicle control is cost prohibitive now, but costs are falling.
- Hydrogen-fired turbines show potential to be lowest overall cost resource to serve winter loads in a 2045 100% clean energy future.
  - Liquid air energy storage (LAES) and pumped hydro are better nearer term options with intermediate energy duration options.
  - Lithium-ion is low cost when coupled with solar or need for short durations.
- A regional resource adequacy program is needed to address regional reliability risk and lower Avista's new resource needs and costs (<1%).
  - Resource mix could favor solar and hydro.
- Retaining Colstrip through 2025 increases cost by 1%.
  - Tradeoff is higher power cost risk with an early exit.
- Meeting the clean energy goals increases total cost by 5%.
  - Idaho rates are 10% higher in 2027/ 28% higher in 2045.
  - Washington rates are 4% higher in 2027/ 20% higher in 2045.
- Energy equity public engagement in Washington may lead to new programs, resources, or investments.
  - Equity budget requirements and limitations are unknown.
- Climate change (warmer temperatures) reduces power costs and resource needs
  - Hydro runoff better matches winter peaks and spill is less.
- Policy requirements with high carbon "taxes" support higher clean energy levels and conservation investments.

Highlights

From the Preferred Resource Strategy

- Avista needs new clean resources to comply with CETA.
- New capacity resources are required to maintain reliability.
- Avista will need to pursue demand response, rate design, and increase energy efficiency.
- Exiting Colstrip is economic, but higher risk.
- Long-duration storage is critical to meeting 100% clean energy objectives.

From Scenario Analysis

- Climate change lowers power costs.
- State/national policies will increase both rates and costs.
- Electrification will significantly increase power supply requirements. T&D and homeowner costs are not estimated at this time.
- Real-time clean energy delivery will be challenging for industry and current market structure.
- Meeting Avista's clean energy goals will be a challenging without new technology or increasing rates.

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Extra Slides

Tables & figures from Draft IRP of potential interest

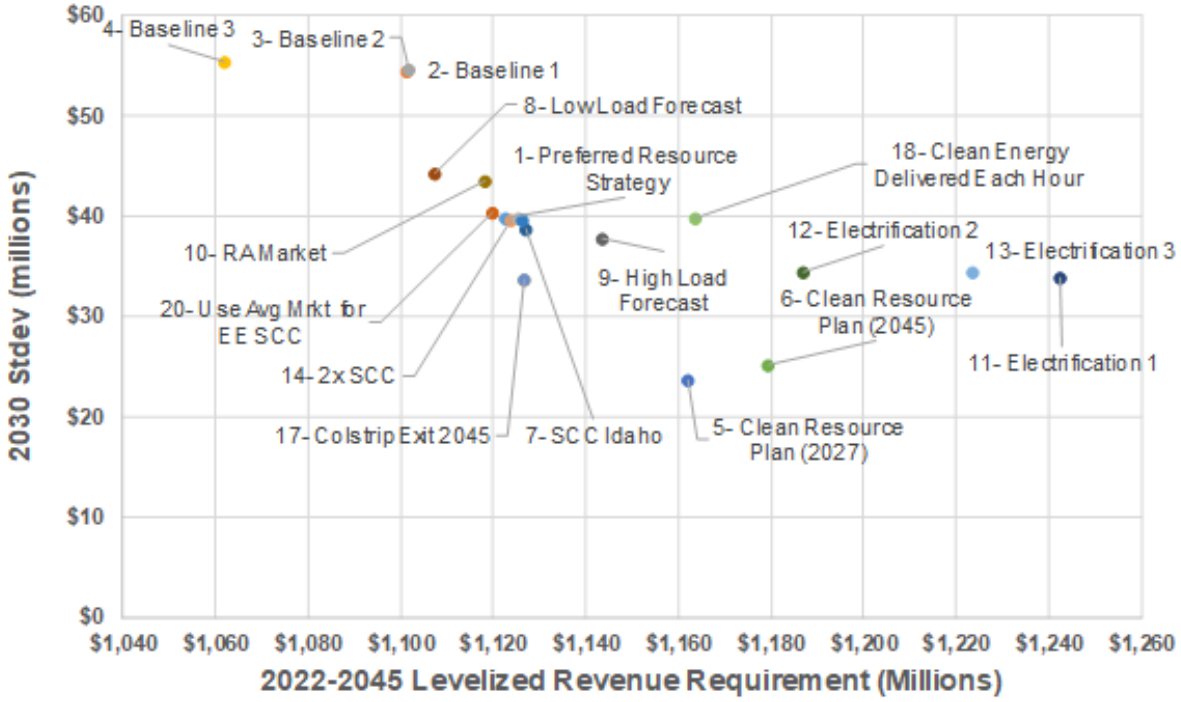
Scenario Analysis

Sorted by System PVRR (highest to lowest)

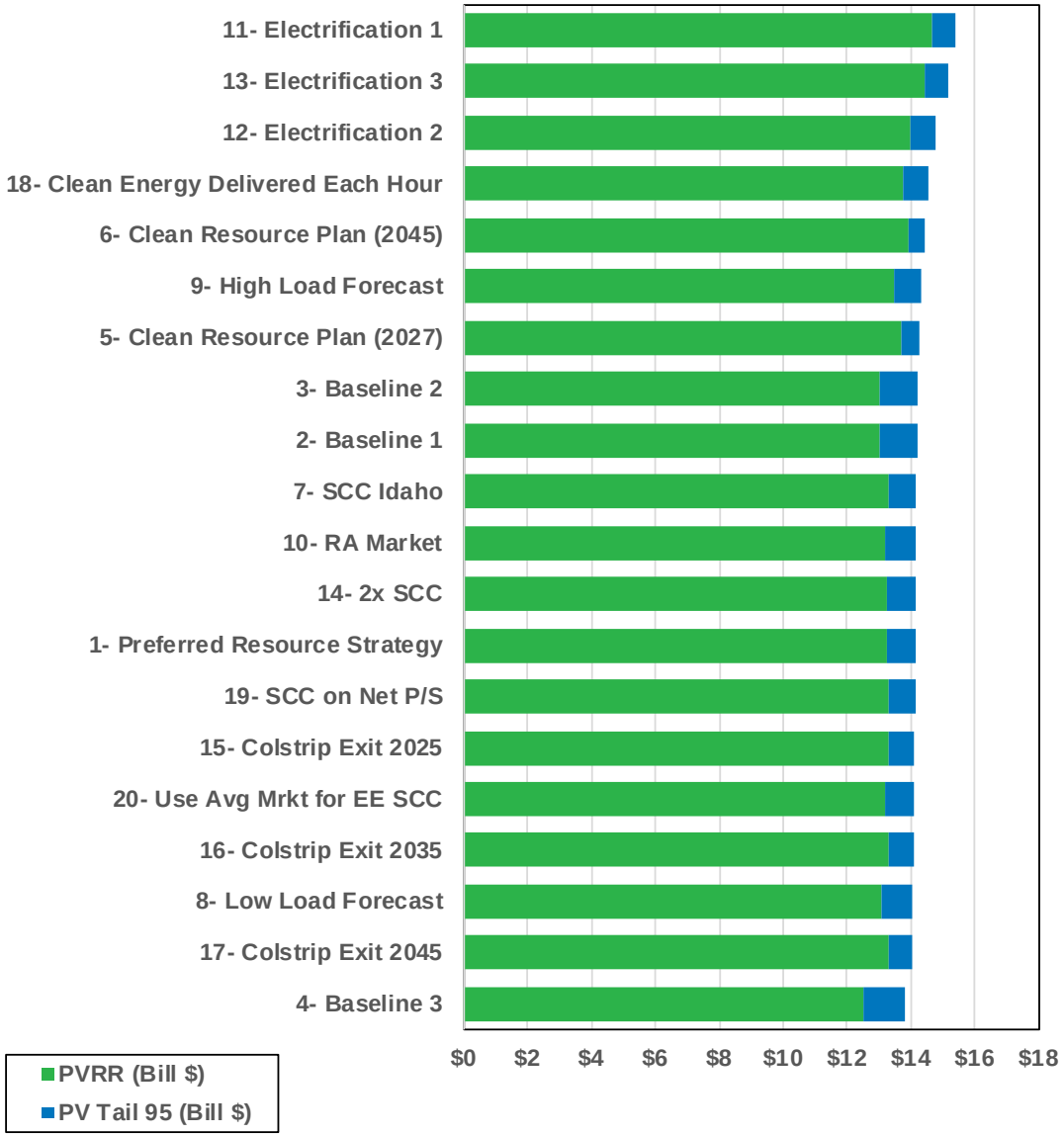
Scenario	System-PVRR ($ Bill)	WA-PVRR ($ Bill)	ID-PVRR ($ Bill)	WA 2030 Rate ($/kWh)	WA 2045 Rate ($/kWh)	ID 2030 Rate ($/kWh)	ID 2045 Rate ($/kWh)	2030 Stdev ($ Mill)	2045 Stdev ($ Mill)	2045 Tail Risk ($ Mill)	2045 GHG Emissions (MT)
11- Electrification 1	14.7	10.1	4.5	0.131	0.188	0.109	0.158	34	88	132	0.57
13- Electrification 3	14.4	9.9	4.5	0.128	0.181	0.109	0.158	34	85	129	0.57
12- Electrification 2	14.0	9.5	4.5	0.127	0.176	0.109	0.155	34	71	115	0.56
6- Clean Resource Plan (2045)	13.9	9.0	5.0	0.130	0.209	0.122	0.196	25	35	48	0.00
18- Clean Energy Delivered Each Hr	13.7	9.2	4.6	0.127	0.207	0.110	0.155	40	115	162	0.50
5- Clean Resource Plan (2027)	13.7	8.8	4.9	0.129	0.176	0.121	0.166	24	56	100	0.50
9- High Load Forecast	13.5	8.9	4.6	0.123	0.164	0.104	0.142	38	70	122	0.56
7- SCC Idaho	13.3	8.7	4.6	0.126	0.175	0.112	0.161	39	82	143	0.50
17- Colstrip Exit 2045	13.3	8.7	4.6	0.127	0.173	0.108	0.154	34	72	127	0.89
16- Colstrip Exit 2035	13.3	8.7	4.6	0.127	0.174	0.108	0.153	34	85	148	0.53
19- SCC on Net P/S	13.3	8.7	4.6	0.126	0.174	0.110	0.153	40	84	148	0.54
15- Colstrip Exit 2025	13.3	8.7	4.6	0.127	0.173	0.110	0.153	40	87	150	0.54
14- 2x SCC	13.3	8.7	4.5	0.127	0.174	0.110	0.152	40	85	147	0.53
1- Preferred Resource Strategy	13.2	8.7	4.5	0.127	0.173	0.110	0.153	40	87	150	0.54
20- Use Avg Mrkt for EE SCC	13.2	8.7	4.5	0.126	0.172	0.108	0.153	40	88	154	0.54
10- RA Market	13.2	8.7	4.5	0.126	0.174	0.109	0.152	43	94	171	0.50
8- Low Load Forecast	13.1	8.6	4.5	0.130	0.186	0.113	0.163	44	101	178	0.48
3- Baseline 2	13.0	8.4	4.6	0.121	0.168	0.110	0.151	55	148	253	0.56
2- Baseline 1	13.0	8.4	4.6	0.121	0.168	0.110	0.152	54	148	254	0.56
4- Baseline 3	12.5	8.1	4.4	0.117	0.158	0.106	0.141	55	162	276	0.33

Quantitative Risk

2030 Standard Deviation vs Levelized Revenue Requirement



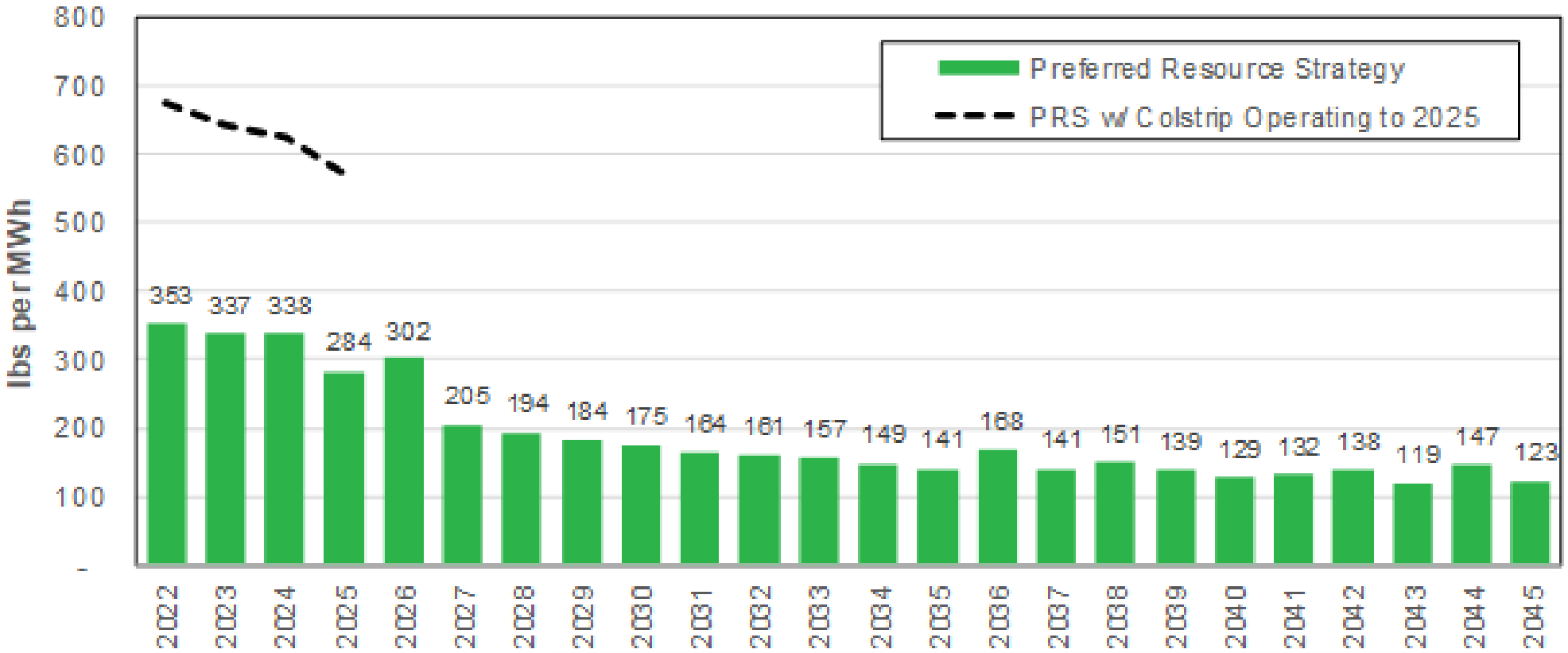
PVRR + PV TailVar95 Risk



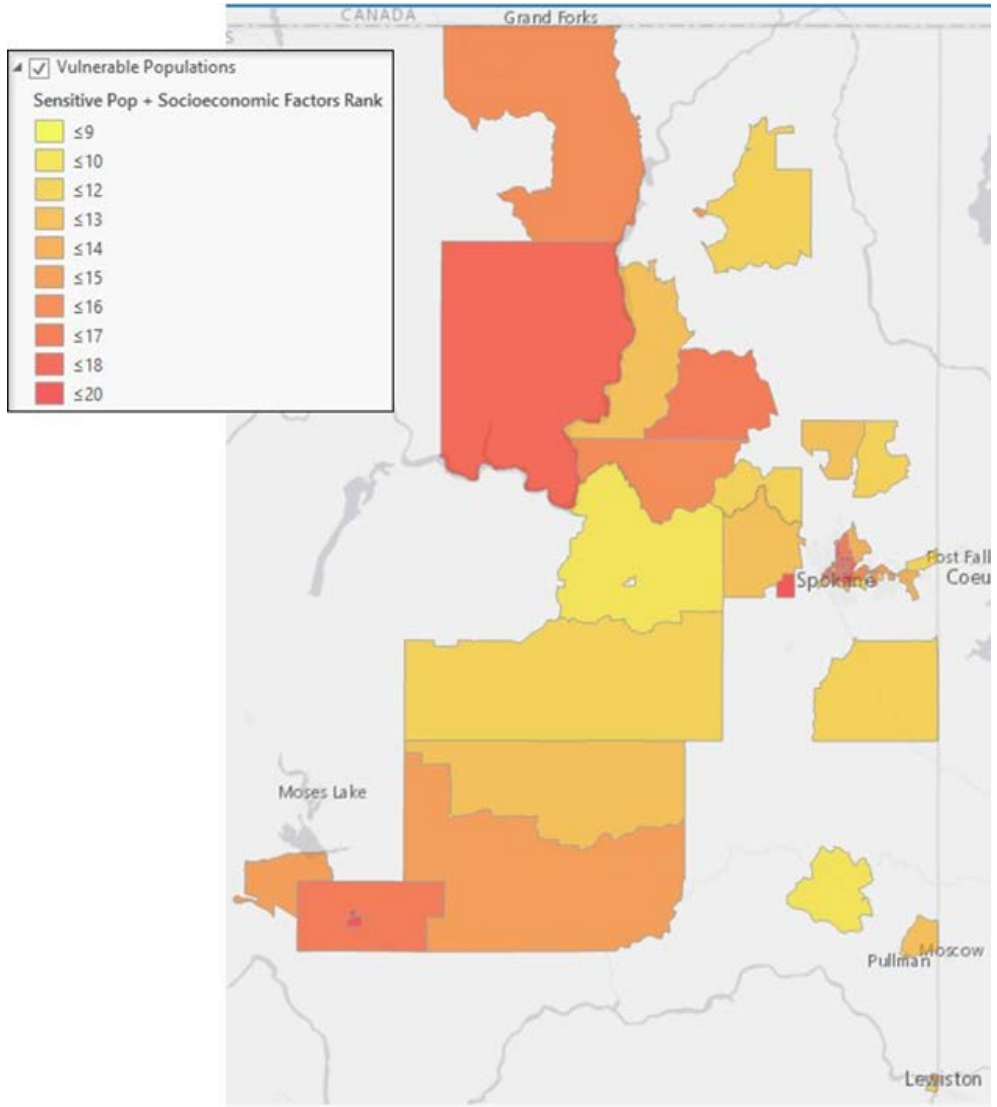
Avoided Costs

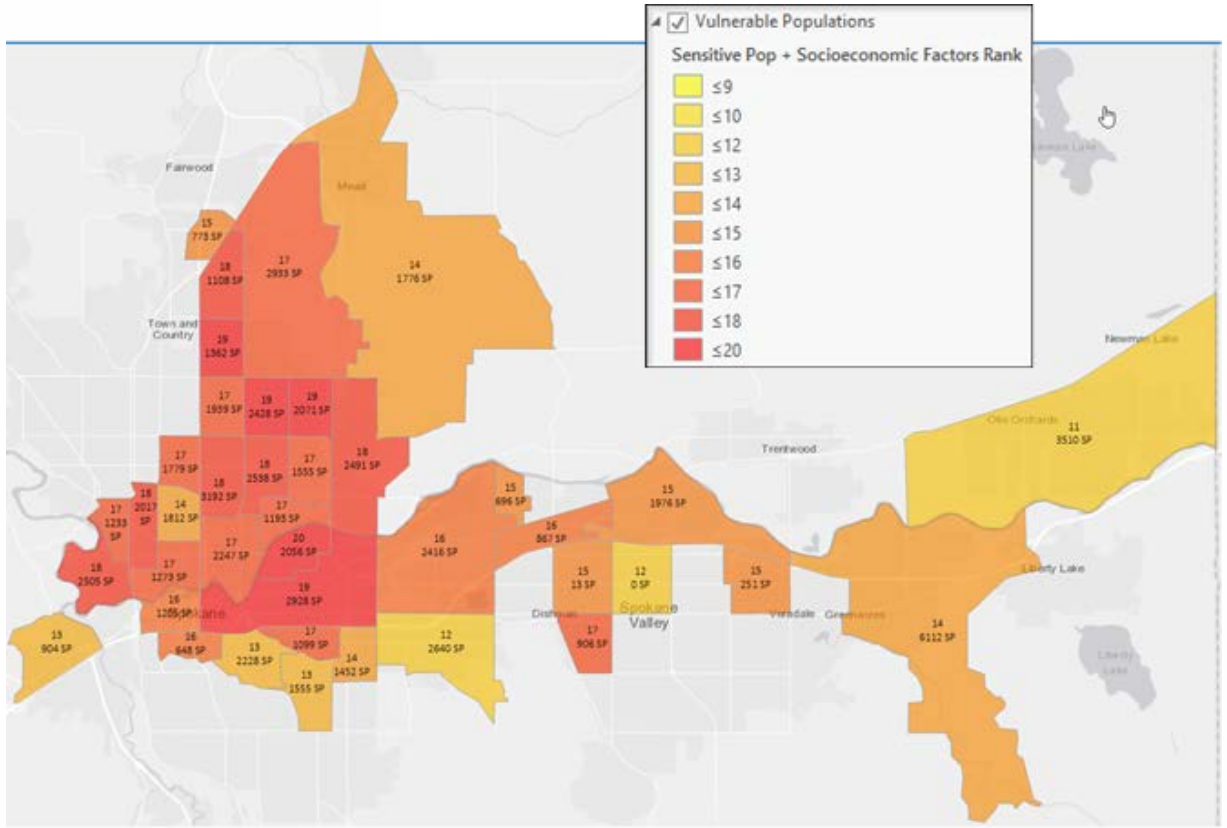
Year	Energy Flat (MWh)	Energy On-Peak (MWh)	Energy Off-Peak (MWh)	Clean Premium (MWh)	Capacity ($/kW-Yr)
2022	$20.37	$21.66	$18.65	$0.00	$0.00
2023	$18.71	$19.34	$17.89	$13.27	$0.00
2024	$18.73	$19.04	$18.32	$13.54	$0.00
2025	$19.99	$20.05	$19.92	$13.81	$0.00
2026	$23.74	$23.68	$23.82	$14.09	$0.00
2027	$24.63	$24.27	$25.12	$14.37	$115.10
2028	$25.67	$24.99	$26.58	$14.65	$117.40
2029	$26.65	$25.77	$27.83	$14.95	$119.80
2030	$26.46	$25.48	$27.78	$15.25	$122.20
2031	$27.63	$26.48	$29.15	$15.55	$124.60
2032	$28.02	$26.86	$29.57	$15.86	$127.10
2033	$29.30	$27.96	$31.08	$16.18	$129.70
2034	$29.42	$27.98	$31.33	$16.50	$132.20
2035	$30.47	$28.81	$32.68	$16.83	$134.90
2036	$32.10	$30.38	$34.41	$17.17	$137.60
2037	$31.95	$30.08	$34.45	$17.51	$140.30
2038	$34.46	$32.26	$37.39	$17.86	$143.10
2039	$34.77	$32.31	$38.04	$18.22	$146.00
2040	$35.67	$33.15	$39.01	$18.58	$148.90
2041	$38.23	$35.77	$41.52	$18.96	$151.90
2042	$38.71	$36.40	$41.79	$19.34	$154.90
2043	$39.27	$36.92	$42.40	$19.72	$158.00
2044	$46.82	$44.18	$50.34	$20.12	$161.20
2045	$46.45	$44.31	$49.28	$20.52	$164.40
20 yr Levelized	**$25.85**	**$25.20**	**$26.72**	**$14.04**	**$80.3**
24 yr Levelized	**$27.18**	**$26.39**	**$28.22**	**$14.50**	**$86.6**

PRS Greenhouse Gas Intensity



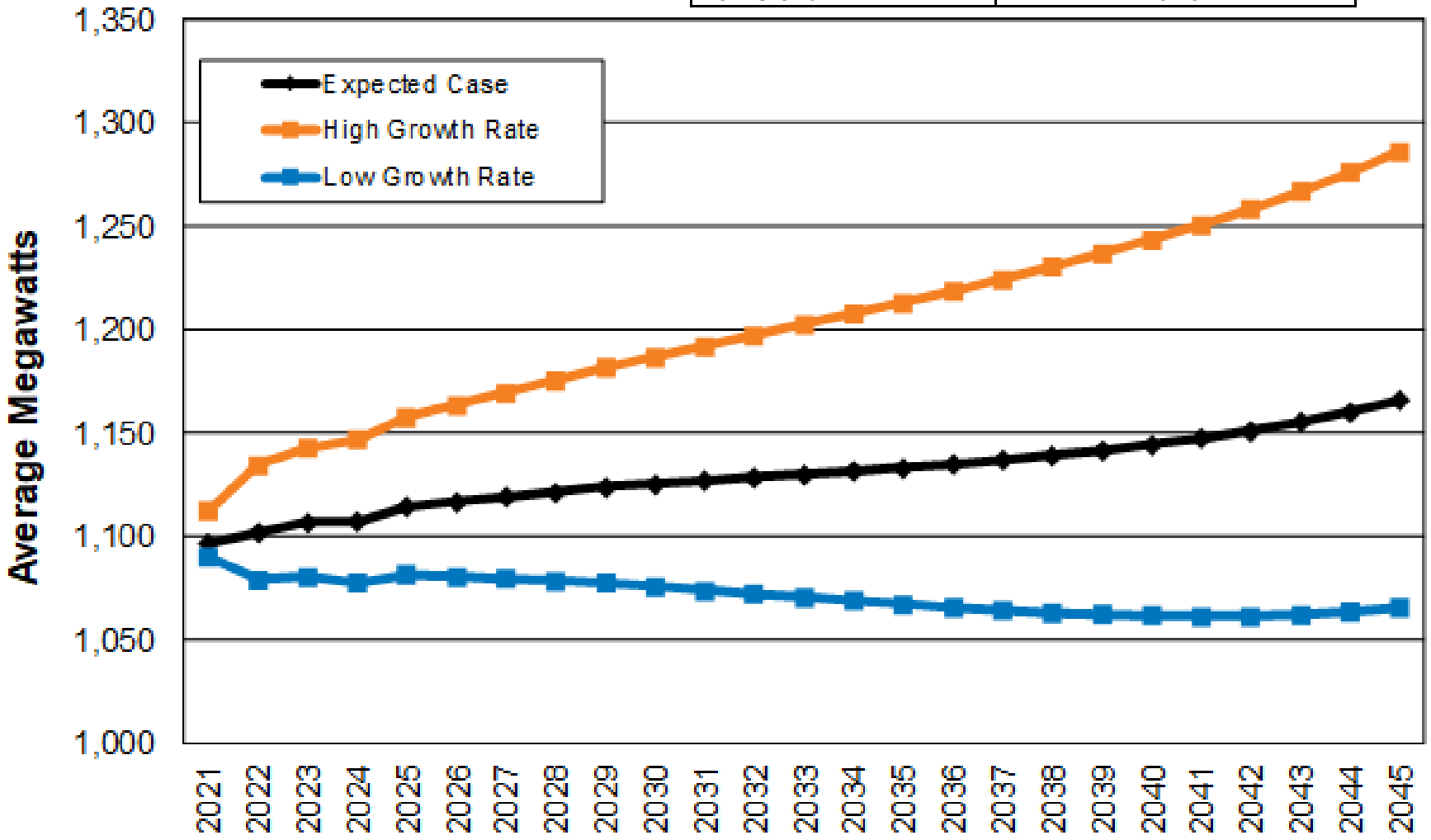
Initial Vulnerable Population Areas





Energy Forecast

Economic Growth	Average Annual Native Load Growth (percent)
Expected Case	0.30
High Growth	0.70
Low Growth	-0.10



2021 Electric IRP Action Items

John Lyons, Ph.D.
Fifth Technical Advisory Committee Meeting
January 21, 2021

Summary of 2017 IRP Action Plan

- Generation Resource Related Analysis
  - Continue to review existing facilities for opportunities to upgrade capacity and efficiency
  - Model specific commercially available storage technologies
  - Upgrade the TAC concerning the EIM study and Avista's plan of action
  - Monitor regional winter and summer resource adequacy, additional LOLP studies
  - Post Falls redevelopment update
  - Ancillary services valuation for storage and peaking technologies using intra hour modeling capabilities
  - Monitor state and federal environmental policies affecting Avista's generation fleet

- Energy Efficiency and Demand Response
  - Consider moving T&D benefits from historical to forward looking values
  - Decide on potential and cost study for winter and summer residential DR programs
  - Use the UCT methodology for Idaho energy efficiency programs
  - Share list of energy efficiency measures with TAC prior to CPA completion

Summary of 2017 IRP Action Plan

- Transmission and Distribution Planning
  - Maintain existing Avista transmission rights
  - Continued participation in BPA transmission rate proceedings
  - Participate in regional and sub-regional efforts to expand transmission system
  - Coordinate IRP and T&D planning to evaluate alternative technologies to solve T&D constraints

2020 Resource Acquisition Action Items

- Determine plan for Long Lake expansion and file with appropriate agencies concerning if the project meets CETA and licensing issues
- Continued pursuit of pumped storage opportunities
- Conduct transmission network and air permitting studies for contingency CTs if pumped hydro is not available
- 2020 RFP for renewable energy capacity (2022-2023 online)
- 2021 RFP for capacity resources (on-line by 2026)
- Additional studies for the eventual shutdown of Northeast CT in 2035

2020 Analytical & Process Action Items

- Continued study of costs of intermittent resources, and financial costs and capabilities of different resources to meet the variability
- Include greenhouse gas emissions from resource construction, manufacturing and operations
- Investigate third-party market price forecast for use with future IRPs
- Participate in CETA rulemaking
- Participate in development of regional resource adequacy program

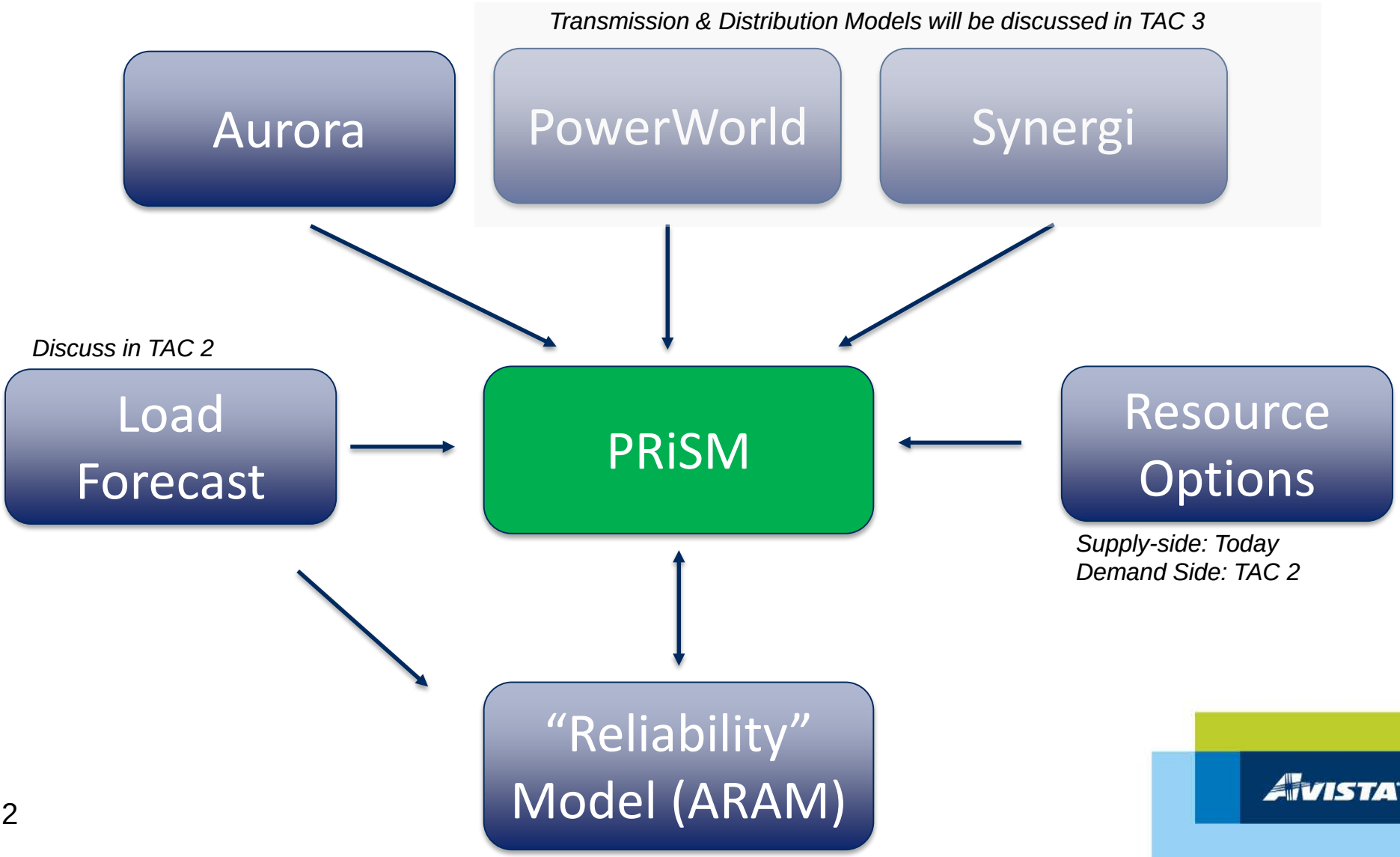
2021 IRP Action Items

- Continue 2020 Action Items with shortened 2021 IRP
- Investigate consultant for hydro and load shift from climate
- Investigate integration of resource dispatch, resource selection and reliability verification functions in IRP modeling
- Study natural gas supply issues and options for Kettle Falls CT
- Determine if distribution planning should be separate process
- Form an Equity Advisory Group
- Conduct existing resource market potential estimate of amount and timing of existing resources through 2045
- Additional DR peak credit analysis
- Partner with a third-party to identify NEI benefits

2021 Electric IRP
Modeling Process Overview

James Gall, IRP Manager
Fifth Technical Advisory Committee Meeting
January 21, 2021

IRP Planning Models



What is Reliability Planning

- Estimate the probability of failure to serve all load
  - Avista's reliability target is 95% of all simulations serve 100% of load and reserve requirements
- Model randomizes events
  - Hydro, weather (load, wind, resource capacity), forced outages
- Typically large sample size 1,000 simulations
- Can be used to validate if a portfolio is reliable
  - Estimate the required planning reserve margin (PRM)
  - May be used to estimate peak credits for new resources (ELCC)
- Gold standard: regional wide program with enforced requirements to each utility
  - Set required methodology, planning margin, and resource contribution based on regional model

2021 IRP Table 7.1: LOLP Reliability Study Results without New Resources

Month	2025 with Colstrip	2025 without Colstrip	2030	2040
Jan	0.6%	2.7%	10.5%	32.7%
Feb	0.1%	0.6%	4.2%	15.0%
Mar	0.0%	0.0%	0.5%	2.9%
Apr	0.0%	0.0%	0.0%	0.0%
May	0.0%	0.0%	0.0%	0.0%
Jun	0.0%	0.0%	0.0%	0.1%
Jul	0.0%	0.3%	1.7%	33.0%
Aug	0.0%	0.1%	0.6%	30.5%
Sep	0.0%	0.0%	0.0%	0.9%
Oct	0.0%	0.0%	0.0%	0.5%
Nov	0.0%	0.0%	0.7%	5.0%
Dec	0.8%	3.2%	7.1%	17.1%
Annual	1.4%	6.3%	21.2%	81.4%

Table 11.5: Reliability Metrics of PRS

Year	2025 (PRS)	2030 (PRS)	2040 (PRS)	2030 (333 MW NG)
LOLP	4.6%	5.4%	8.8%	5.2%
LOLH	1.45 hours	1.74 hours	2.89 hours	1.89 hours
LOLE	0.12	0.14	0.21	0.15
EUE	233 MWh	266 MWh	548 MWh	316 MWh
Total Events	126	148	228	160

Scenario Analysis

- Due to limited time, focus on scenarios with reliability implications
- Any other scenario we should look at?

#	Scenario	Year Studied	LOLP	LOLH	LOLE	EUE
1	PRS	2030	5.4%	1.74	0.14	266
5	Clean Resource Plan (2027)	2030	5.7%	1.66	0.13	250
6	Clean Resource Plan (2045)	2040	7.5%	2.98	0.22	643
10	Resource Adequacy Program	2030	6.4%	2.67	0.2	510
16	Colstrip Exit 2035	2030	5.7%	1.77	0.14	287
11	Electrification Scenario 1	2040	TBD	TBD	TBD	TBD

DRAFT

2021 Electric IRP
Clean Energy Action Plan

John Lyons, Ph.D.
Fifth Technical Advisory Committee Meeting
January 21, 2021

Clean Energy Action Plan

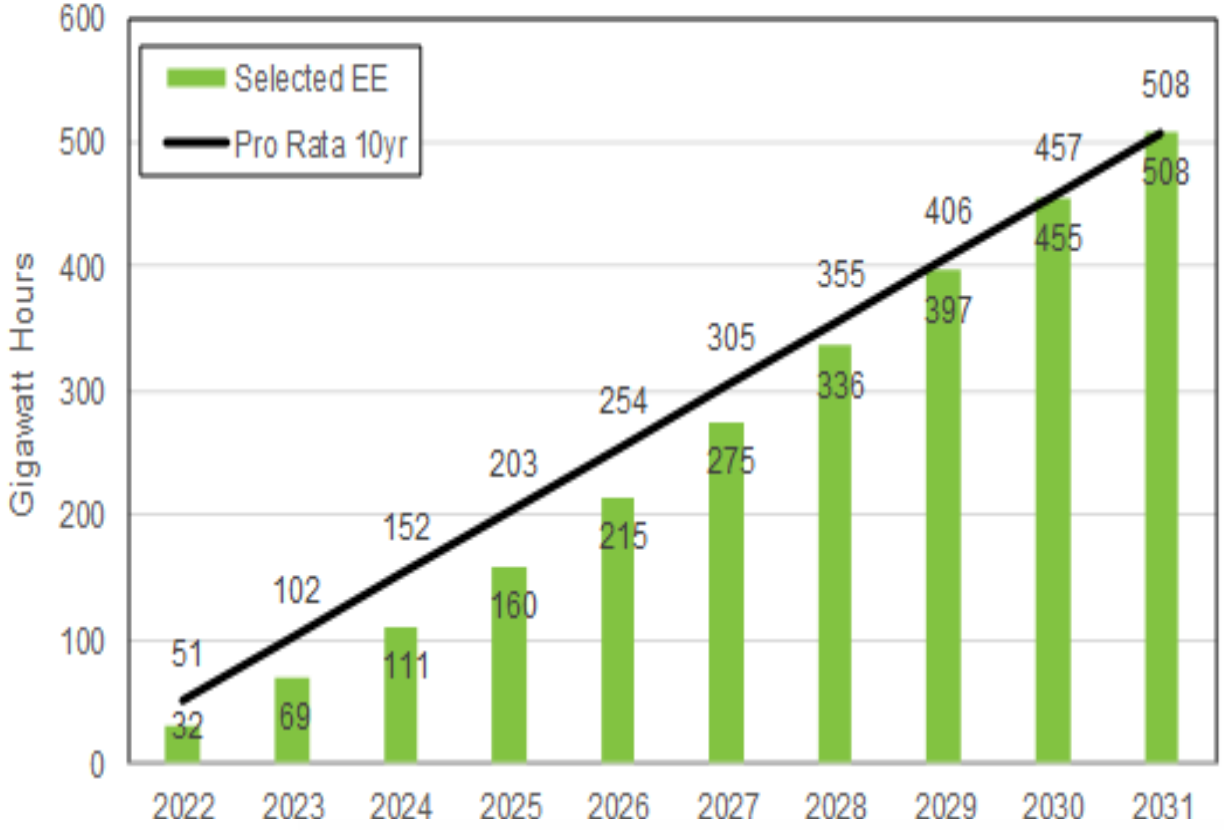
The CEAP must:

1. identify and be informed by the utility's ten-year cost-effective conservation potential assessment;
2. if applicable, establish a resource adequacy requirement;
3. identify the potential cost-effective demand response and load management programs that may be acquired;
4. identify renewable resources, non-emitting electric generation and distributed energy resources that may be acquired and evaluate how each identified resource may be expected to contribute to meeting the utility's resource adequacy requirement;
5. identify any need to develop new, or expand or upgrade existing bulk transmission and distribution facilities; and identify the nature and possible extent to which the utility may need to rely on alternative compliance options, if appropriate.

- CEAP is available in chapter 15 of the 2021 IRP

Energy Efficiency Savings

Figure 15.1: Washington 10-year Energy Efficiency Target



- 508 GWh of cumulative energy efficiency or 61.3 aMW with T&D line loses.
- Reduce winter peak 64.3 MW and summer peak 69.5 MW.

Resource Adequacy

- Participating in development of a regional resource adequacy program.
  - 16 percent winter peak and 7 percent summer peak planning margins, plus operating reserves and regulation requirements.
  - A resource adequacy program could reduce Avista's new capacity needs by up to 70 MW in 2031 based on the current draft program design.
  - Could reduce future resource acquisitions if successfully implemented.
- 2021 IRP identifies 83 MW of natural gas-fired capacity for Washington by November 1, 2026 to replace Lancaster PPA and maintain reliability.
- Future RFP may identify a lower cost clean resource.

Demand Response and Load Management Programs

Table 15.1: Demand Response and Load Management Programs

Program	Washington
Time of Use Rates	3.1 MW (2024)
Variable Peak Pricing	8.9 MW (2024)
Large C&I Program	25.0 MW (2027)
DLC Smart Thermostats	0.6 MW (2031)
Total	37.6 MW (2031 Total)

- CEAP identifies new programs with the potential to reduce load by 37.6 MW by 2031.
- Begin in 2024 with time of use and variable peak pricing opt-in programs, estimated to be 12 MW by 2031.
- 25 MW large commercial customer program offering is likely before the Lancaster PPA ends in 2026.
- Heating and cooling program starts in 2031 with 0.6 MW of savings and grows to over 6 MW by 2045.
- Future RFPs may identify other DR opportunities.

Planned Clean Energy Acquisitions

Table 15.2: 2022-2031 Washington Clean Energy Targets (aMW)

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Retail Sales	647	650	651	655	657	658	658	661	662	663
PURPA	22	22	22	22	22	22	22	22	22	22
Solar Select	6	6	6	6	6	6	0	0	0	0
Net Requirement	**619**	**623**	**624**	**628**	**629**	**631**	**636**	**640**	**641**	**642**
Target Clean %	80	80	85	85	90	90	95	95	100	100
Clean Energy Goal	**496**	**498**	**530**	**534**	**567**	**568**	**604**	**608**	**641**	**642**
Owned Hydro	292	288	288	285	292	289	292	289	291	291
Contract Hydro	96	95	65	66	65	64	63	58	59	23
Kettle Falls	24	23	23	21	23	21	22	20	21	19
Palouse Wind	24	24	24	24	24	24	24	24	24	24
Rattlesnake Flat Wind	36	36	36	36	36	36	36	36	36	36
Adams Neilson Solar	0	0	0	0	0	0	6	6	6	6
Available Resources	**473**	**466**	**436**	**431**	**439**	**434**	**441**	**433**	**436**	**399**
Shortfall	**23**	**33**	**94**	**103**	**127**	**134**	**163**	**174**	**204**	**242**
Resource Forecast										
Montana Wind	0	48	96	96	96	96	144	144	144	144
Kettle Falls Upgrade	0	0	0	0	6	6	6	6	5	5
Regional Hydro	0	0	0	0	0	0	0	0	0	31
ID AVA Ren. Purchase	23	0	0	7	25	32	13	25	42	41
ID AVA Hydro Purchase	0	0	0	0	0	0	0	0	13	21
Total Energy/RECs	**23**	**48**	**96**	**103**	**127**	**134**	**163**	**175**	**204**	**242**
Net Position	**0**	**15**	**2**	**0**	**0**	**0**	**0**	**1**	**0**	**0**
Total Clean Resource Need	**23**	**48**	**96**	**103**	**127**	**134**	**163**	**175**	**191**	**180**

Transmission & Distribution Improvements

- 2021 IRP did not identify any significant transmission or distribution improvements.
- Future transmission investment follows the 10-year plan in Appendix G.
- Two interconnection requests to Avista transmission to evaluate up to 200 MW in Rathdrum and additional capacity at Kettle Falls.
  - Kettle Falls interconnection request does not require any significant improvements.
  - Rathdrum results will not be available until later in 2021.
- Reviewed potential resource acquisitions that could defer distribution investments, but none were selected in this IRP.
- Will begin designing a public process for distribution planning in 2021.

Energy Equity

- Developing plan for equitable distribution of benefits and reduced burdens on highly impacted communities and vulnerable populations.
- Washington is identifying highly impacted communities and guidance on cost premiums.
  - Avista developed methodology to identify vulnerable populations and will finalize after forming Equity Advisory Group (EAG) in 2021.
  - EAG will guide determination of communities and help design outreach and engagement to distinguish and prioritize indicators and solutions.
  - Committed to energy efficiency program pilot for vulnerable populations starting in 2021.
- Enhancements to energy efficiency cost effectiveness test include non-energy benefits.
- Avista prioritizes efficiency projects to improve resiliency and increase energy security in these communities and gives a preference to renewable projects in vulnerable areas.
- Future request for proposals may yield more beneficial renewable resources.

Cost Analysis

- IRP compares PRS cost to baseline portfolio without CETA requirements to show if alternative compliance (2% cost cap) will be required.
- Avista expects to be below cap by $64 and $61 million for first two of the four-year compliance periods.

Table 15.3: 2022-2024 Washington Cost Cap Analysis (millions $)

	2021	2022	2023	2024	2025	Total
Revenue Requirement w/ SCC	651	651	669	700	705	
Baseline		650	657	672	678	
Annual Delta		1	11	28	27	67
Percent Change		0.2%	1.7%	4.2%	4.0%	2.5%
Four Year Max Spending		33	33	33	33	132
Comparison vs Annualized Cost Cap		(32)	(22)	(5)	(6)	(64)

Table 15.4: 2025-2028 Washington Cost Cap Analysis (millions $)

	2024	2025	2026	2027	2028	Total
Revenue Requirement w/ SCC	705	714	718	744	755	
Baseline		688	709	721	731	
Annual Delta		26	9	23	23	81
Percent Change		3.8%	1.3%	3.2%	3.2%	2.9%
Four Year Max Spending		36	36	36	36	143
Comparison vs Annualized Cost Cap		(10)	(27)	(13)	(12)	(61)

2021 Electric IRP
Clean Energy Implementation Plan (CEIP)

James Gall, Electric IRP Manager
Fifth Technical Advisory Meeting
January 21, 2021

CEIP Overview

- File by October 1, 2021. (draft by Aug 15, 2021)
- Include current clean energy mix (2020).
- Set targets for energy efficiency, demand response and clean energy acquisition using median hydro conditions.
- Include an assessment of indicators of Highly Impacted Communities and Vulnerable Populations through work with the Equity Advisory Group.
- Include specific actions the utility will make to meet clean energy goals; including resource adequacy and equity considerations.
- Calculate incremental costs.
- Create public participation plan (due on May 1, 2021).
- Interested parties have 60 days to provide written comments to the Commission.
- Commission will set an open public meeting; after adjudication, Commission will approve, reject or approve with condition the utility's CEIP or CEIP update.

Public Participation

- A public participation plan must be filed with the WUTC on May 1, 2021.
- Avista will begin public participation on the CEIP toward the end of May 2021.
- All TAC members are welcome to join; please contact John Lyons at john.lyons@avistacorp.com or 509-495-8515 to be on the CEIP email list.
- Equity Advisory Group is currently forming.
  - Ana Matthews leads this effort
  - Contact her at 509-495-7979 or ana.matthews@avistacorp.com for more information

Clean Energy Implementation Plan (CEIP)
Details of Requirements

WAC 480-100-640
CEIP Content – Filing Requirements, Interim Targets

1. Utility must file with the commission a CEIP by **October 1, 2021**, and every four years thereafter; must describe the utility's plan for making progress toward meeting the clean energy transformation standards
2. Interim targets.
   a) Utility must propose a series of interim targets that
      i. Demonstrate utility's reasonable progress toward meeting the standards.
      ii. Consistent with WAC 480-100-610 (4).
         – EE, DR, Safety, Reliability, Balancing system, Equity
      iii. Interim targets must be proposed in the form of the percent of forecasted retail sales of electricity supplied by nonemitting and renewable resources prior to 2030 and from 2030-2045
   b) Must include utility's percentage of retail sales of electricity supplies by nonemitting and renewable resources in 2020 in the first CEIP it files.
   c) Each interim target must be informed by the utility's historic performance under median water conditions

3) CEIP Content – Specific Targets

a) Utility must specific targets for energy efficiency, demand response and renewable energy.

   i. EE target much encompass all other EE and conservation targets and goals required by the Commission; must be described in the BCP; utility must provide forecasted distribution of energy and nonenergy costs and benefits

   ii. Must provide proposed program details, budget, measurement and verification protocols, target calculations, forecasted distribution of energy and nonenergy costs and benefits for the utility's demand response target.

   iii. Must propose the renewable energy target as a percent of retail sales of electricity supplied by renewable resources, details of renewable energy projects or programs, budgets, forecasted distribution of energy and nonenergy costs and benefits

b) Must provide description of technologies, data collection, processes, procedures and assumptions used to develop targets

4) CEIP Content – Customer Benefit Data

a) Identify highly impacted communities using the cumulative impact analysis pursuant to RCW 19.405.140 combined with census tracts (Indian country).

b) Identify vulnerable populations based on adverse socioeconomic and sensitivity factors developed through the Equity Advisory Group (EAG) process and public participation plan; describe changes from the utility's most recently approved CEIP.

c) Include proposed or updated customer benefit indicators and associated weighting factors related to WAC 480-100-610(4)(c) such as energy benefits, nonenergy benefits, reduction of burdens, public health, environment, reduction in cost, energy security and resiliency. Customer benefit indicators and weighting factors must be developed consistent with the EAG process and public participation; describe any changes from the most recently approved CEIP.

5) CEIP Content – Specific Actions

Include specific actions the utility will take over the implementation period; actions must meet and be consistent with the clean energy transformation standards and be based on the utility's CEAP and interim/specific targets; specific action items must be presented in a tabular format providing

a) General location, if applicable, proposed timing, estimated cost, whether resource will be located in a highly impacted community, will be governed by, serve or benefit highly impacted communities or vulnerable populations in part or in whole.

b) Metrics related to the RA including contributions to capacity or energy needs.

c) Customer benefit indicator values, or a designation as nonapplicable, for every customer benefit indicator described in section (4) (c)

6) CEIP Content – Narrative Description of Specific Actions

CEIP must describe how the specific actions:

a) Demonstrate progress toward meeting the standards.

b) Demonstrate consistency with the standards in 480-100-610(4)

   i. An assessment of current benefits and burdens on customers, by location and population, and the projected impact of specific actions on the distribution of customer benefits and burdens during the implementation period.

   ii. Description of how the specific actions in the CEIP mitigate risks to highly impacted communities and vulnerable populations and are consistent with the longer-term strategies and actions described in the utility's most recent IRP and CEAP

c) Consistent with proposed interim and specific targets;

d) Consistent with the IRP;

e) Consistent with the resource adequacy requirements and a narrative describing how the resources identified in the most recent RA assessment conducted or adopted by the utility demonstrates that the utility will meet its RA standard;

6) CEIP Content – Narrative Description of Specific Actions (continued)

f) Demonstrate how the utility is planning to meet the clean energy transformation standards at the lowest reasonable cost such as

   i. Utility's approach to identifying lowest cost portfolio of specific actions that meet the requirements as well as its methodology for weighting considerations

   ii. Utility's methodology for selecting the investments and expenses it plans to make over the next 4 years that are directly related to the utility's compliance with clean energy transformation standards and demonstrate investments represent a portfolio approach to investment plan optimization

   iii. Supporting documentation justifying each specific action identified in the CEIP

CEIP Content

7. Include a projected incremental cost as outline in WAC 480-100-660 (4).
8. Detail the extent of TAC/EAG or other public participation in the development of the CEIP.
9. Describe any utility plans to rely on alternative compliance mechanisms as described in RCW 19.405.040 (1) (b)
10. If the utility proposes to take the early action coal credit, it must satisfy the requirements in that statutory provision by
    - Demonstrate the proposed action constitutes early action by presenting the analysis by detailing with and without the proposed early action
    - Compare both the proposed early action and the alternative against the same proposed interim and specific targets

11) CEIP Content – Biennial CEIP Update

- Utility must make a biennial CEIP update filing on or before November 1 of each odd-numbered year that the utility does not file a CEIP.
- CEIP update may be limited to the BCP requirements.
- Must file its biennial CEIP update in the same docket as its most recently filed CEIP and include an explanation of ow the update will modify targets in its CEIP.
- Utility may file in the update other proposed changes to the CEIP as a result of the IRP progress report.

480-100-645
CEIP Review Process

1. Interested parties may file written comments with the Commission within 60 days of the utility's filing.
2. Commission will set an open public meeting; after adjudication, Commission will approve, reject or approve with condition the utility's CEIP or CEIP update; Commission may order, recommend or require more stringent targets.
   a) Commission may adjust or expedite interim or specific target timelines.
   b) Parties requesting the commission make existing targets more stringent or adjust the existing timelines has the burden of demonstrating the utility can achieve the targets or timelines.