2023 Electric Integrated Resource Plan

Technical Advisory Committee Meeting No. 1 Agenda

Wednesday, December 8, 2021
Virtual Meeting

Topic	Time	Staff
Introductions	9:00	John Lyons
2021 Action Item Review	9:10	John Lyons
Summer 2021 Heat Event	9:45	
Resource Adequacy		James Gall
Feeder Outages		David Thompson
NW Power Pool Resource Adequacy Program	10:45	Scott Kinney
Lunch	11:30	
Resource Adequacy Program Impact to IRP	12:30	Michael Brutocao
IRP Resource Adequacy/Resiliency Planning	1:00	James Gall
Break	1:45	
TAC Survey Results & Discussion	2:00	Lori Hermanson
Washington State Customer Benefit Indicators	2:45	Annette Brandon James Gall
2023 Draft IRP Workplan	3:15	John Lyons
Adjourn	3:30	

Microsoft Teams meeting
Join on your computer or mobile app: Click here to join the meeting
Or call in (audio only): +1 509-931-1514,,643047233# United States, Spokane
Phone Conference ID: 643 047 233#

2023 IRP Introduction

2023 Avista Electric IRP

TAC 1 – December 8, 2021

John Lyons, Ph.D. Senior Resource Policy Analyst

Meeting Guidelines

- IRP team is still working remotely and is available by email and phone 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?
- Other IRP data posted to web site – will set up better descriptions and navigation this time due to the amount of data shared
- Virtual IRP meetings on Microsoft Teams until back in the office and able to hold large group meetings again
- TAC presentations and meeting notes posted on IRP page

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 may be recorded if the tech cooperates

Integrated Resource Planning

The Integrated Resource Plan (IRP):

- Required by Idaho and Washington* every other year
  - Washington now 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
  - Ask questions
  - Always looking for help with soliciting new TAC members
- Open forum while balancing need to get through topics
- Welcome requests for studies or different assumptions.
- Available by email or phone for questions or comments between meetings
- Do TAC members want a calendar invite for the meetings?

Today's TAC Agenda

9:00 – Introductions, Lyons

9:10 – 2021 Action Item Review, Lyons

9:45 – Summer 2021 Heat Event, Gall and Thompson

10:45 – NW Power Pool Resource Adequacy Program, Kinney

11:30 – Lunch

12:30 – Resource Adequacy Program Impact to IRP, Brutocao

1:00 – IRP Resource Adequacy/Resiliency Planning, Gall

1:45 – Break

2:00 – TAC Survey Results and Discussion, Hermanson

2:15 – Washington State Customer Benefit Indicators, Brandon and Gall

3:00 – 2023 IRP Draft Work Plan

3:30 – Adjourn

2021 IRP Action Item Review

2023 Avista Electric IRP

TAC 1, December 8, 2021 – TAC 1

John Lyons, Ph.D. – Senior Resource Policy Analyst

2021 IRP Action Item Review

- Investigate and potentially hire a consultant to develop both a hydro and load forecast to include a shift in climate in the Inland Northwest. This analysis would include a range in new hydro conditions and temperatures so the Company can utilize the new forecast for resource adequacy planning and baseline planning.
  - **Avista is internally studying temperature and precipitation trends at Natural Resources Conservation Service (NRCS) Snow Telemetry (SNOTEL) sites.**
  - **Studying when snowpack peaks, experiences total melt out, and whether the total amount of snow is increasing or decreasing at various locations during specific months.**
  - **Studying Clark Fork and Spokane River flow trends:**
    - **Is the annual flow amount increasing or decreasing?**
    - **Are the flow amounts during specific months increasing or decreasing?**
  - Working though CEATI (Centre for Energy Advancement through Technological Innovation) to examine the effects of Climate Change. The members of CEATI contracted with Artelys Canada Inc. to create the Streamflow Assessment Toolkit for Changing Conditions. Members of CEATI are using this program to look at:
    1. Future Streamflow Scenarios from Available Model Datasets
    2. Historic vs. Future Streamflow Variability
    3. Streamflow correlation with climate indices
    4. Timing of the Spring Freshet
    5. Agreement among Climate Projections
    6. Change in drawdown low-flows

- This is currently a work in progress.

2021 IRP Action Item Review

- Investigate streamlining the IRP modeling process to integrate the resource dispatch, resource selection and reliability verification functions.
  - **With the RAP progressing, the need for reliability verification functions may not be necessary.**
  - **Avista is evaluating Plexos to perform this task. We are assessing the dispatch of the system and have not tested the Capacity Expansion logic. Avista does not anticipate using Plexos for the 2023 IRP with the exception of risk assessments.**
- Study options for the Kettle Falls CT regarding potential reductions of the natural gas supply in winter months. The Company will investigate alternatives for this resource including fuel storage, retirement or relocation of the asset.
  - **Avista is still investigating when the plant will be impacted from potential changes and is currently studying alternatives.**

2021 IRP Action Item Review

- Determine how to best implement the Washington Commission's strong encouragement under WAC 480-100-620 (3) regarding distribution energy resource planning as a separate process or in conjunction with the 2025 IRP.
  - **This is an area of ongoing work that will be shared with the TAC in 2022.**
  - **Additional staff budgeted for 2022 to help with this effort.**

- Form an Equity Advisory Group to ensure a reduction in burdens to vulnerable populations and highly impacted communities and to ensure benefits are equitably distributed in the transition to clean energy in the state of Washington. This group will provide guidance to the IRP process on ways to achieve these outcomes.
  - **Equity Advisory Group is up and running. They are a major component of the Clean Energy Implementation Plan.**

2021 IRP Action Item Review

- Avista will conduct an existing resource market potential to estimate the amount and timing of existing resources available through 2045.
  - **Avista is conducting an all-source RFP in Q1 2022 to identify resources through 2030.**
  - **Avista will study resource opportunities between 2030 and 2045 after the RFP and other regional RFPs are complete.**
- Conduct further peak credit analysis to understand the reliability benefits of all resources including demand response options with different duration and call options of the wide range of DR program options.
  - **Avista plans to use the Resource Adequacy Program Qualifying Capacity Credit (QCC).**
  - **Avista expects the RAP to develop QCC values in Q1 or Q2 of 2022.**

2021 IRP Action Item Review

- Avista will partner with a third-party consultant to identify non-energy impacts that have not historically been quantified for both energy efficiency and supply side resources.
  - **DNV was awarded a contract to study these impacts and will present their draft report at the March 2022 TAC meeting.**
  - **TAC participants will be able to provide comments prior to the final draft in April 2022.**
- Formalize the process for public to submit IRP-related comments and questions and for Avista to share responses to those requests.
  - **Realized we need a better system and structure with the shear amount of data being shared.**
  - **Still deciding if we will set something up and change as needed or provide options for feedback.**
- Develop a transparent methodology to include pricing data and consider available options for new renewable generation and energy storage options.
  - **The 2021 IRP included Avista's spreadsheet for resource cost calculations, due to the complexity of the analysis, Avista seeks input from TAC members on how to best share the information.**

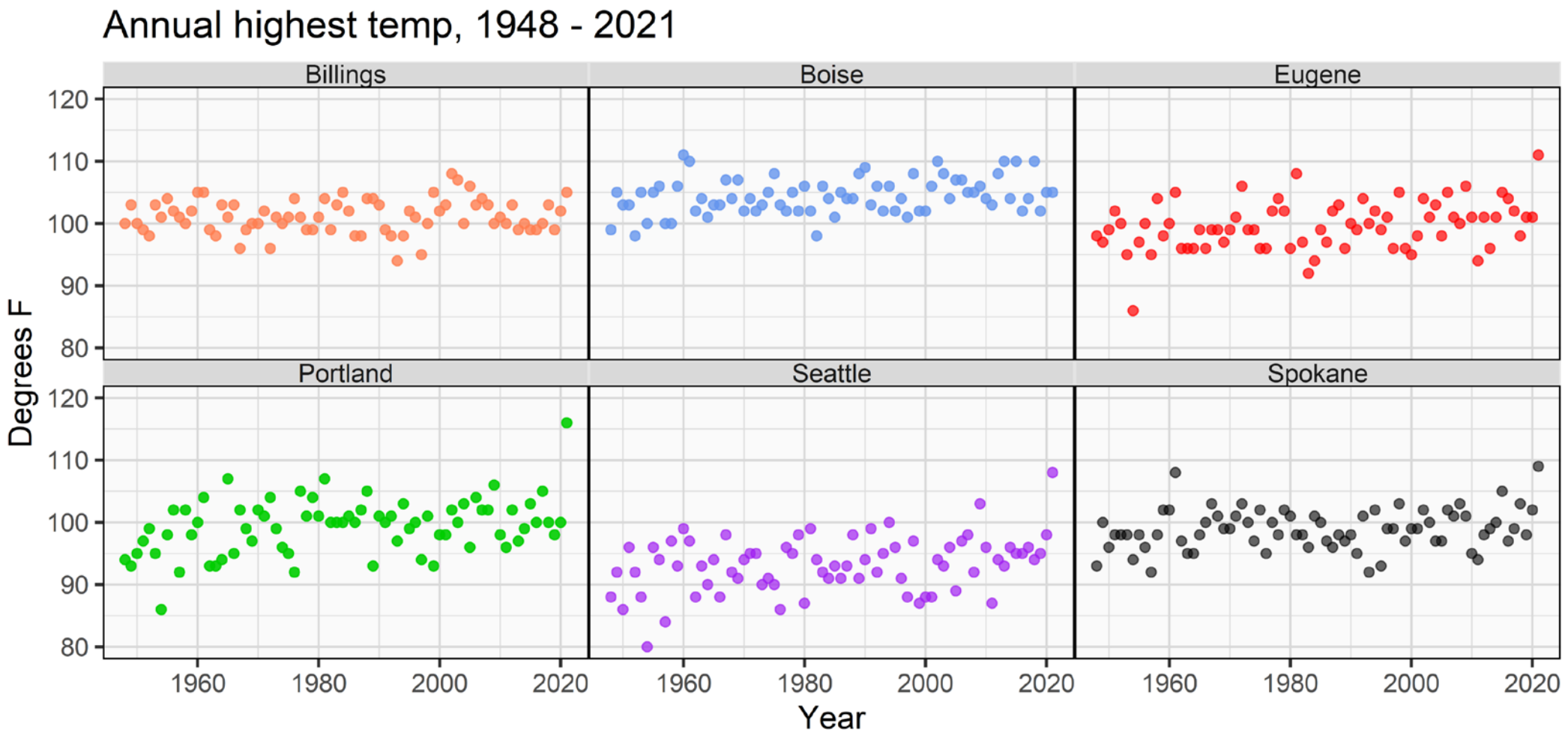
2021 Heatwave Loads & Resources

Avista, Electric Technical Advisory Committee

December 8th, 2021 – TAC 1

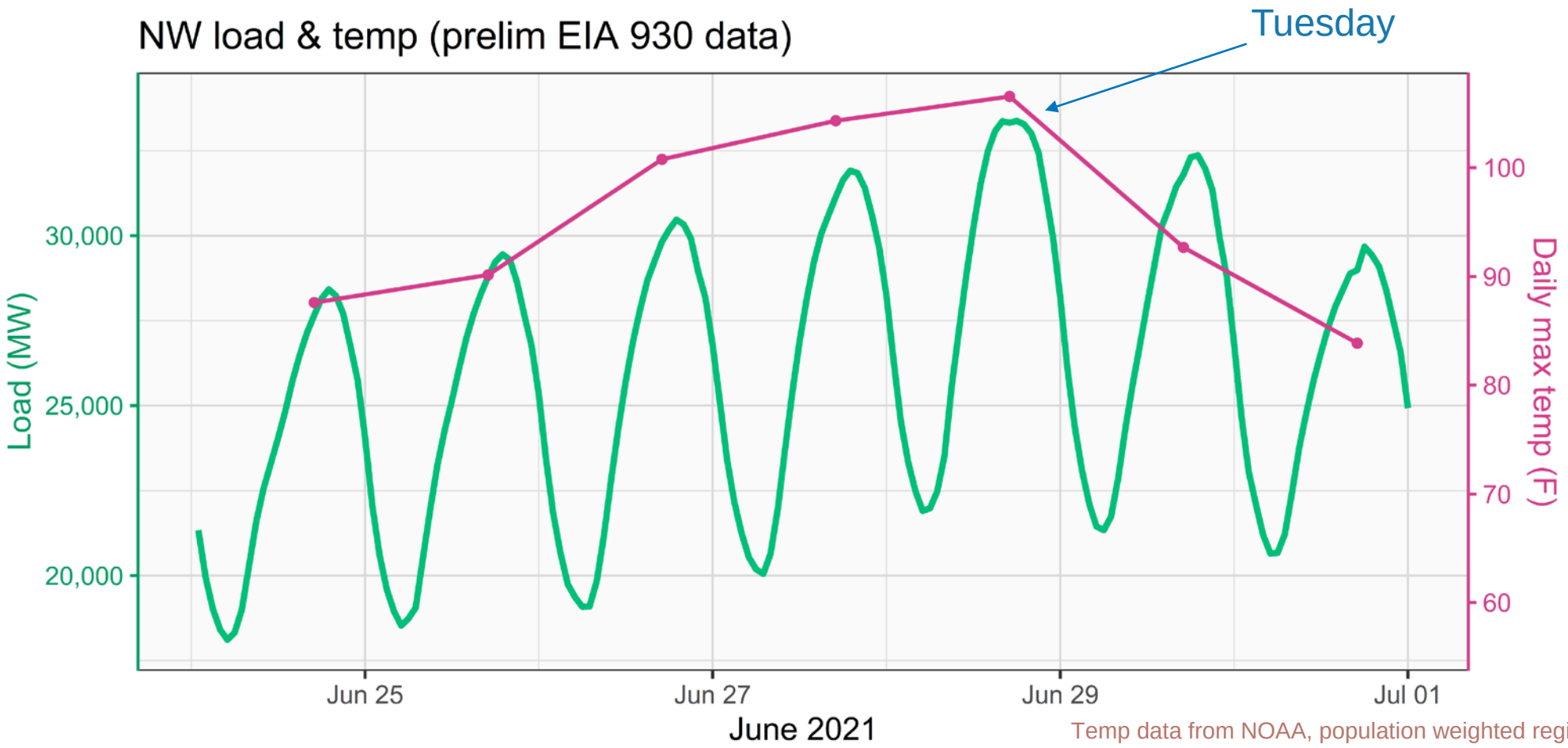
James Gall, Electric IRP Manager

Regional Temperatures



Data from NOAA. Updated with data through July 1, 2021. Graphic used with permission from the PNUCC

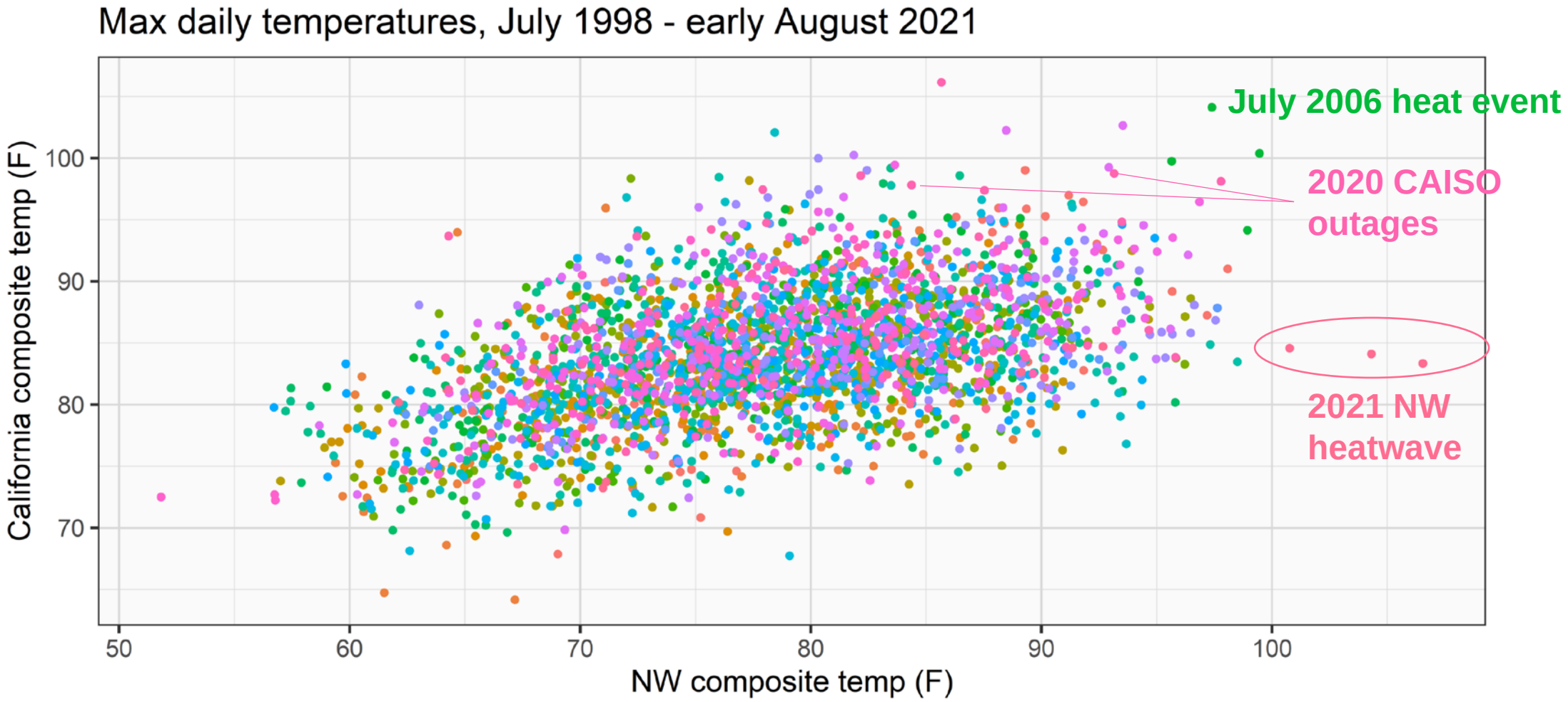
Pacific Northwest Loads vs Temperature



Temp data from NOAA, population weighted regional average (*SEA .40; PDX .24; BOI .12; GEG .11, BIL .07, EUG .05*)
Load data from EIA 930; 12 NW BA coincident loads (AVA, BPA, CHPD, DOPD, GCPD, IPC, NWE, PACW, PGE, PSE, SCL, TWPR)

Graphics used with permission of the PNUCC

NW vs California Loads

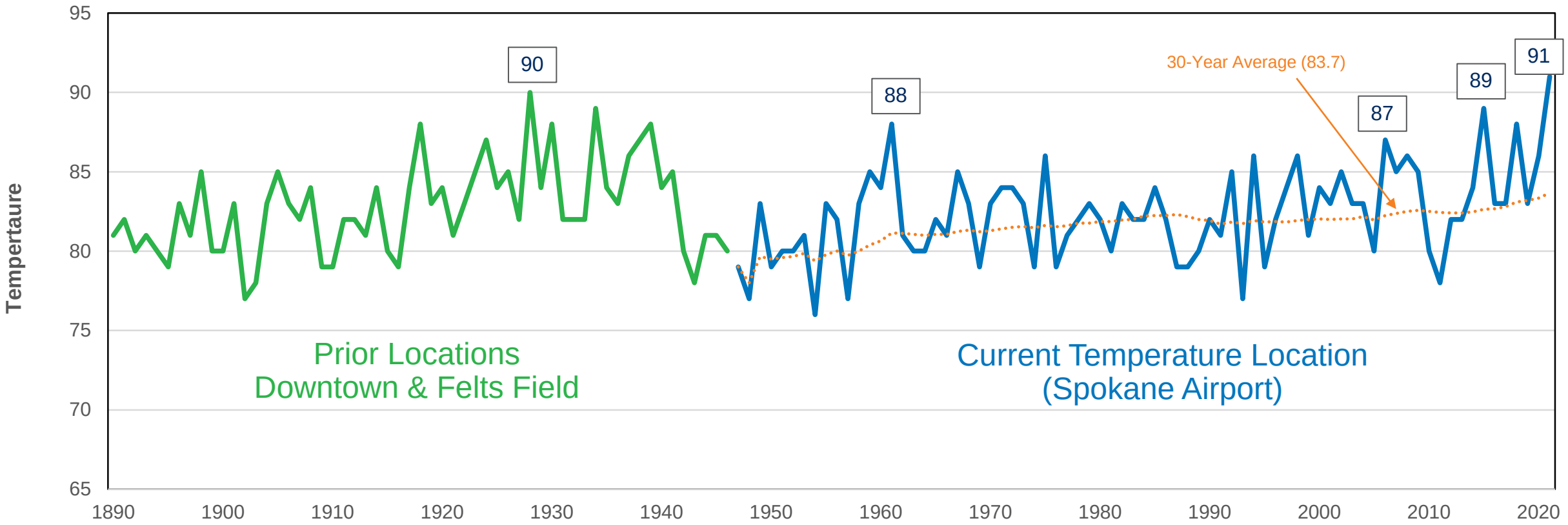


Northwest temp data from NOAA, population weighted regional average (*SEA .40; PDX .24; BOI .12; GEG .11, BIL .07, EUG .05*)
California temp data from NOAA, roughly weighted average (LA (USC), SAN, SMF, FAT, SJC)

Graphics used with permission of the PNUCC

Spokane Historical Hottest Days

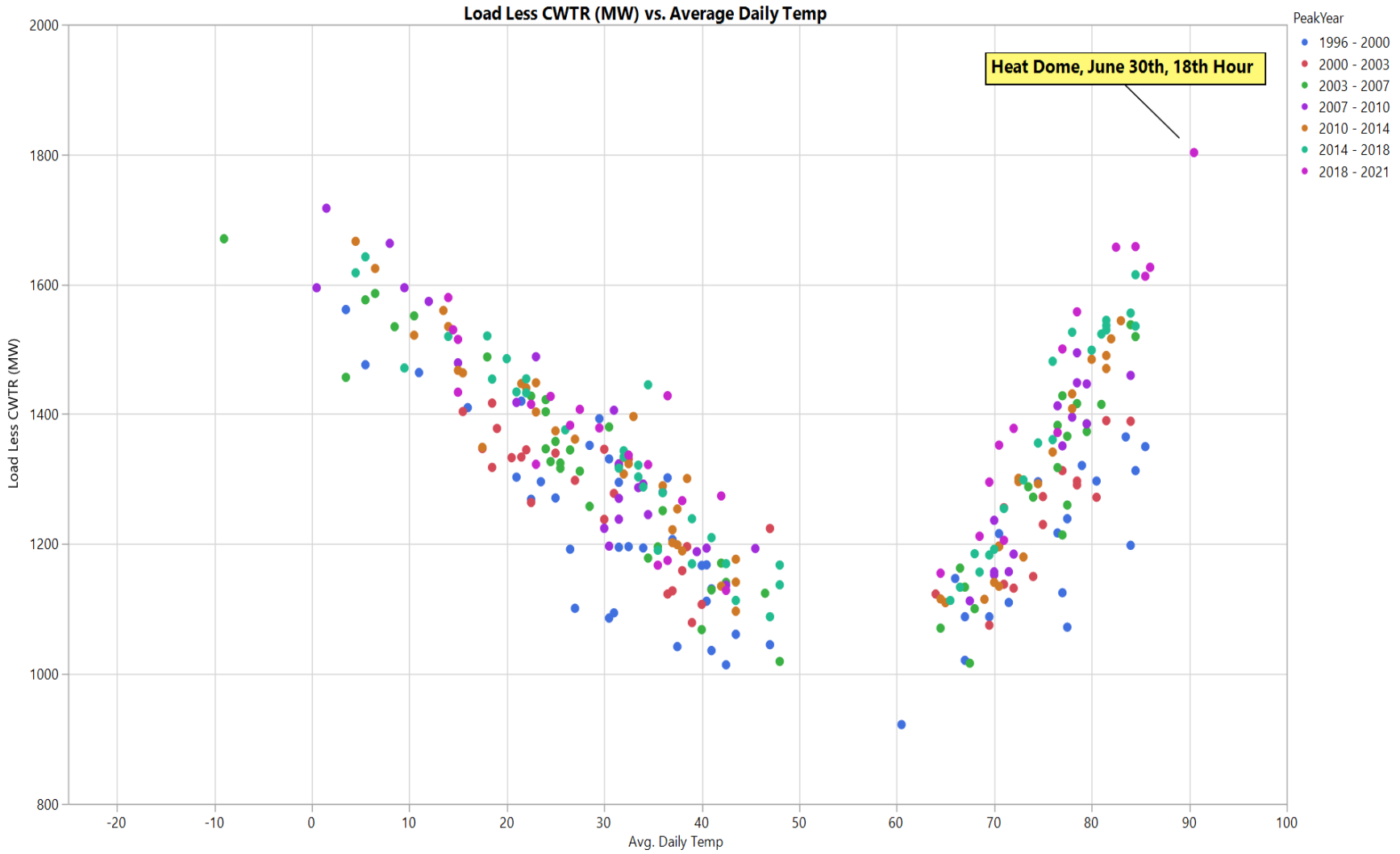
(Avg High & Low Daily Temperature)



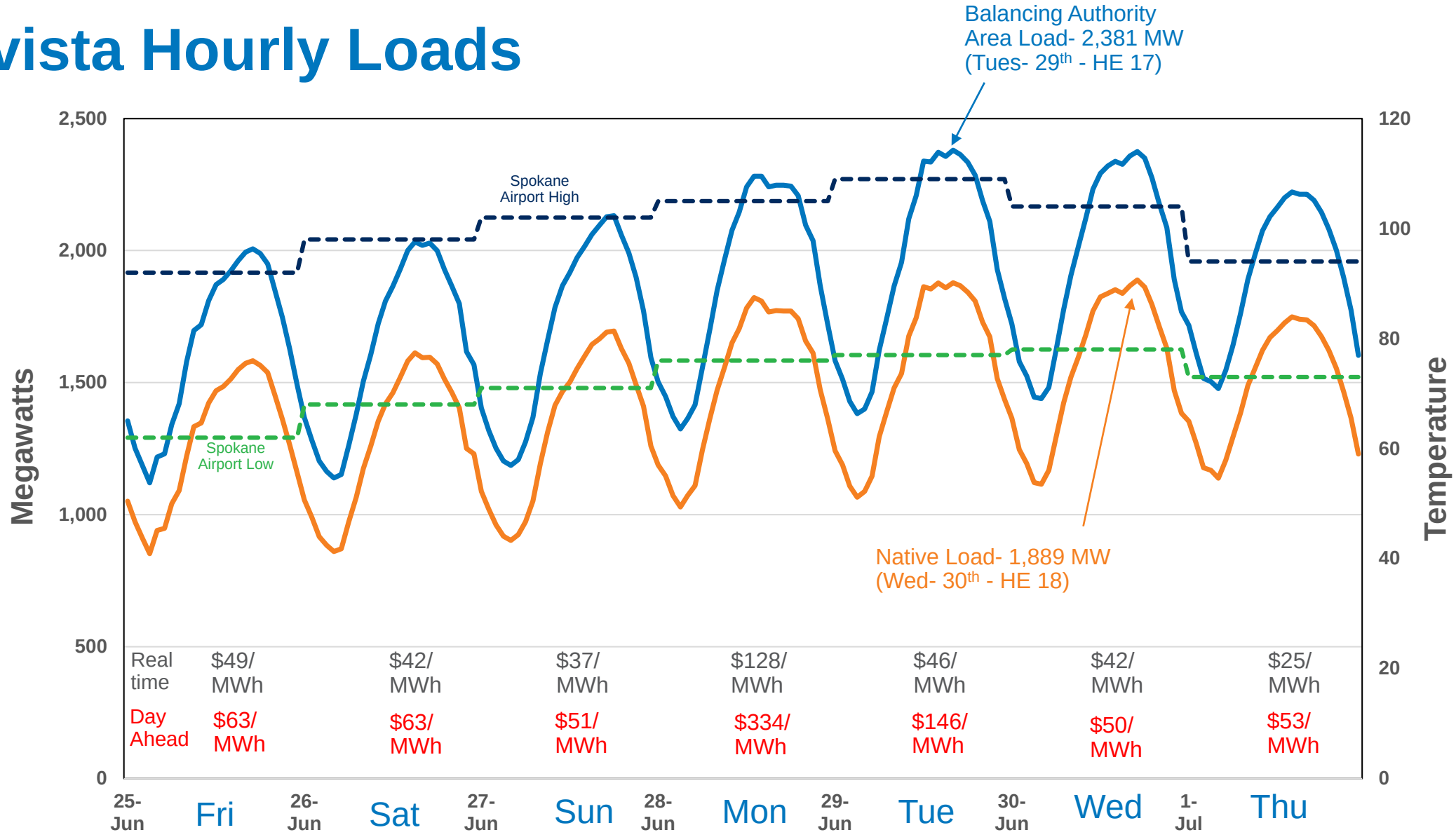
Note: temperatures are not adjusted for locational differences, but summer months

Data from NOAA

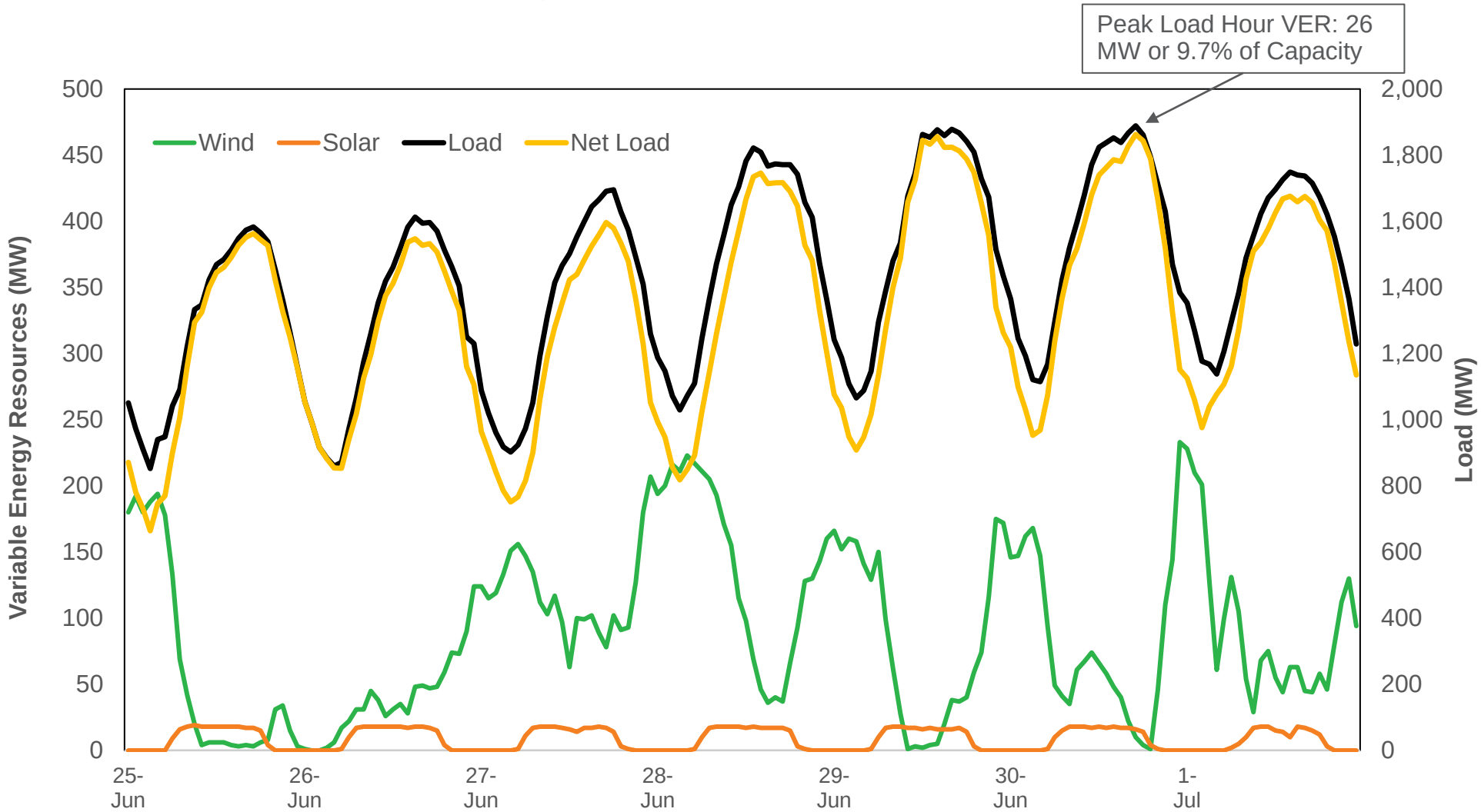
Avista Peak Loads in Perspective



Avista Hourly Loads



Load vs Variable Energy Production



Summer Peak Load Forecast Implications

- Actual peak load was 92 MW higher (5%) then fundamental forecast given the actual temperature.
- Avista will move to a 30-year average hottest day for summer peak load forecasting.
- Improve peak load forecast techniques.

Heat Event-
Emergency Operating Plan
June 28 – July 1, 2021

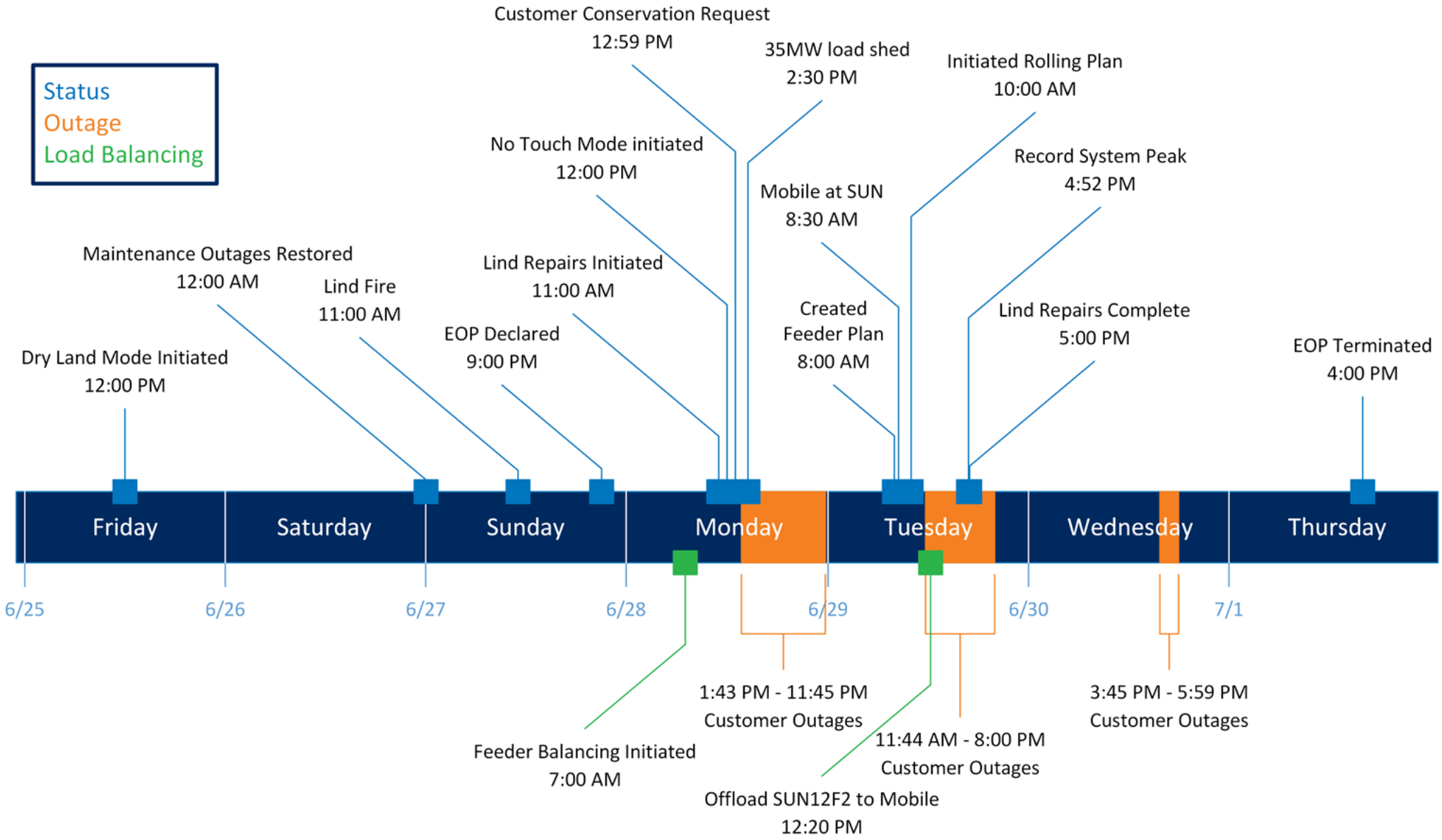
2023 Electric IRP – TAC 1

December 8, 2021

David Thompson, System Planning Engineer

EOP Overview
June 25 – July 1, 2021

Event Overview

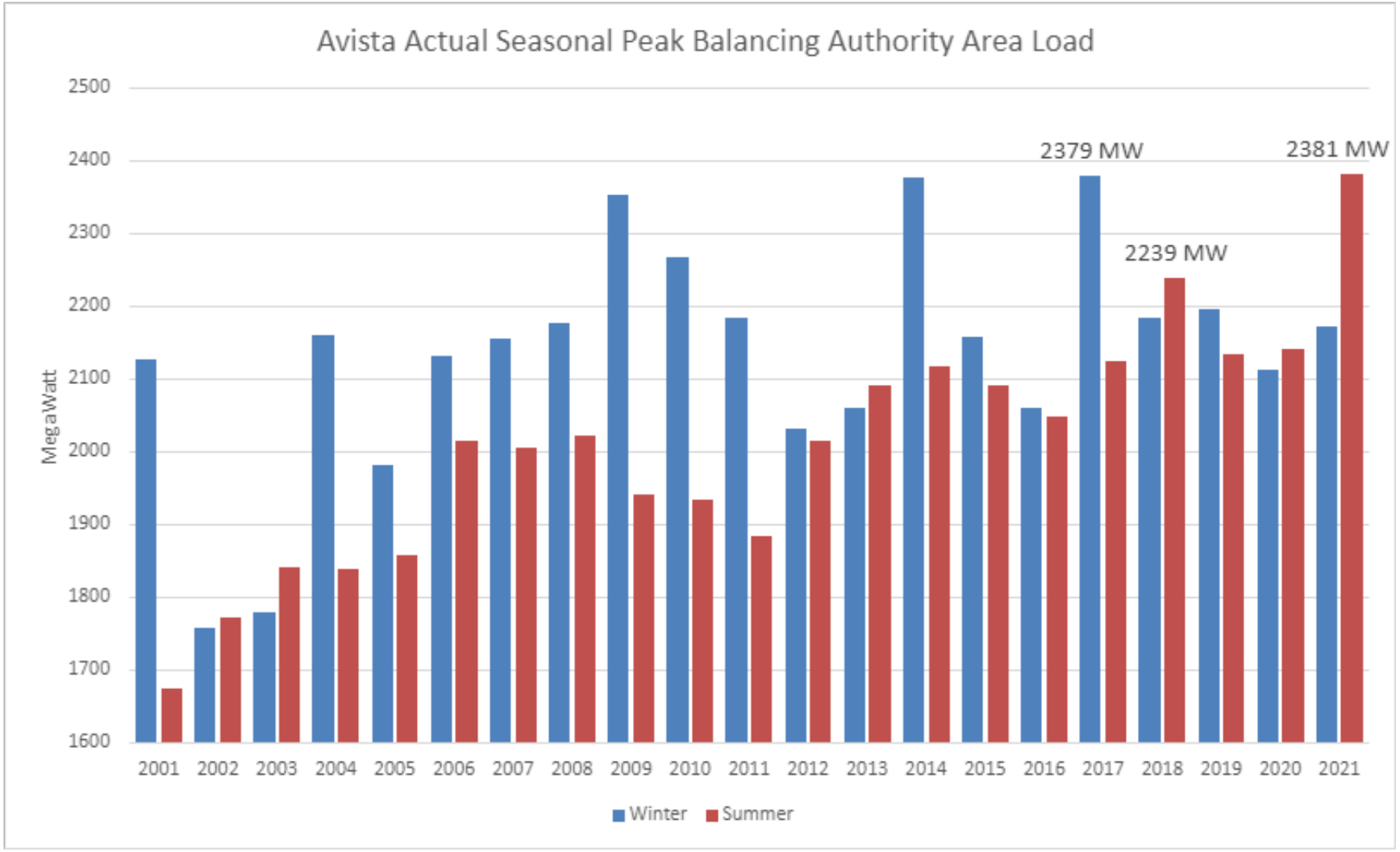


Temperature Metrics

	High Temperature (°F)		Low Temperature (°F)	
Date	Forecast	Actual	Forecast	Actual
Monday, 6/28	108	105*	73	76
Tuesday, 6/29	110	109*	74	77
Wednesday, 6/30	108	104	74	78
Thursday, 7/1	106	94	73	73

- Record high daily temperatures forecasted by National Weather Service
- Expected significant customer demand for HVAC with indoor activities
- Relatively high “low” temperatures limited equipment cooling

Balancing Authority Area Peak

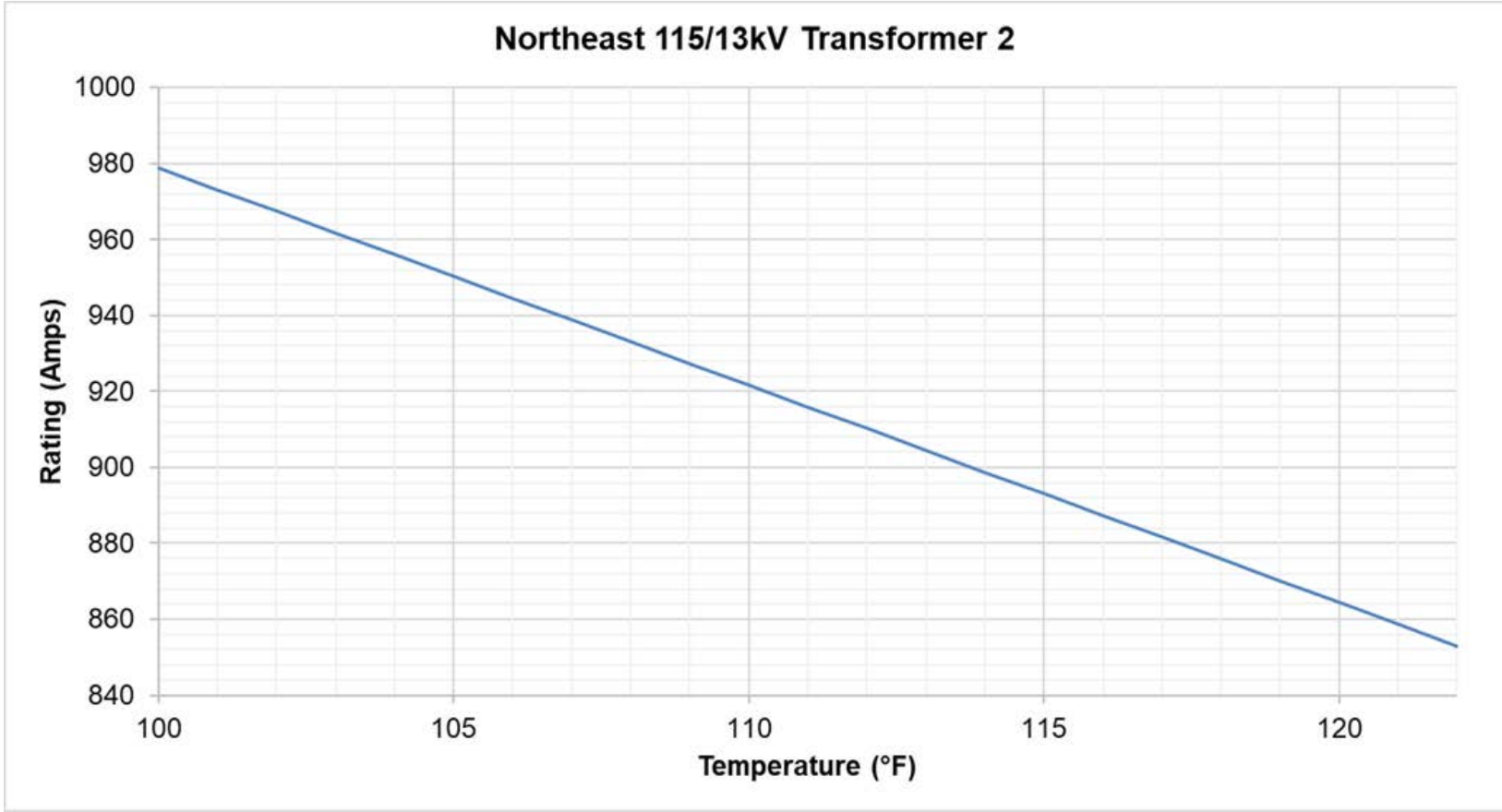


June 28	2,285 MW
June 29	2,381 MW
June 30	2,358 MW

New peak load is 6% increase over prior record.

Summer Challenges

- Equipment capacity ratings are typically reduced with increasing ambient temperatures
- Cooling systems can adjust capacity ratings



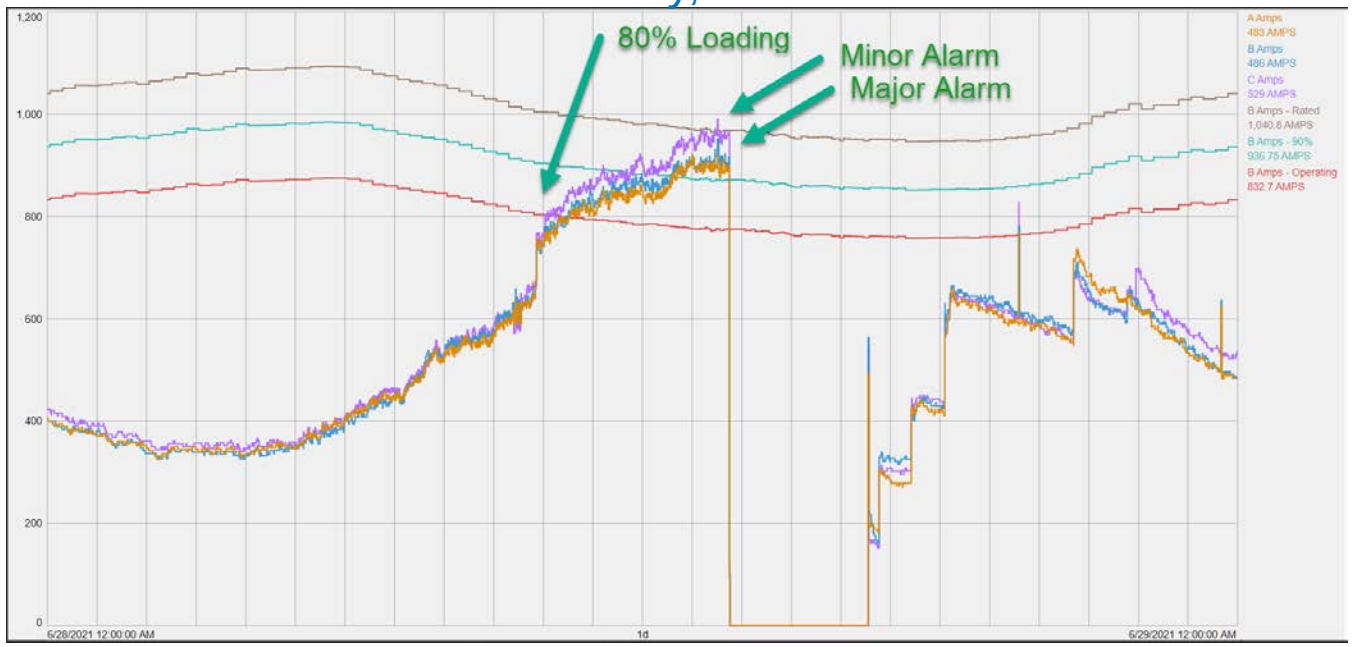
Heat EOP Performance-Distribution Transformers

- Operating limits are monitored for equipment protection
- 201 transformers in 140 substations throughout Avista's service territory
- Minor alarm at 80°C (176°F), monitored for continued safe operation
- Major alarm at 115°C (239°F), transformer to be taken out of service

Operating Limit	June 28	June 29	June 30
≥80%	19	32	19
≥90%	7	7	1

Northeast 115/13kV Transformer 2

Monday, June 28

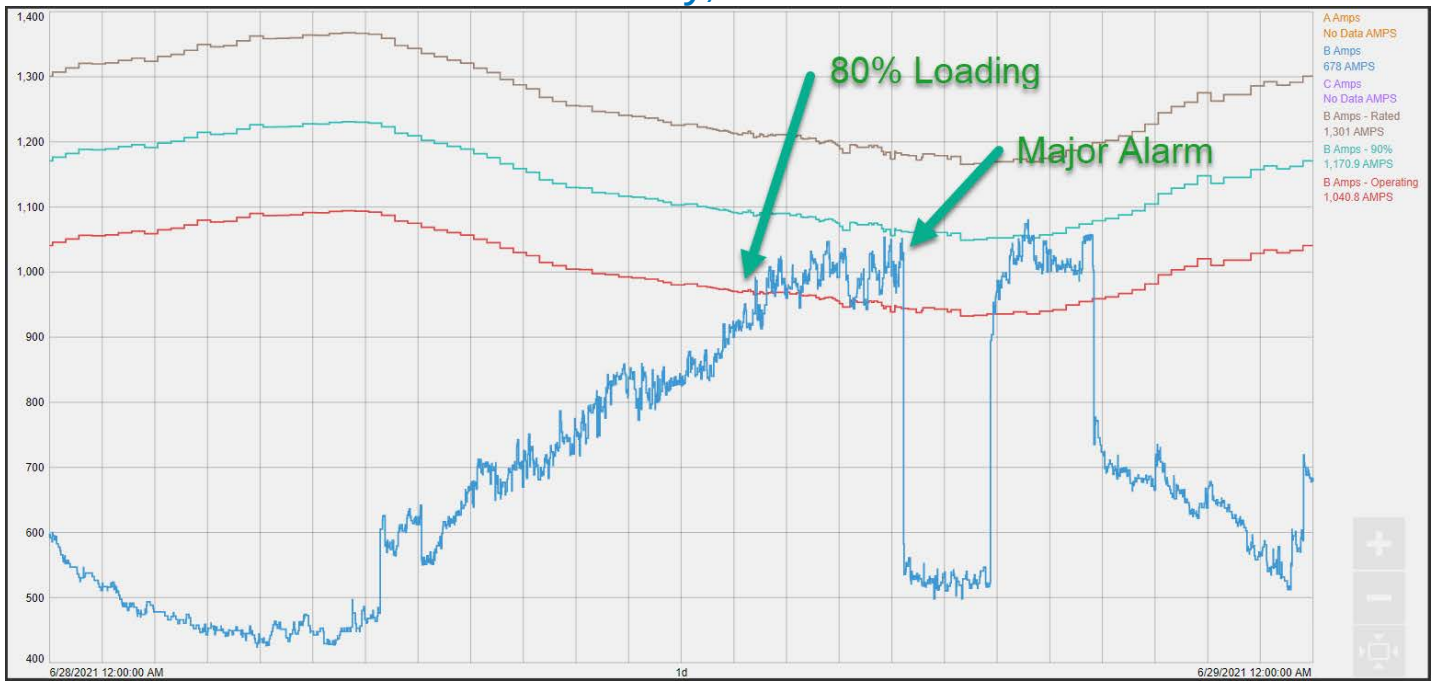


- 9:50 a.m. - Transferred ROS12F1 feeder to Northeast
- 10:18 a.m. – 80% loading
- 1:32 p.m. – minor alarm at 96%
- 1:41 p.m. – major alarm, dropped customers
- Investigation found three cooling fans nonfunctional

Sunset 115/13kV Transformer 2

- 1:44 p.m. – reached 80%
- 4:12 p.m. – major alarm at 89%, dropped customers on SUN12F2
- 5:30 p.m. – restored SUN12F2
- 7:47 p.m. – major alarm, dropped SUN12F1
- Mobile Substation 4 used to energize SUN12F2, required 4-hour outage

Monday, June 28



Heat EOP Performance-Distribution Feeders

- Operating limits are monitored for equipment protection
- 369 distribution feeders connecting substations to customer load
- Operation at 80% of limit initiates notification
- Operation at 100% of limit requires unloading

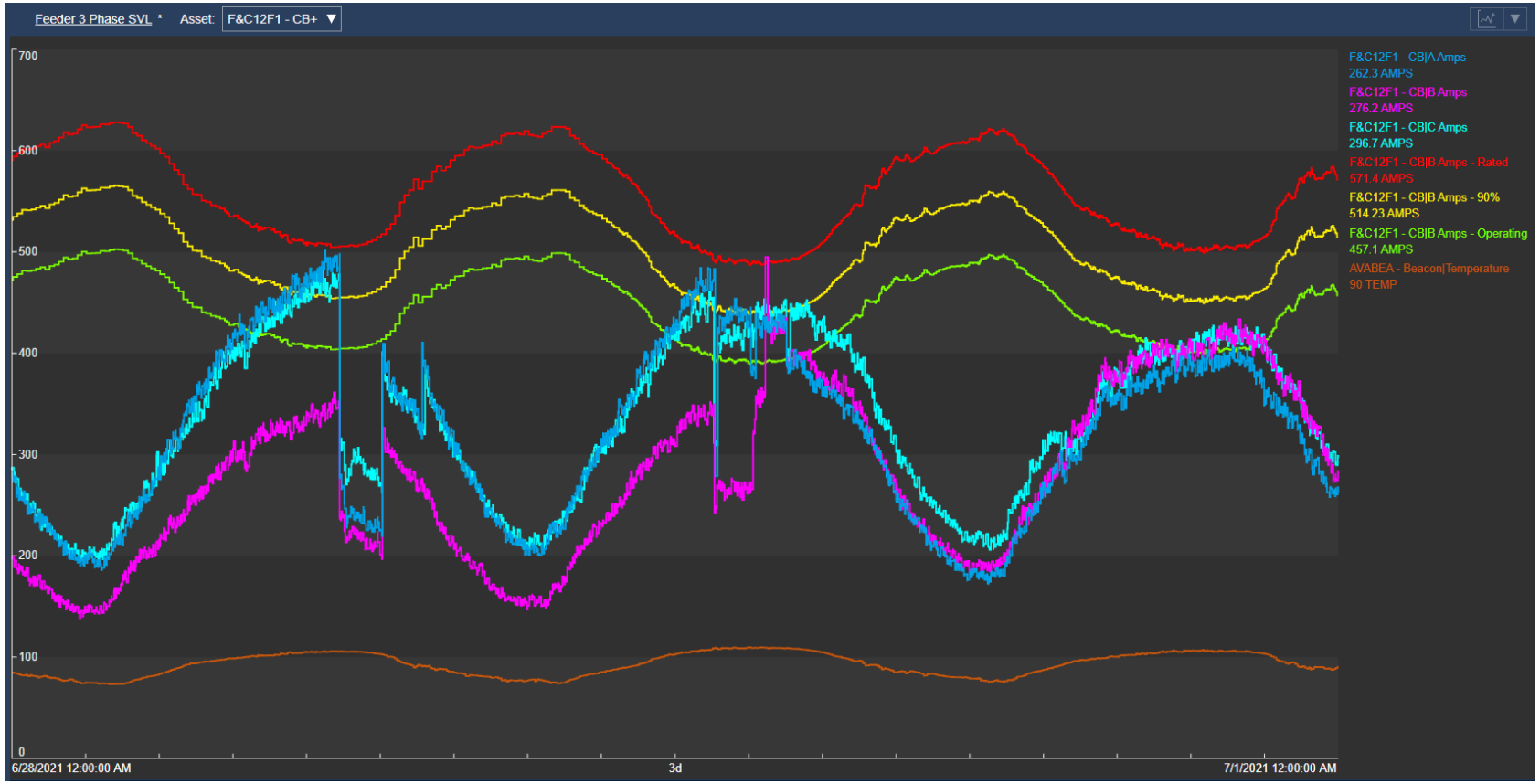
Operating Limit	June 28	June 29	June 30
≥80%	39	53	32
≥90%	13	16	5

Transferring Load

- Move load from heavily loaded feeder to adjacent feeder
- Requires surplus capacity on adjacent feeders
- Transfers accomplished remotely or with field crews, depending on feeders

Timestamp	Switching Notice	Load Transfer Action
6/24, 7:18 a.m.	CDA 21-56	HUE142 to HUE141[1]
6/28, 8:30 a.m.	SPD 21-92	COB12F2 to MEA12F3
6/28, 9:30 a.m.	CDA 21-57	PRA222 to PF212
6/28, 9:50 a.m.	SPD 21-91	ROS12F1 to NE12F1
6/28, 11:30 a.m.	SPD 21-93	GLN12F1 to 3HT12F2
6/28, 11:30 a.m.	SPD 21-94	GLN12F2 to SE12F2
6/28, 3:12 p.m.	CDA 21-58	APW112 to APW115
6/28, 3:44 p.m.	SPD 21-96	WAK12F1 to MEA12F2
6/28, 5:18 p.m.	CDA 21-59	HUE142 to DAL132
6/28, 11:33 p.m.	DO210629	Restore SUN12F1 from C&W12F4 and SUN12F6
6/29, 1:45 a.m.	DD210628	MEA12F2 to WAK12F1
6/29, 8:00 a.m.	CDA 21-60	DAL132 to DAL135
6/29, 9:00 a.m.	PAL 21-18	M15513 to M15514
6/29, 10:41 a.m.	SPD 21-99	NE12F4 to BEA12F2
6/29, 10:45 a.m.	LC 21-20	SLW1358 to LMR1530
6/29, 1:00 p.m.	PAL 21-19	TUR116 to TUR112
6/29, 1:30 p.m.	CDA 21-62	DAL131 to AVD151
6/29, 2:10 p.m.	CDA 21-63	DAL132 to DAL136
6/29, 7:39 p.m.	DO2100629-1	H&W12F2 to H&W12F5 SUN12F2 to H&W12F1
6/30, 9:30 a.m.	CDA 21-64	SPT4521 to SAG742
6/30, 12:01 p.m.	CDA 21-61	PRA221 to PRA222

Feeder Balancing



Feeder	June 28	June 29	June 30
3HT12F2	--	4	--
3HT12F4	--	4	--
BEA12F5	--	--	1
BKR12F1	--	1	--
DAL131	3	--	--
F&C12F1	--	1	1
F&C12F2	2	--	--
F&C12F4	--	--	1
IDR253	--	--	1
L&S12F4	--	1	--
LMR1530	--	1	--
NE12F1	--	2	--
PRA221	--	1	--
Total	5	15	4

Customer Engagement

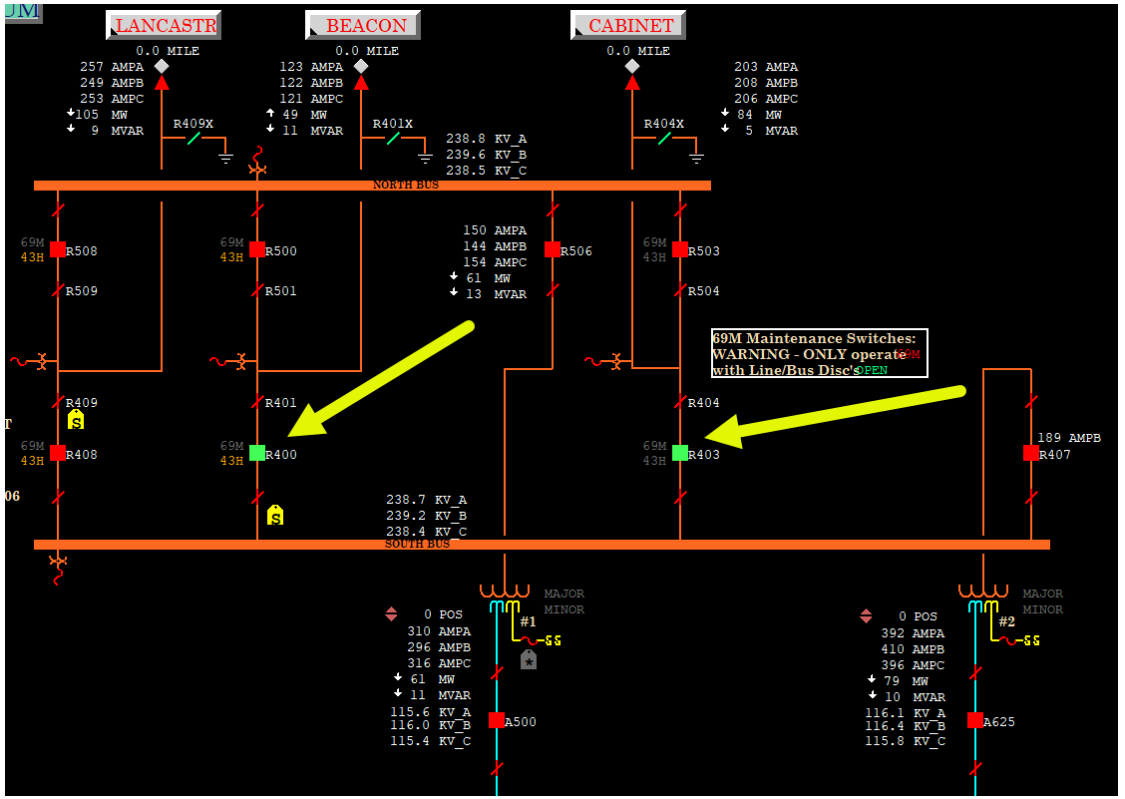
- Demand response conservation requests
- Commercial customer reduced 35MW on Monday afternoon
- Two high schools
- College campus
- Local water district

Heat EOP Performance-Transmission System

- Equipment issues
  - Three 230kV breakers
  - One 230/115kV transformer
  - Next issue would pose significant outage challenges
- No impacts to customers

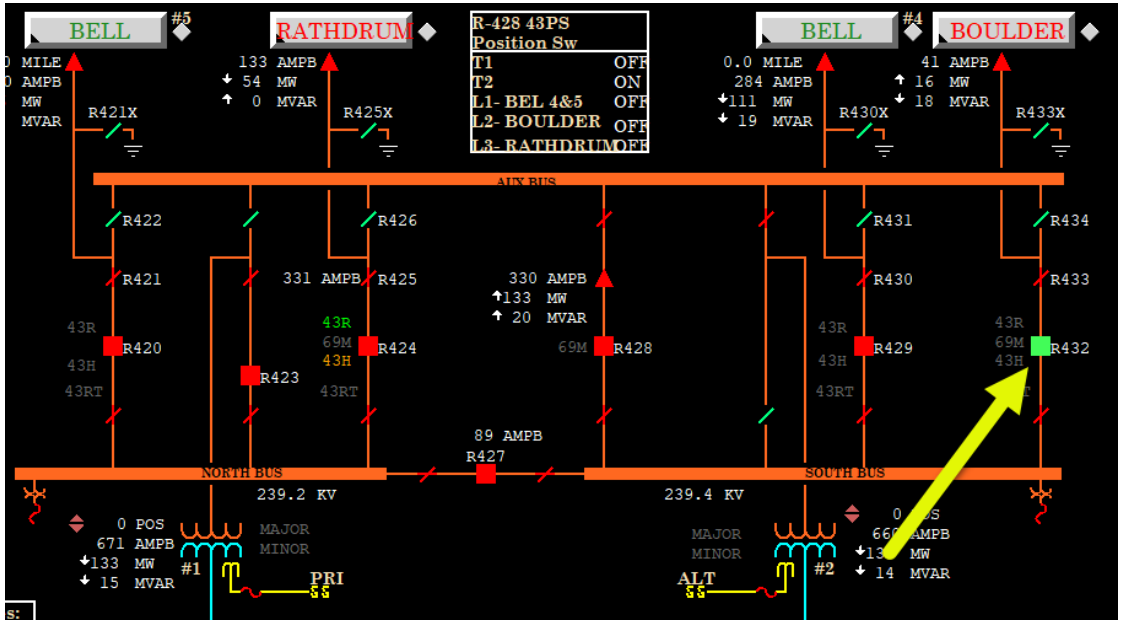
Rathdrum Station

- Breaker R-403
  - Cabinet – Rathdrum transmission line
  - Failed bushing
  - Monday 4:47 a.m. until Friday
- Breaker R-400
  - Beacon – Rathdrum transmission line
  - Leaking bushing
  - Wednesday 9:05 a.m. until Thursday
- Additional device failure would likely cause transmission outage



Beacon Station

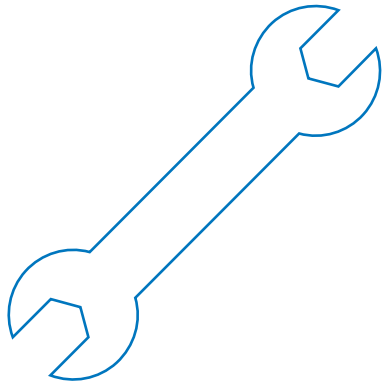
- Breaker R-432
  - Beacon – Boulder transmission line
  - Failed bushing
  - Monday 11:39 p.m. until Tuesday 5:13 p.m.
- Beacon 230/115kV Transformer 2
  - Multiple major alarms on Tuesday but operating at 80% of capacity
  - Cooling fan bank loss of power



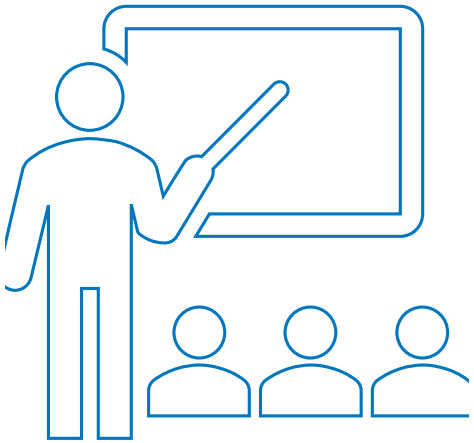
Heat EOP Summary

- 31 protective events caused customer outages
  - 16,029 customer outages on Monday, June 28
  - 5,523 customers with outages on Tuesday, June 29
  - 603 customers with outages on Wednesday, June 30
- Customer outages regions
  - South Lewiston area
  - Greater Spokane area

Recommendation Summary

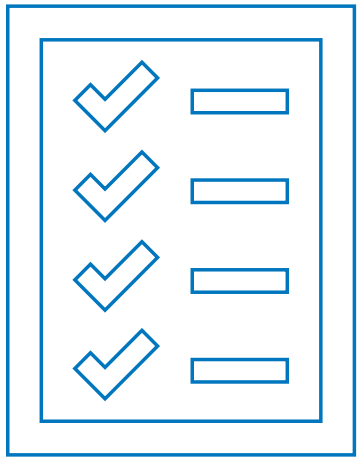


Capacity Mitigation

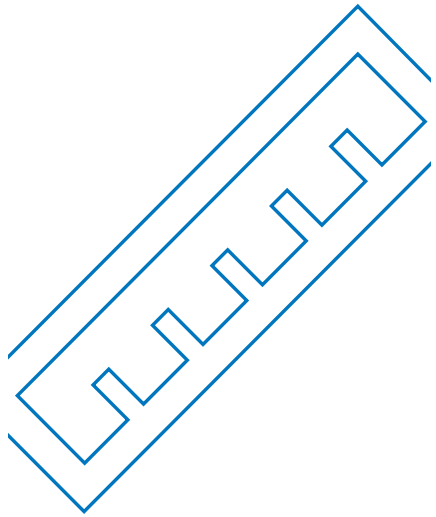


Distribution System Planning Assessment

Feeder Balancing Program



Operational Planning



Major Equipment Utilization

Q&A

Thank You

Western Resource Adequacy Program

Avista TAC Meeting

December 8, 2021

Agenda

- Overview
- Timeline
- Participation
- Design Framework
- Governance
- Costs and Benefits
- Next Steps

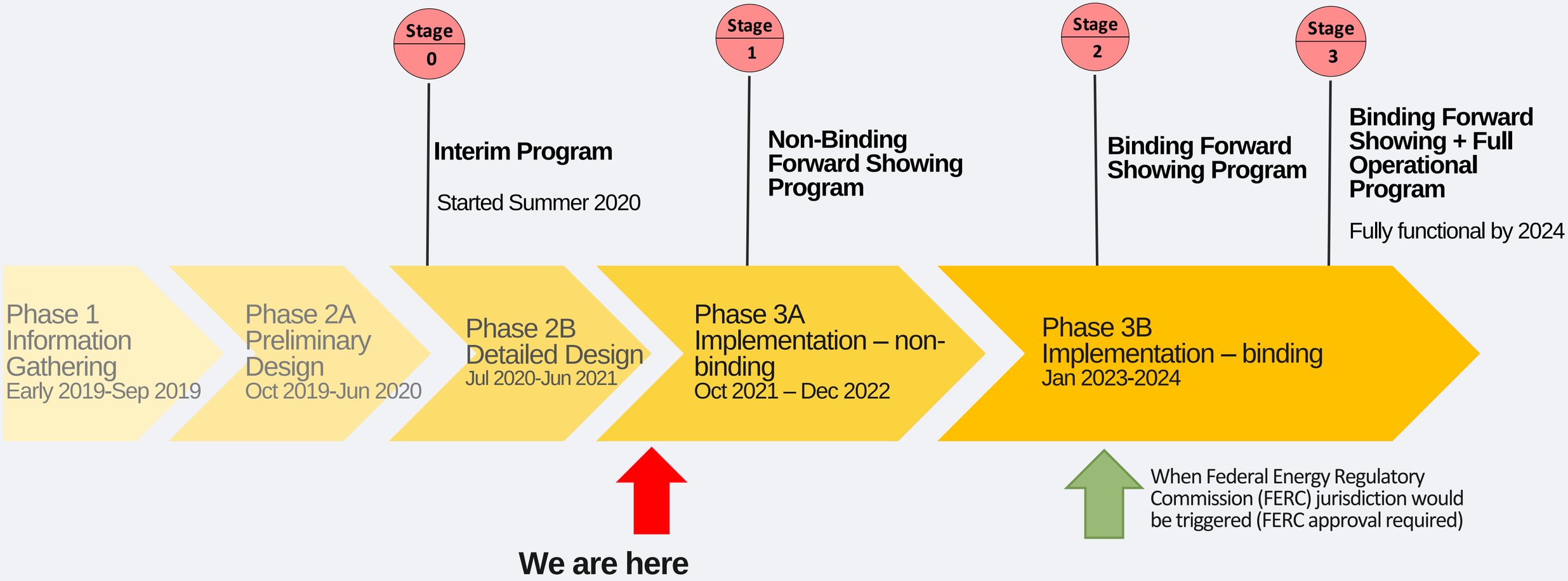
OVERVIEW

- The WRAP is a regional capacity program
  - *Similar programs are available across North America*
  - *Significant effort to build organizational structure necessary to administer program*
  - *Capacity will improve reliability in most expedient manner*
- Not building a market – relying on current bilateral structure
  - *Will not set prices for energy*
  - *Load Responsible Entity (LRE) remain responsible for determining which resources participate and are potentially deployed*

BENEFITS

- RELIABILITY
  - *Ensure sufficient generation and transmission resources are installed and committed to reliably serve demand, during stressed grid and market conditions, with a high degree of confidence*
- COST SAVINGS
  - *Unlock the benefits of diversity in supply and demand in a safe and equitable way*
- IMPROVED VISIBILITY & COORDINATION
  - *Enable members to make fully informed RA planning decisions, using common industry planning metrics and methods*

Project Timeline

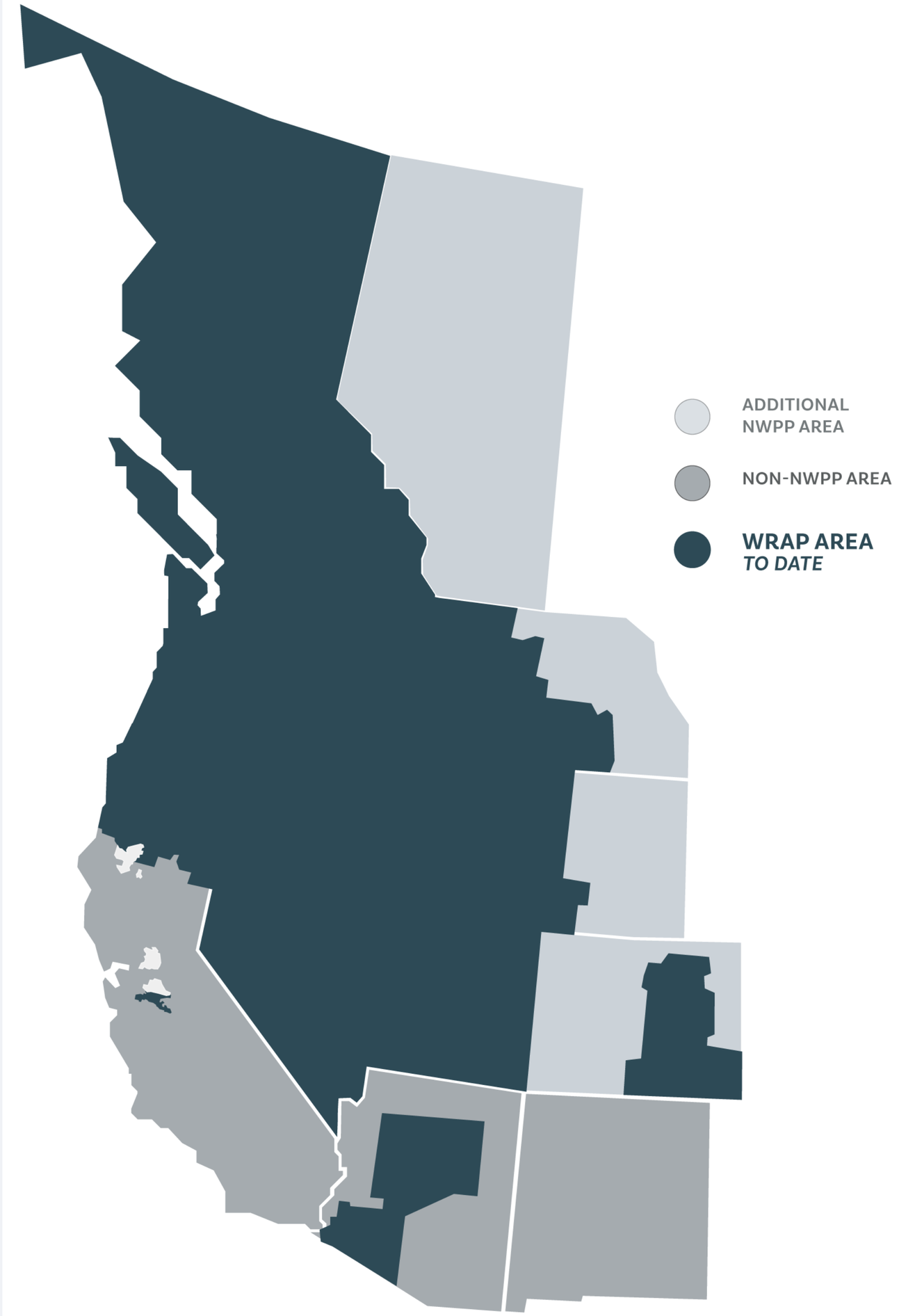


Program Participation

- Participation open to Load Responsible Entities (LREs) – both in and outside current NWPP footprint
- Voluntary entry (absent any contractual or other regulatory requirements), followed by obligation to comply
- Participants decide how they will meet the program resource requirements – through resource ownership or contracts
- Participants agree to use common resource planning metrics
- IPPs and LREs (program Participants and those not participating) are all eligible to contract with Participants

Initial Phase 3A Participants

APS
Avangrid
Avista
Black Hills
BPA
Calpine
Chelan PUD
Clatskanie PUD
Douglas PUD
EWEB
Grant PUD
Idaho Power
NorthWestern
NV Energy
PacifiCorp
PGE
Powerex
PSE
SRP
SCL
Shell
Snohomish PUD
Tacoma Power
TEA
TID



Phase 3A – nonbinding trial

- Phase 3A began Oct 1
- Runs through Dec 2022
- 25 Participants so far
- Approximately 70,000 MWs of peak season load
- Data collected for participating entities on Nov 8
- No penalty for non-compliance
- First forward showing for Winter 2022-2023 on May 15, 2022
- Second forward showing in September 2022 for Summer 2023

Program Framework

Two Time Horizons

FORWARD SHOWING | **OPERATIONAL SEASON** | **AFTER THE FACT**

1 and 3 Years Prior — 7 Months Prior — 3-5 Months Prior — 6 Days Prior — Present

Multi-Year LOLE Assessment
PO provides advisory LOLE study results 2-3 years out and binding 1 years out

Portfolio Deadline
Entities contract to meet regional metrics / demonstrate compliance

Cure Period
PO verifies all entities have met obligation / entities true up discrepancies

Rolling Daily Assessment
Assess upcoming need for pooled resource sharing

Sharing Event
Energy deployment to meet regional event needs

Settlement for held and deployed energy

Note: PO refers to Program Operator

FORWARD SHOWING

BALANCING LOADS AND RESOURCES

DEMAND SIDE

Calculate: “PURE” CAPACITY NEEDED BASED ON:

- **P50 LOAD FORECAST +**
- **Contingency Reserves +**
- **PRM needed to meet The RA metric (1 in 10 LOLE)**

SUPPLY SIDE

Calculate: “PURE” CAPACITY AVAILABLE BASED ON:

- **Total Supply, de-rated and qualified as follows:**
  - ***Wind and solar – ELCC***
  - ***Thermals – UCAP***
  - ***Run of River Hydro – ELCC***
  - ***Storage Hydro – UCAP + NWPP developed hydro methodology***
  - ***Other (Storage, Demand Response, etc.)***

“PURE” CAPACITY NEEDED < “PURE” SUPPLY AVAILABLE

Show 75% of capacity is backed by firm or conditional firm transmission

Two binding seasons

Season	Binding/ Advisory	Duration	Compliance Showing Date	Cure Period
Winter	Binding	Nov-March 15	March 31	June 1 – July 31
Summer	Binding	June-Sept 15	October 31 (of prior year)	Jan 1 – Feb 28
Spring	Advisory	April-May	N/A	N/A
Fall	Advisory	October	N/A	N/A

Program Operator will provide additional out-year (2-3 years) assessment of RA requirements for planning purposes

Operational Program

- Need ability to access diversity in real-time
- PO monitors participants needs 5-7 days in advance
- Day ahead assessment
  - *Participants with unplanned conditions may be eligible for next day assistance*
  - *Participants with planned extra capacity asked to hold back*
- Operating day assessment
  - *If a participant meets hour ahead criterion, then they will be provided energy*
  - *Long participants must deploy energy*
- Transmission
  - *All transactions scheduled to a hub (Mid-C and ?)*
  - *Delivering participant must schedule firm transmission to the hub*
  - *Receiving participant can schedule firm or non-firm transmission from the hub*
- Settlement of both day ahead capacity hold and/or energy deployed

GOVERNANCE

PROPOSED APPROACH

- NWPP governing authority – “Public Utility”
- Independent **Board of Directors** (BOD)
  - *Once the initial structure of the board and program is established, the board has authority to approve budgets; provide direction and set priorities*
  - *Proposed governance preserves structures and functions of exiting NWPP program*
- **Participant Committee** (RAPC) with influence
  - *Substantive authority to modify amendments to the RA Program*
  - *Substantive authority to modify RA Program rules*
  - *Subject to stakeholder right of appeal to independent board*
- Program Operator – Southwest Power Pool
- Point of compliance - Load Responsible Entity (LRE)

Governance

Proposed Approach

- **State Officials Committee** (SOC) – meeting through end of year to refine the role of this committee
- **Nominating Committee** (NC) – the members of the BOD will be selected by a NC comprised of multi-sector representatives.
- **Program Review Committee** (PRC) – future changes to the program rules will be recommended through a multi-sector committee
- **Independent Evaluator** (IE) – Reports to BOD for annual review of program

Next Steps

Phase 3A – Non-binding Program

(October 2021-December 2022)

- Non-Binding Forward Showing Program
  - *Determine regional PRM and resource capacity credits in Q1 2022*
  - *Perform two Forward Showings: Winter 2022/23, Summer 2023*
- Preparation for later phases
  - *Prepare for FERC filing (filing targeted for March 2022)*
  - *Prepare for NWPP independent board (transition in 2023)*
  - *Work through outstanding design considerations for Operations program*

Phase 3B - Full Binding Program

(March 2023 showing for winter 2023/24)

QUESTIONS

Northwest Power Pool (nwpp.org)

Resource Adequacy Program Impact to IRP

Avista, Electric IRP – TAC Meeting 1

December 8th, 2021

Michael Brutocao, Natural Gas Analyst

Planning Reserve Margin

Summer

- 2021 IRP method: ~14.6%
  - **Planning Margin (7%)** + Operating Reserves + Regulation
- RAP: ~13%
  - **Planning Margin (12%)** + Operating Reserves for Non-Avista Load in Balancing Authority + Regulation

Winter

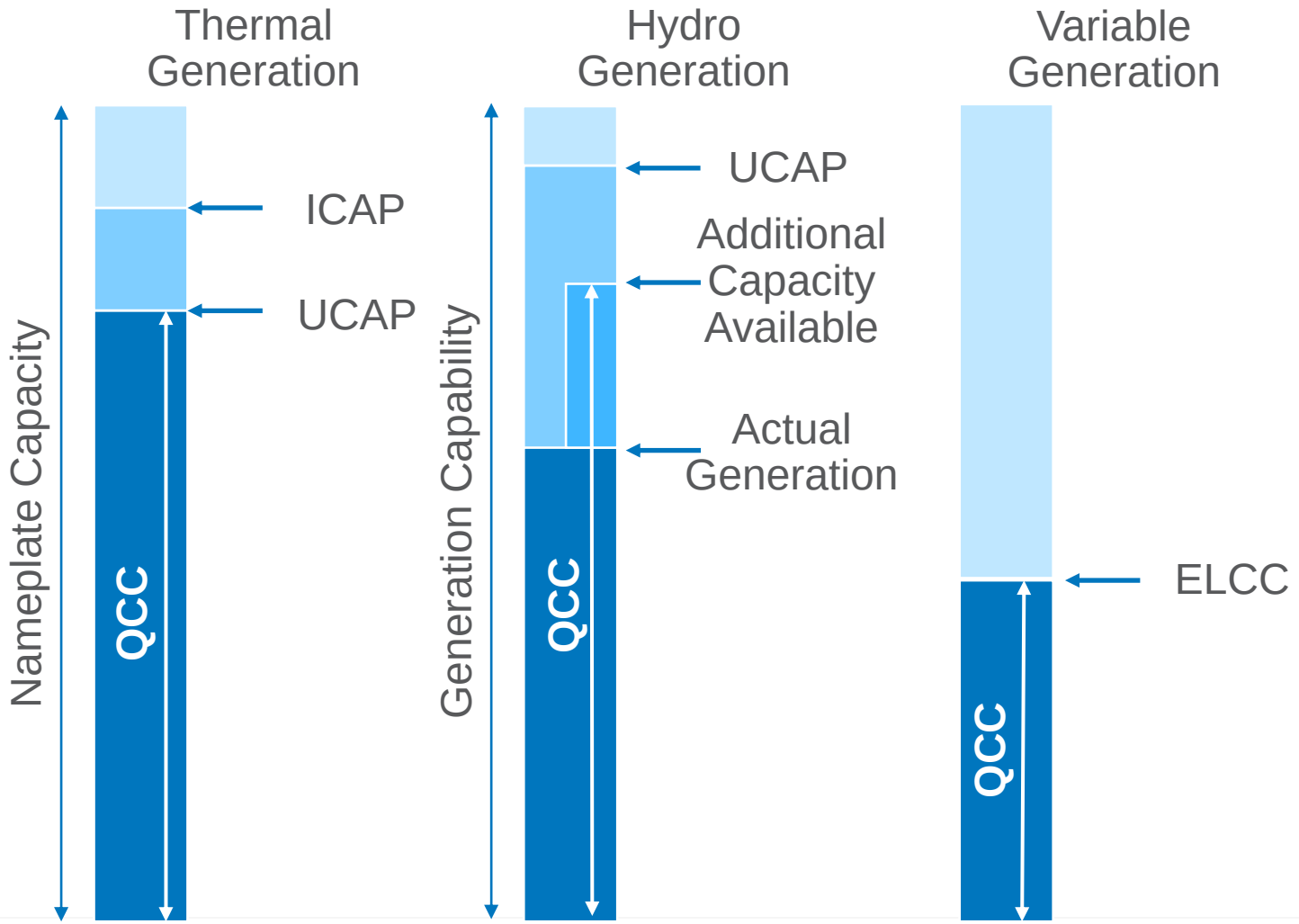
- 2021 IRP method: ~24.6%
  - **Planning Margin (16%)** + Operating Reserves + Regulation
- RAP: ~18%
  - **Planning Margin (16%)** + Operating Reserves for Non-Avista Load in Balancing Authority + Regulation

Obligations – RAP

- Peak Load
- System Sales
- Demand Response (-)
- Regulation
- Operating Reserves for BA Load (only non-native load)
- ~~Avista Operating Reserves~~

Rights – RAP

- Power Deal Purchases
- Thermal Generation
- Hydro Generation
- Variable Generation
- Small Power (QF, PURPA)
- Storage
- ~~Operating Reserve Credit – Hydro~~



Calculating Net Position – RAP

Planning Margin
~~Operating Reserves (load)~~
~~Operating Reserves (generation)~~

Obligations
Peak Native Load
Power Deal Sales
Capacity Services
Demand Response
Regulation
Operating Reserves for BA Load
~~Operating Reserves~~

(1) **Total Obligation**

Rights
Power Deal Purchases
Coal
Wood
Wind
Solar
CCCT
Peaker
Spokane
Clark Fork
Mid-Columbia
Small Power
Storage
~~Oper Reserve Credit-hydro~~

(2) **Total Rights**

(3) Planning Margin

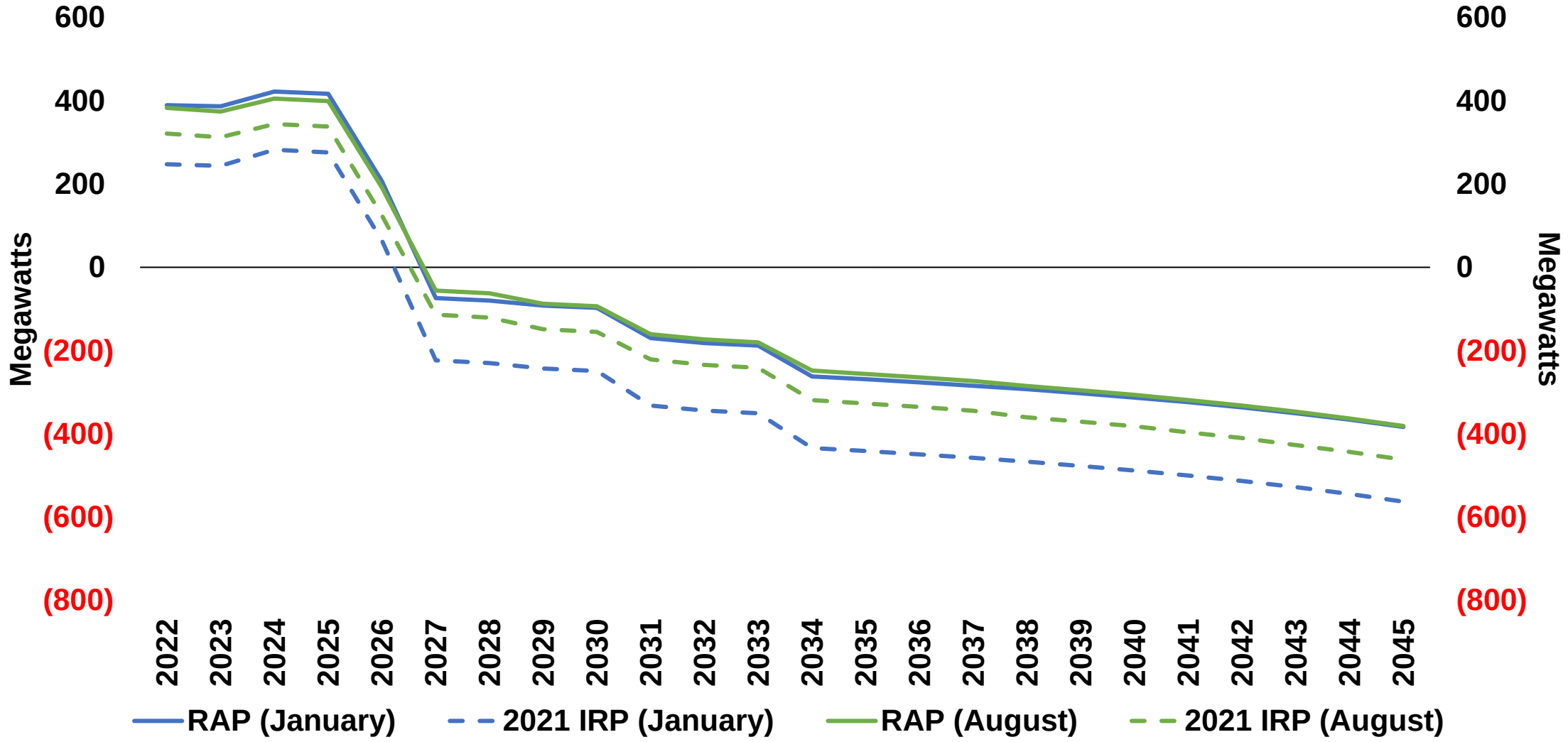
Net Position (2) - (1) - (3)

Resource Capability
x Qualified Capacity Contribution
Net Capability

Example: Lancaster GS

	282.00
x	98%
	273.36

2021 IRP Net Position with RAP Changes



*Net positions subject to change

Conclusions

- Participating utilities will use the same methodology for resource adequacy on determination
- Lower capacity requirements using RAP should lower customer cost
- RAP will result in additional market risk due to regional ELCCs for variable resources and storage

Resource Adequacy & Resiliency

Avista, Electric Technical Advisory Committee

December 8th, 2021 – TAC 1

James Gall, Electric IRP Manager

Resource Adequacy (RA)

- In the simplest terms, RA is just a regulatory construct developed to ensure that there will be sufficient resources available to serve electric demand under all but the most extreme conditions. – Gridworks
  - The result is a utility must plan for a certain “Planning Margin” or “Loss of Load Probability”
- Our utility Commissions have not required a specific RA requirement, but utilities have an obligation to serve (i.e. RCW 80.28.010 (2))
  - ”safe, adequate and efficient, and in all respects just and reasonable”
- Sufficient Resource Adequacy requires either regional coordination or additional resource supply

NERC Defines Reliability

The NERC defines reliability of the bulk electric system via two main responsibilities – adequacy and security.

Adequacy is defined as “the ability of the bulk power system to supply the aggregate electrical demand and energy requirements of the customers at **all times** (e.g., 1 day in 10 years), taking into account scheduled and reasonably expected unscheduled outages of system elements”.

Security (operating reliability) is defined as the “ability of the bulk power system to withstand sudden disturbances such as electric short circuits or unanticipated loss of system elements from credible contingencies”

North American Electric Reliability Corporation (NERC) “Reliability Issues Steering Committee report on Resilience.” (November 18, 2018)

Past IRP's Resource Adequacy Considerations

- Planning margin requirements
- Loss of load probability studies
- Annual energy acquisition targets
- Resource peak credit estimates
- Largest single contingency

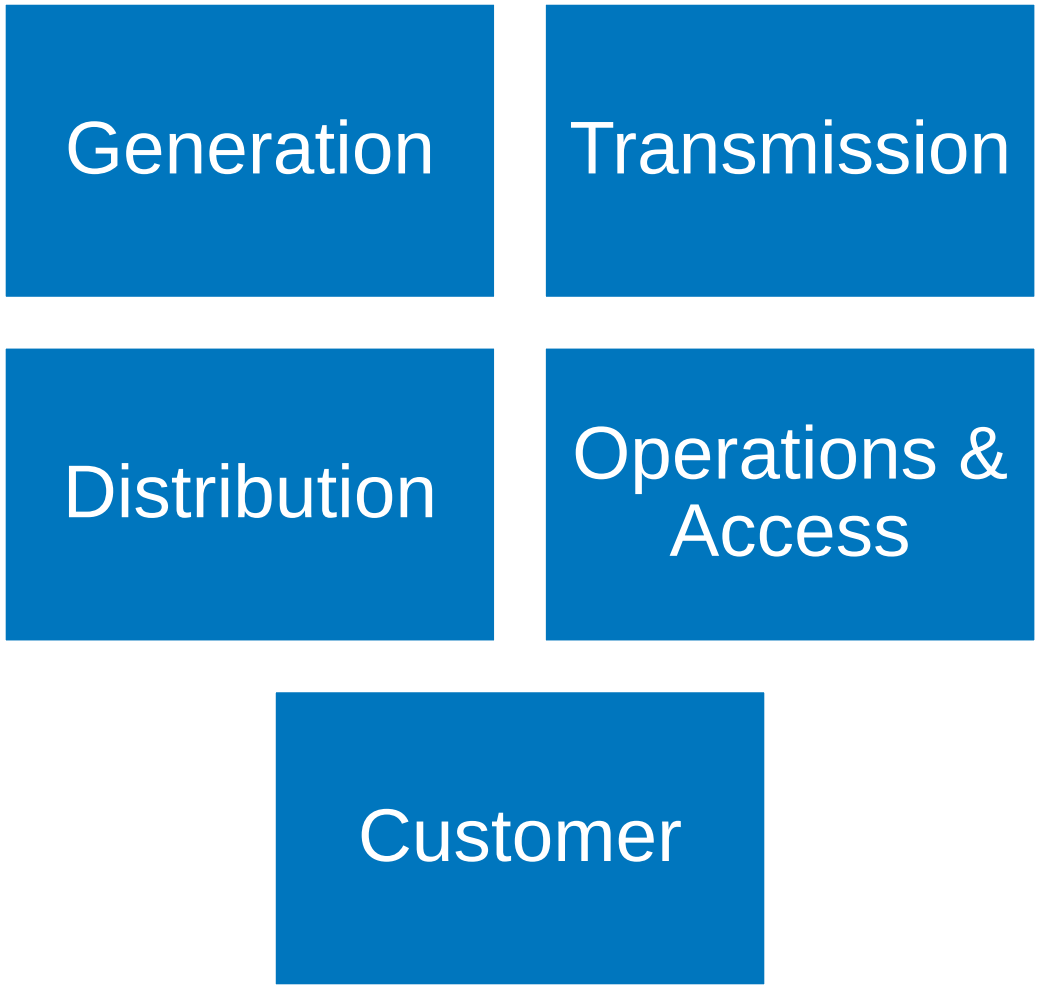
Resiliency

- Resilience is generally defined as increasing the ability of the power system to prevent or mitigate the impact of unusual or catastrophic events (e.g., storms, fires, earthquakes, cyber and physical attacks).

  - Finster, M., Phillips, J., Wallace, K. “Front-Line Resilience Perspectives: the Electric Grid.” Prepared for U.S. Department of Energy, Office of Energy Policy and Systems Analysis – Global Security Sciences Division, Argonne National Laboratory (November 2016)

- Washington’s CETA calls out energy security and resiliency as benefit from the transition to clean energy
  - This benefit is tracked as a customer benefit indicator”

Resiliency Area’s of Concern



Resiliency Risks

Flooding	Wind, Snow, and Ice Load	Extreme weather (drought, heat, rainfall, wind, etc.)
Cyber Security, Civil Unrest, Terrorism	Wildfires	Permafrost and Land Movement
Funding	Organizational Silos	Supply Chain & Personnel

.

Hall, P., Vanderbeck, R., and Triano, M. (May 2019) Electric utilities: An industry guide to enhancing resilience. Resilience Primer. Wood Group PLC and Resilience Shift, UK.

Past IRP's Resiliency Considerations

- Critical water planning (10th percentile)
- Fuel supply limitations
- Fuel price risk
- Weather protections included in resource costs
- Modeling weather related generation constraints
- Transmission interconnection requirements
- Non-energy impacts for energy efficiency

Resource Adequacy & Resiliency Changes for the 2023 IRP

- Resource acquisition will target monthly & seasonal Resource Adequacy Program targets
  - Use RA Qualified Capacity Credits (QCC) for each existing and potential resource
  - Use RA required planning margin
- Ensure Avista has energy resources to meet each month's energy need assuming 10th percentile hydro conditions and 90th percentile loads
  - With increasing amounts of wind and solar generation, Avista will need to plan for lower expected generation
  - Should Avista plan for average monthly energy or both On-Peak vs Off-Peak?
  - Draft CETA "use" rules require hourly clean energy delivery "planning"
- Conduct stochastic risk assessment to measure market exposure risk
  - Risk assessment may lead to higher planning margins or need for additional transmission

Resiliency Group Discussion

- What resiliency topics should be evaluated in the IRP vs other planning forums?
- What level of resiliency should utilities plan for?
  - Spectrum of probability
  - Outage time and service level
  - Utility cost vs societal cost
- How interchangeable is DERs with grid improvements?
- Customer resiliency
  - Self generation, fuel diversity, shell improvements, shelters, critical infrastructure
- Should we conduct resiliency related scenario analysis and what should we change in the plan based on the results?
- Include resiliency credit for local resources
  - May have locational and benefit limitations
  - Additional resources cost are likely for resources to be responsive to distribution outages
  - Require feedback loop between T&D planning
- Integrated Resource and Resiliency Planning
- Resiliency product offerings (i.e., home generators or storage)

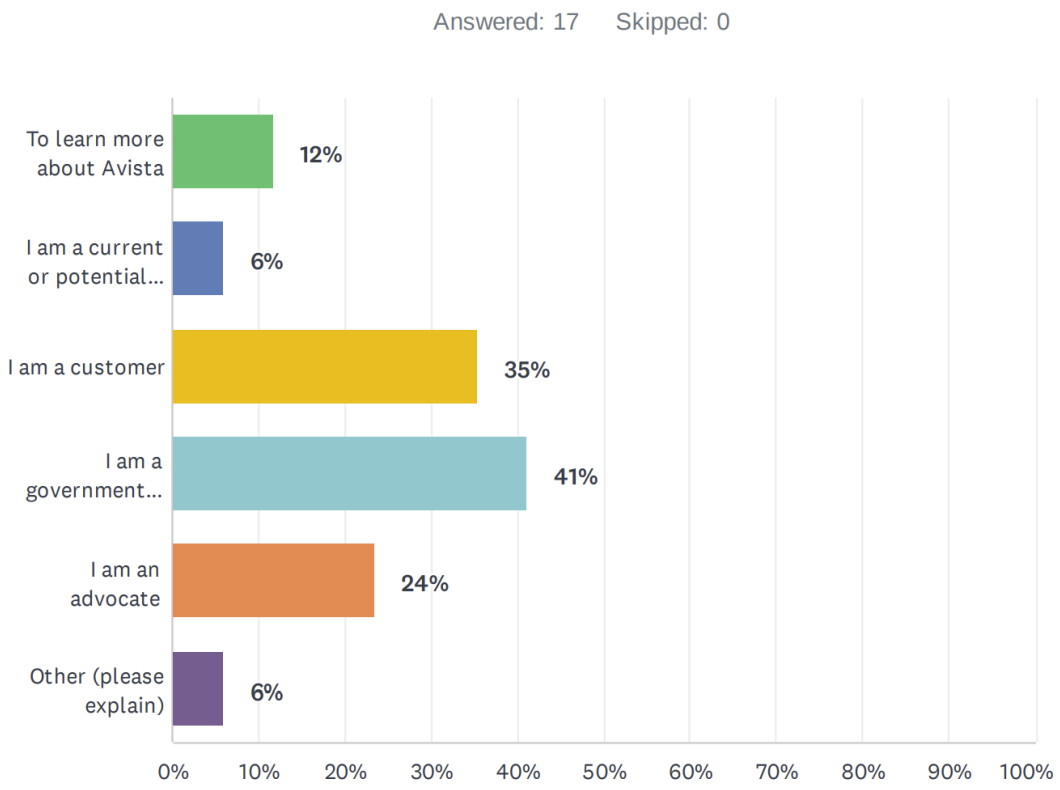
Technical Advisory Committee Participant Survey

2023 Electric IRP

First Technical Advisory Committee Meeting, December 8, 2021

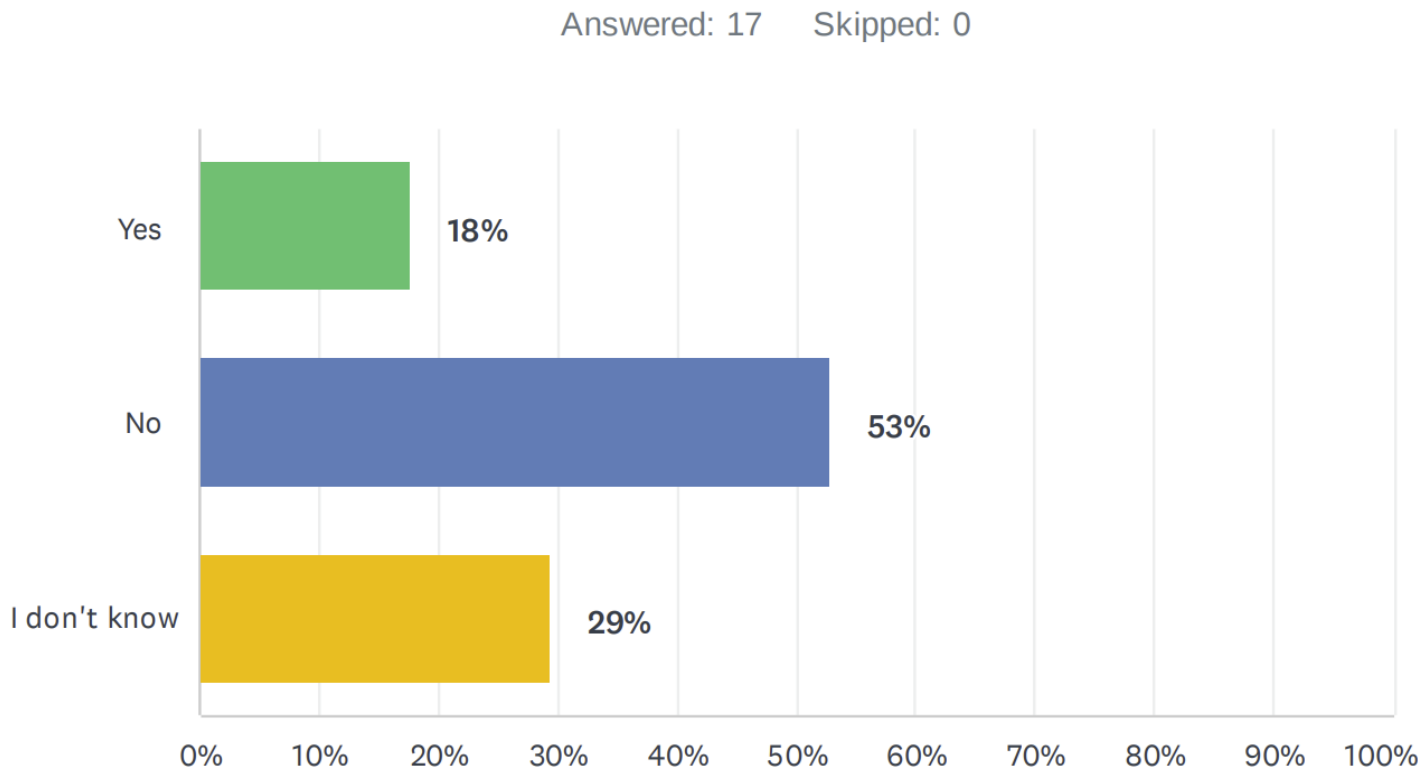
Lori Hermanson, Senior Power Supply Analyst

Why are you involved in the IRP process?

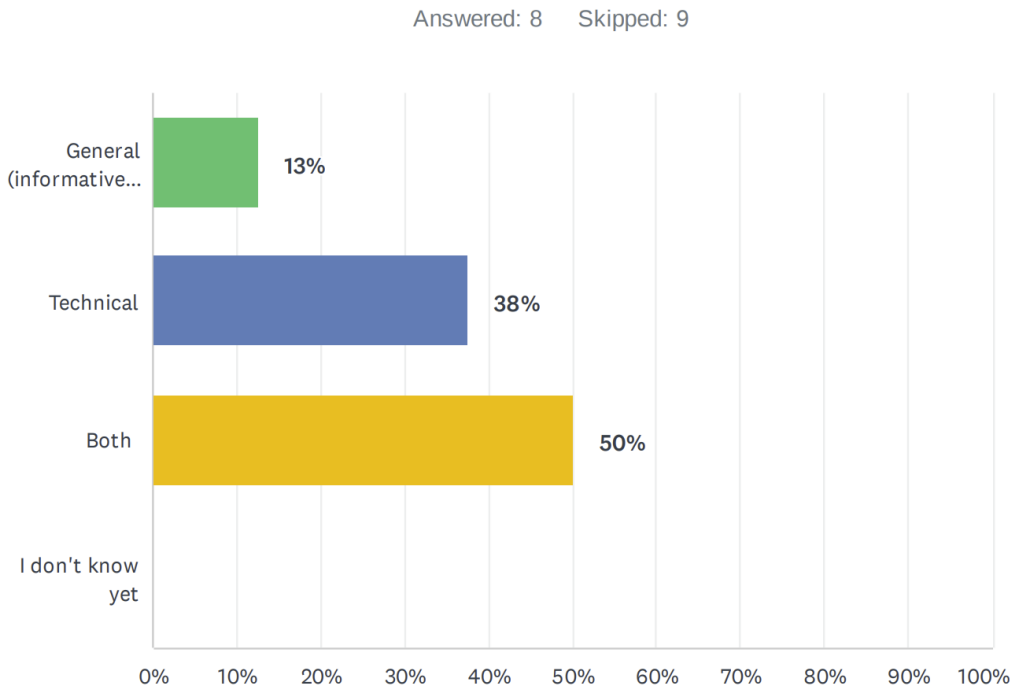


- Majority of participants are non-customers from government entities
- Many are customers
- One wants to drive solar

Would two IRP tracts (i.e. informative vs. technical) be better?

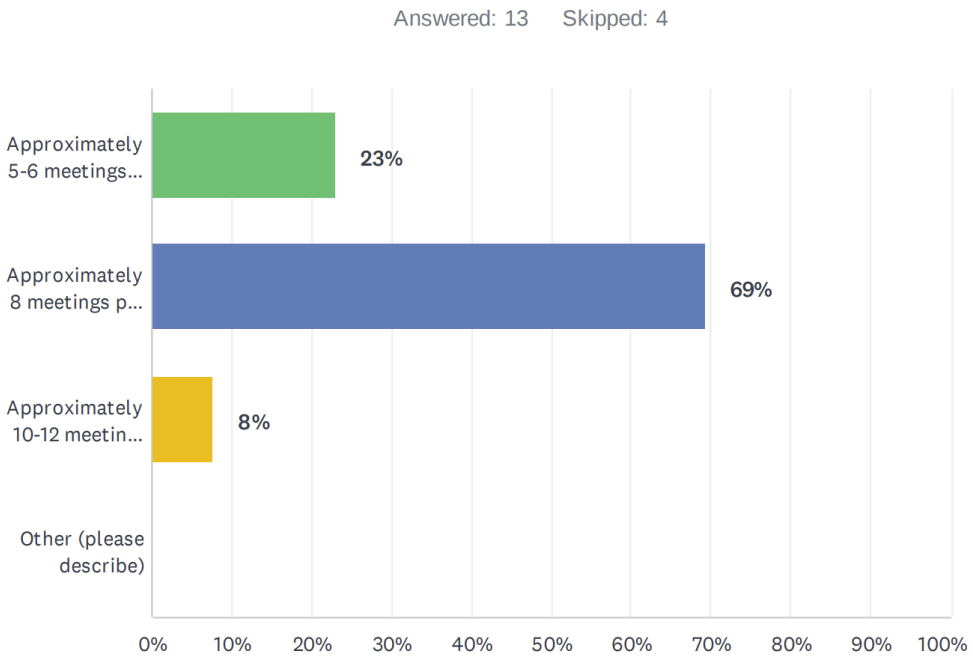


Which tract would you prefer to participate in?



- 88% prefer to participate in technical or both technical and informative

What is your preference for meeting occurrence and length?



- 69% prefer approximately 8 meetings per IRP with meetings no more than 3-4 hours in length

What topics would you like to discuss?

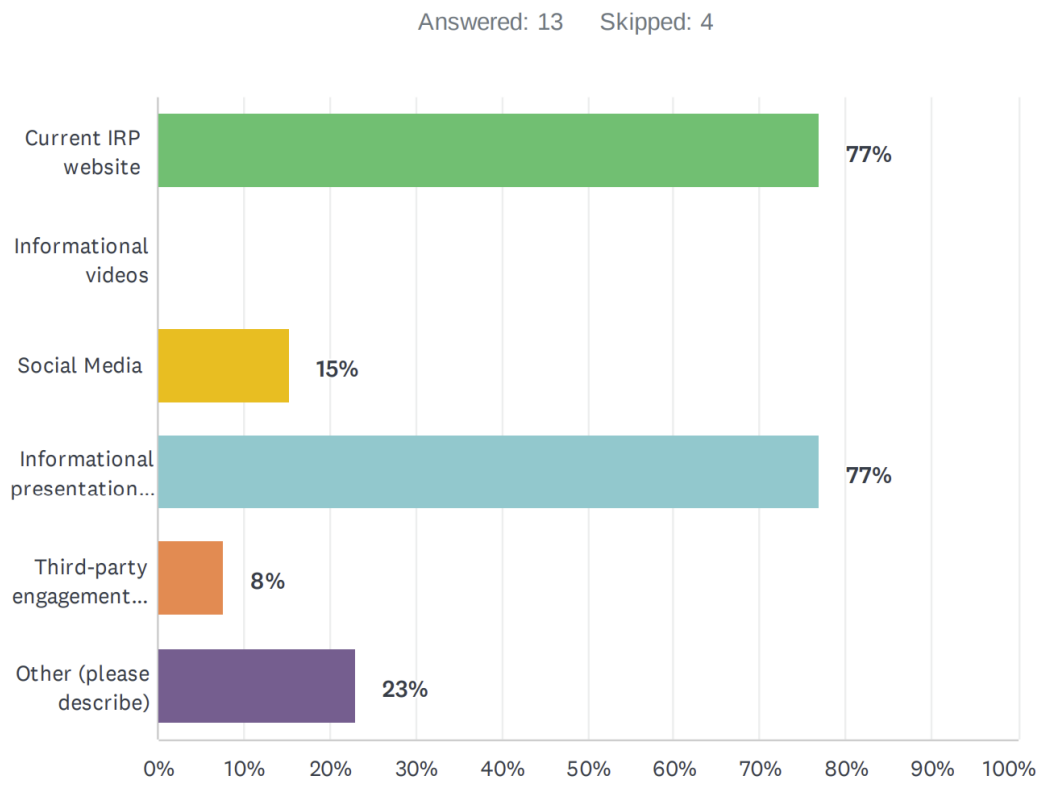
- Customer partnerships – local resource options (DR, EE, DER, electrification)
- Resource adequacy*
- Regional area network vulnerability and Avista's contingency plan to prevent loss of service*
- Stakeholder review and feedback of Avista's generic resource assumptions*
- Potential sources of renewable energy realistic for Avista's service territory, DER and energy storage options*
- Transmission and distribution technologies; T&D capacity limits; improvement needs (both regionally and local)*
- Regulatory strategy to protect legacy power generating capacity
- Nuclear power to replace coal (long-term, low-cost) instead of wind or solar; use natural gas for peaking not energy
- Impact of customer benefit indicators on IRP process*
- Resource cost/benefits analysis (new resources vs PPAs)
- Load & resource balance*
- EV adoption forecast*
- Action items status*
- Climate change*
- Reliability*
- Jurisdictional allocations

*Covered in today's or future TAC meetings.

What additional supporting data would you like to see?

- Balance was right – a strength of the 2021 IRP
- Chart of portfolio with annual operating costs and risk profile of each resource strategy – shows customers' risk exposure
- Updated climate modeling
- Refined resource adequacy considerations that target multiple characteristics including need, duration, probability and size; modeling that allows a suite of storage resources to be selected
- Current plan is to comply with WA law – plan should provide reliable, low-cost power to customers
- Modernize resource modeling with tools like WIS:dom-P (Vibrant Clean Energy) that models load, grid and renewable potential to the neighborhood level and identify where DER + storage deployment is least-cost investment
- Utilize existing biomass energy resource, not wind or solar

What are your preferences to engage customers?



- Majority prefer the website or informational presentations to engage customers
- Improved website that explains the issues and steps instead of text and links
- Newspaper articles
- Input from actual customers not outside environmental groups since customers pay the bills and hold the financial risk

What did you like about the 2021 IRP Process?

- Process was complete and detailed. Appreciated how Avista endeavored to implement the WA clean energy law and meet Idaho policy expectations (challenging!)
- Increased transparency; amount of data and presentations for varying levels of technical expertise
- Large audience
- Nice job of explaining the data and modeling tools/techniques used so folks understood the outcomes
- Logic was to comply with CETA only – we need a customer-focused IRP!
- Good presentations/presenters
- Remote meetings and format

What improvements would you like to see?

- Stop assuming Idahoans want methane gas plants. We want reliable, affordable energy.
- Focus on providing low cost, reliable power from sources that have a long-term stable cost outlook. Natural gas costs driven up as its used to firm wind/solar. Should be using nuclear and biomass with limited natural gas for peaking.
- Continue to find ways to make complicated concepts accessible to the general public.
- Online index of what topics were covered during various TAC meetings.
- Promote the process.
- Ensure Avista's modeling tools are able to conduct modern day resource planning (e.g. consider a suite of storage resources to meet capacity shortfalls, multiple characteristics of resource adequacy, modern climate modeling and aligning inputs with a fast-evolving industry)

Washington State Clean Energy Implementation Plan Customer Benefit Indicators

December 8, 2021 – 2023 Electric IRP TAC 1

Annette Brandon

Clean Energy Transformation
IRP to CEIP

Integrated Resource Plan (IRP)

20+ year resource planning identifying customer future resource needs

- Lowest reasonable cost of resource mix including societal benefits
- Maintain and protect safety, reliable operation and balancing of electric system
- Economic, health and environmental benefits

Clean Energy Action Plan (CEAP)

Sets 10-Year targets for resources based on the lowest reasonable cost plan including; filed jointly with IRP

- Societal costs;
- Clean energy requirements; and
- Reliability Requirements.

Clean Energy Implementation Plan (CEIP) 2022-2025

CEIP establishes the actions the utility will take to comply with CETA goals over the next four years. Including:

- Interim Targets
- Specific Targets
- Public Participation Process
- Customer Benefit Indicators

Public Participation Inputs

Identify Named Communities

Highly Impacted Communities

Vulnerable Populations

Benefits/Barriers “Equity Areas”

Benefits of Clean Energy

Prioritization

Barriers to Participation

Customer Benefit Indicators

Measurable

Accountable

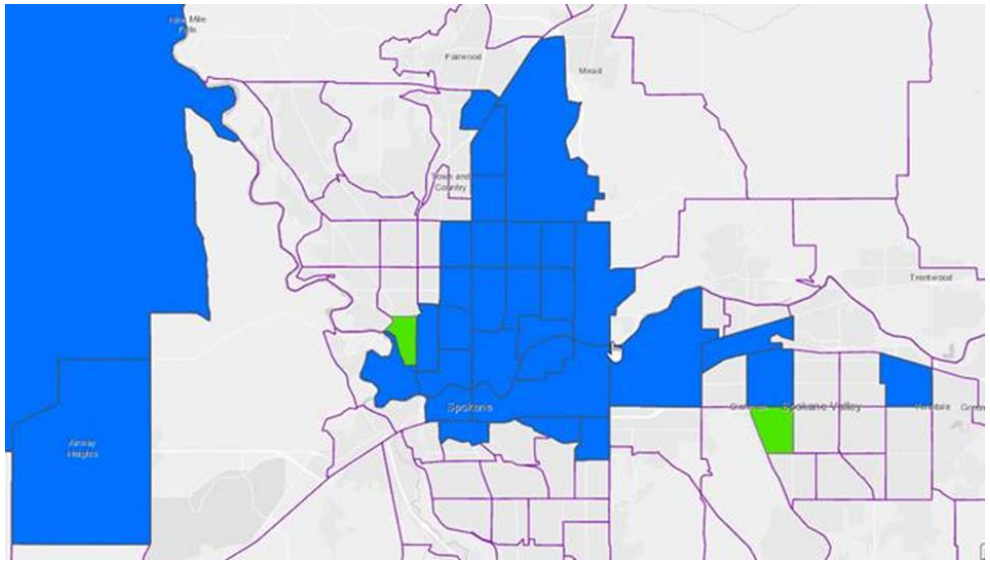
CEIP

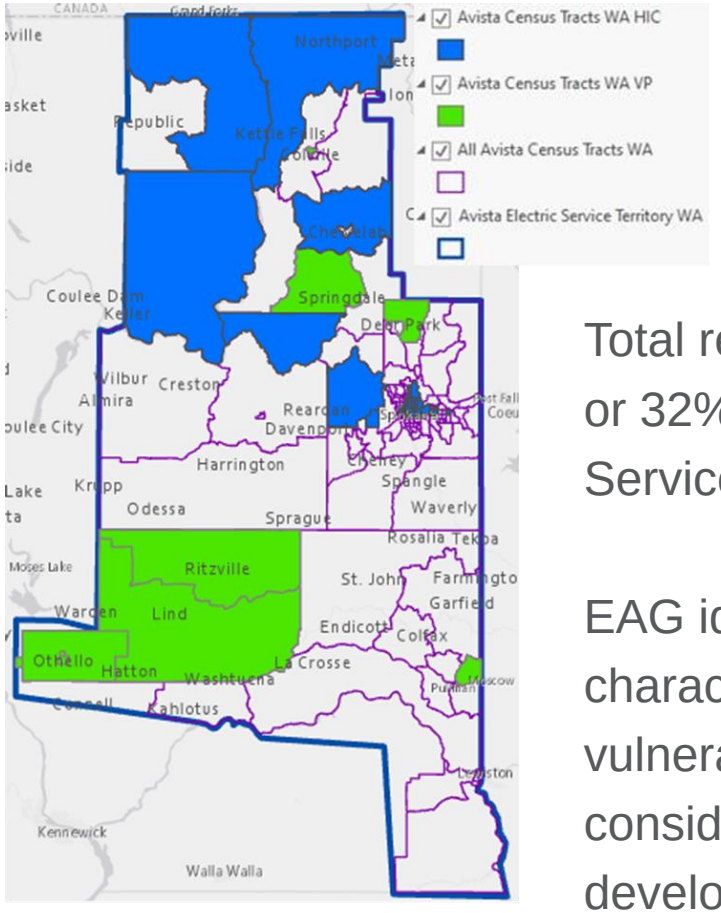
Resource Mix

Lowest Reasonable Cost

Resource Adequacy

Highly Impacted Communities and Vulnerable Populations ("Named Communities")
Who is most Impacted?





- Highly Impacted Communities
  - Designated by DOH
  - 34 Census Tracts (25%)

- Vulnerable Populations
  - Socioeconomic and sensitive population areas 9 or higher
  - 13 Census Tracts (7%)

Total represents 47 areas or 32% of total Washington Service Territory.

EAG identified additional characteristics for vulnerable populations considered as part of CBI development.

Benefits of Clean Energy Transition

Utilities must consider input from advisory group members (including equity advisory group), and customers to meet requirement that all customers benefit from the transition to clean energy through:

Equity

- Equitable distribution of energy and nonenergy benefits and reductions of burdens to vulnerable populations and highly impacted communities

Public Health and Environmental

- Long term and short-term public health and environmental benefits and reductions of costs and risks;
- Such as less air pollution which results in lower asthma rates

Energy Security and Resiliency

- Energy Security – strategic objective to maintain energy services and protecting against disruption
- Energy Resiliency – ability to adapt to challenging conditions from disruptions

Meet Planning Standards

- Maintaining and protecting the safety, reliable operation and balancing of the electric system
- Lowest reasonable cost including social costs

Developing Customer Benefit Indicators – From 86 touchpoints to 12 Final

- How could the transition to clean energy benefit (or unintentionally harm) customers?
  - Affordability
  - Environmental
  - Access to clean energy
  - Energy security, resiliency
  - Community/economic development
  - Health and well-being
- What may be some barriers or burdens?
  - Language
  - Cultural
  - Awareness
  - Transportation Access

Prioritizing Customer Benefit Indicators

- Communication Power
  - To what extent is the indicator easily understandable by a broad audience?
- Proxy Power
  - Which are critically tied to everyone benefiting equitably from the transition to clean energy? (“Data Herd”)
- Data Power
  - Which are most able to be tracked, measured, and counted?

Customer Benefit Indicators

Customer Benefit Indicator (CBI) – is an attribute, either quantitative or qualitative of a resource or related distribution investment associated with customer benefits

Customer Benefit Indicators

Affordability
Participation in Company Programs
Number of Households with high energy burden (>6%)

Community Development
Named Community Clean Energy Investment in Named Communities

Access
Outreach and Communication
Transportation Electrification

Energy Resiliency & Security
Energy Availability
Generation Location

Environmental
Greenhouse Gas Emissions
Outdoor Air Quality

Public Health
Employee and supplier diversity
Indoor Air Quality

CBIs are measurement tools for evaluating progress towards ensuring customers are benefitting from the transition to clean energy.

Areas considered:

- ✓ Affordability
- ✓ Access to Clean Energy
- ✓ Environment and Public Health
- ✓ Energy Security and Resiliency
- ✓ Community and Economic Development

Directly Related IRP CBIs

Number of Households With High Energy Burden	Energy Burden by All Customers and Named Communities
Named Community Clean Energy	Percent of Energy Efficiency, Non-Emitting, Renewable Energy in Named Communities
Energy Availability	Resource Adequacy Planning Margin
Energy Generation Location	Percent of Generation Located in Washington or Connected to Avista T&D system
Outdoor Air Quality	Avista Plant Air Emissions
Greenhouse Gas Emissions	Avista's GHG emissions

Number of Households with High Energy Burden

The goal is to reduce the number of customers, especially in Named Communities, with an energy burden of six percent or more.

BASELINE METRIC

County	Households Energy Burdened in Excess of 6% (electric heat)	Energy burdened households as a percent of total households (electric heat)	Average excess burden per household (electric heat)
Adams	802	22%	$752
Asotin	810	13%	$669
Ferry	198	18%	$754
Lincoln	427	18%	$638
Spokane	14,211	16%	$533
Stevens	2,355	20%	$718
Whitman	1,543	11%	$589
Total	20,346	16%	$621

Baseline (preliminary) a point-in-time estimate (as of year end 2020) developed by Empower DataWorks.

Named Community detail in progress.

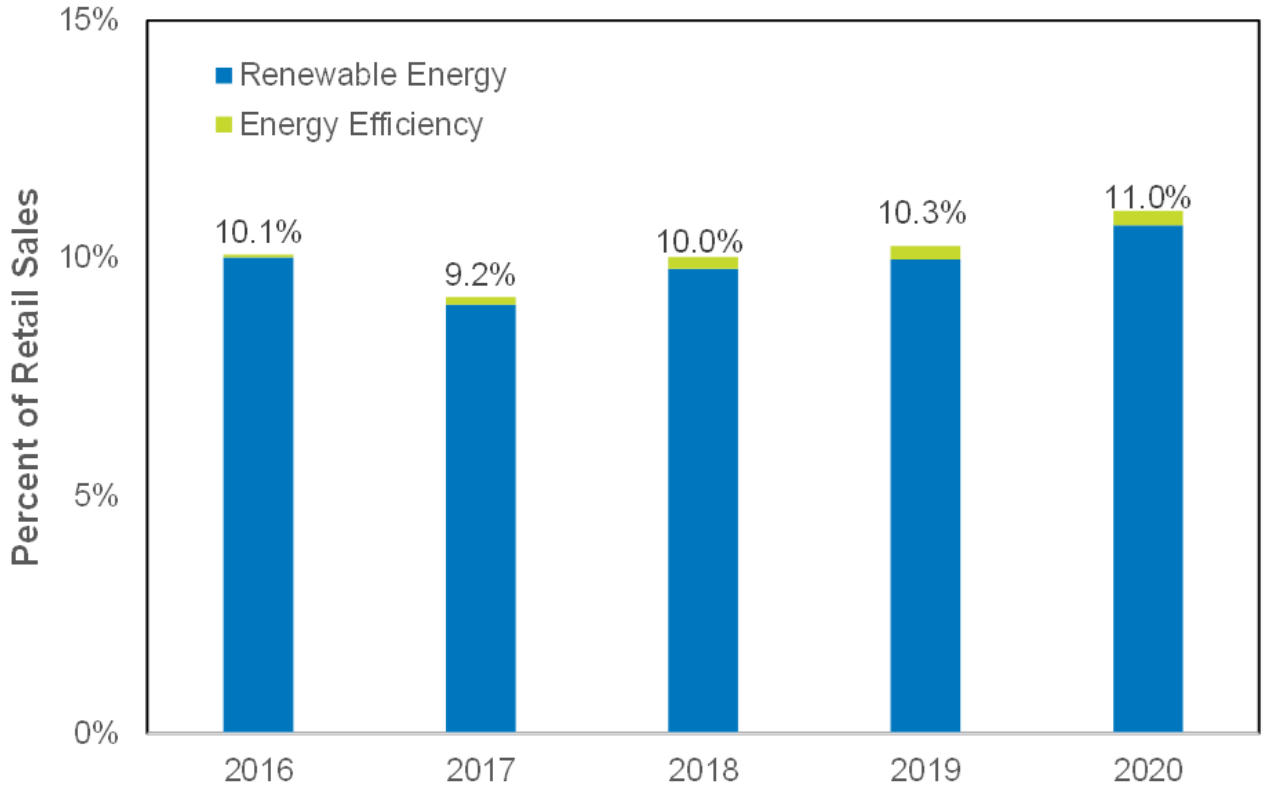
Lowest Reasonable Cost Resource calculation benefits customers in terms of

- ✓ Reduction of Burdens (if located in Named Community)
- ✓ Reduction of Cost (for all Customers)

Named Community Clean Energy

The Named Community Clean Energy CBI concentrates on the percent of non-emitting or clean energy resources, including distributed generation or energy efficiency in Named Communities.

Percent of Non-Emitting/Renewable Energy in Named Communities

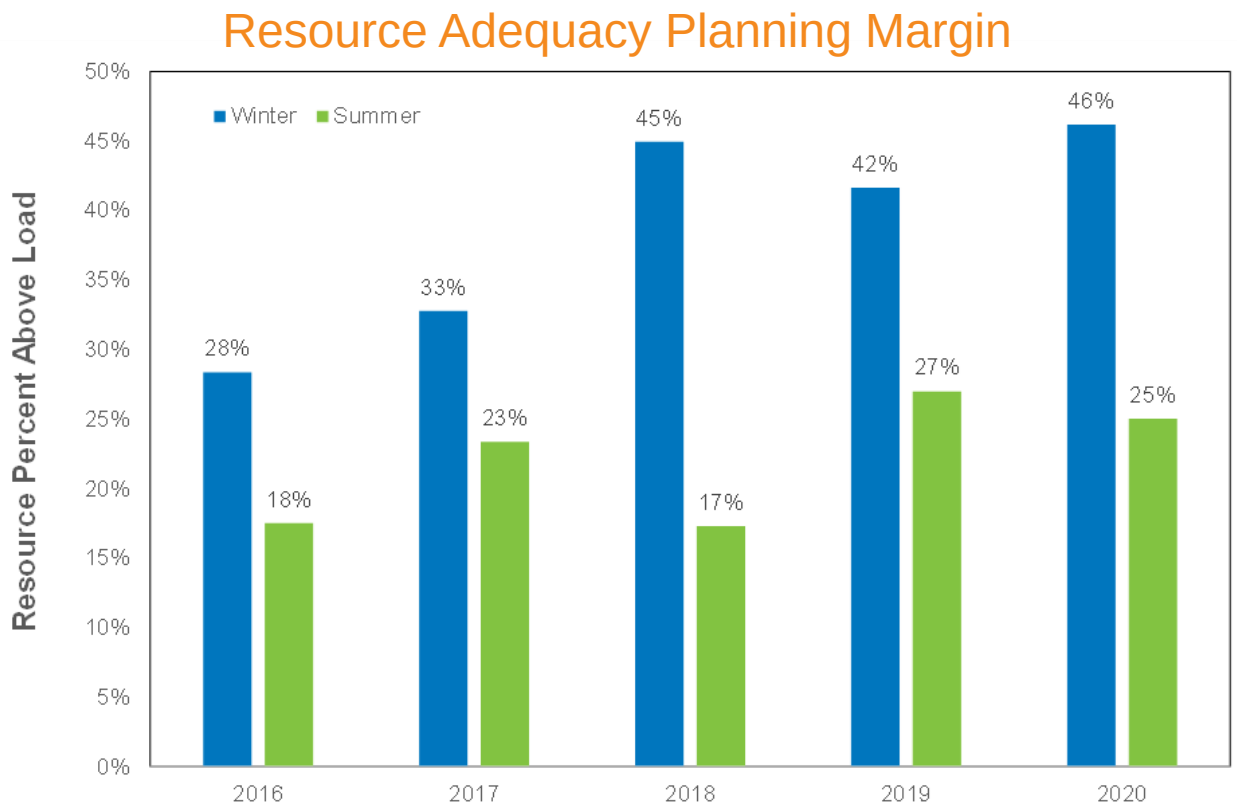


Power Supply Contribution:

- ✓ Reducing energy burdens and costs.
- ✓ New distributed energy resources may aid in faster recovery from outages.
- ✓ Non-energy benefits such as labor and economic development

Energy Availability

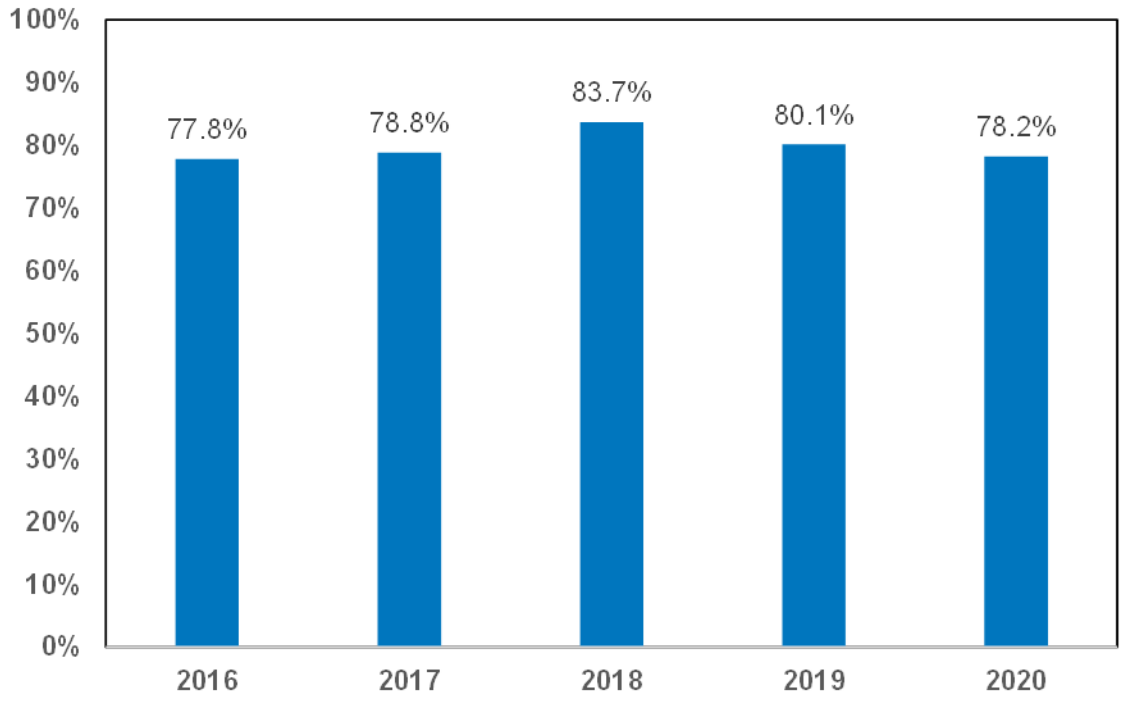
Avista's resource Planning Margin is a measure of resource adequacy indicating the level of customer exposure to resource outages or market reliance.



Energy Generation Location – Energy Security

As part of Named Community development, Avista will track the amount of clean generation and energy efficiency in its annual system resource mix. The benefits associated with this metric will provide economic opportunities to these communities and a more energy secure pathway.

Percent of Generation located in WA or Connected to Avista Transmission system

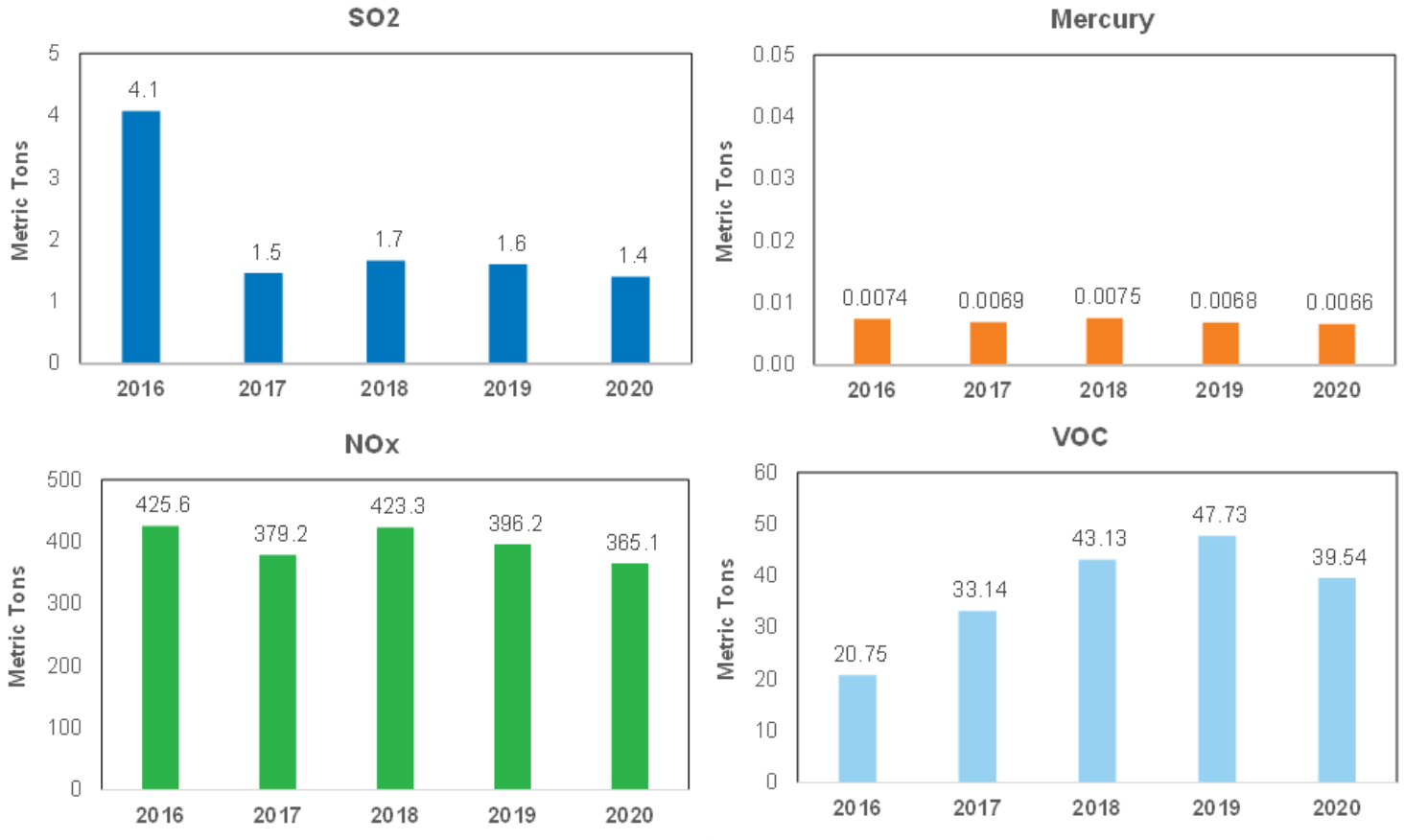


- Locating resources closer to customers will not eliminate disruptions.
- Local generation may create benefits by reducing transmission of power risk and/or policy issues from out-of-state resources.
- There are risks to utilizing local generation such as lack of diversity of weather, for example

Outdoor Air Quality

Avista will monitor Avista-specific Plant Air Emissions on a locational basis.

Avista Plant Air Emissions

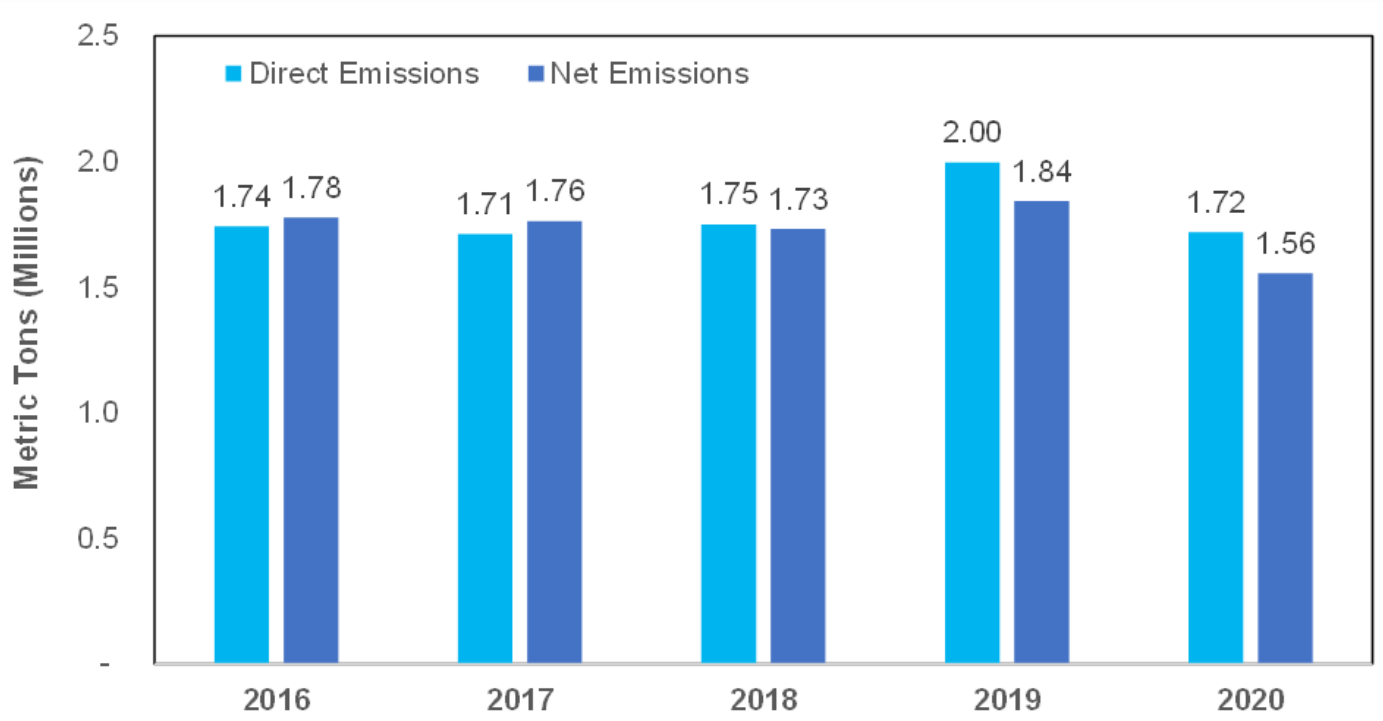


Greenhouse Gas Emissions

Avista will monitor the greenhouse gas emissions from Avista resources and how it interacts with the wholesale market.

Renewable Energy Projects will contribute to the overall reduction in Regional GHG as we move towards 2030.

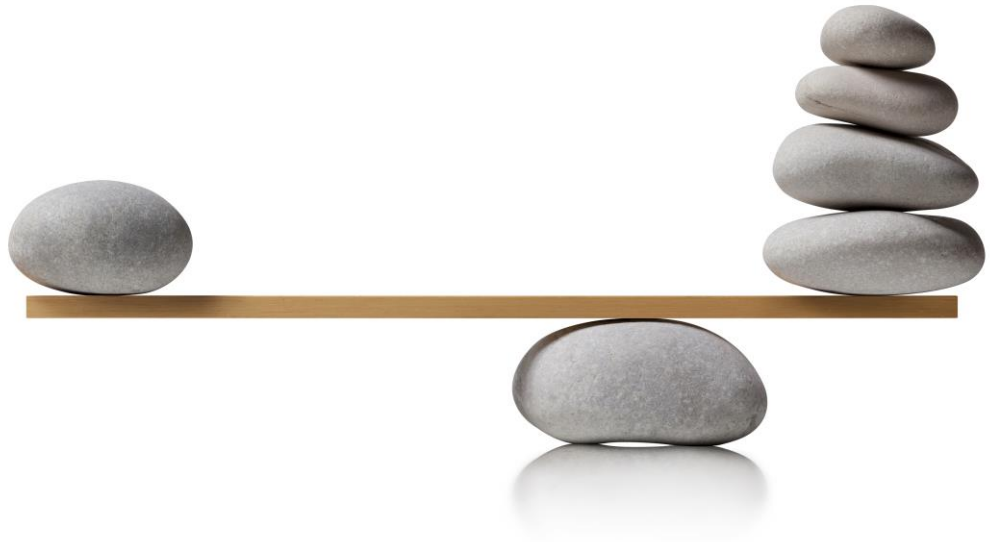
Avista-specific GHG



CBIs and Resource Selection

CBIs must be incorporated into resource selection and program prioritization in order to ensure customers are benefitting from the transition to clean energy.

Energy Efficiency	Used to prioritize programs Focus on impacts to Named Communities
Demand Response	Will be used in development of Time of Use and Peak Time Rebate pilots
Renewable Energy Acquisition	Considered in weighting of RFP evaluation



CBIs and Resource Selection

IRP Portfolio Analysis and Preferred Portfolio must consider:

- Lowest Reasonable Cost
- Include cost-effective, reliable and feasible conservation and efficiency resources and distributed energy sources
- Consider acquisition of existing renewable resources
- Maintain and Protect safety, reliable operation and balancing of the utility's electric system
- Include long-term strategy and interim steps to equitable distribute benefits or reduce burdens to highly impacted in vulnerable populations
- Assess the environmental health impacts to highly impacted communities

How to incorporate CBIs into this mix?

Prioritization

- one CBI is not determined to be more important than another on a stand-alone basis.
- Dependent upon resource selection, how much weight should be given?
- What about those that are not able to be quantified

- Weighting of factors?
- Develop standard weighting?

CBI's Indirectly Related to the IRP

Participation in Company Programs	Participation in weatherization programs and energy assistance programs (State and Named Community statistic)
Availability of Methods/Modes of Outreach & Communication	Number of outreach contacts Number of marketing impressions
Transportation Electrification	Number of trips provided by community-based organizations Number of public charging stations located in Named Communities
Investments in Named Communities	Incremental spending each year in Named Communities Number of customers/and/or community-based organizations served
Employee Diversity	Employee diversity equal to communities served by 2035 (goal)
Outdoor Air Quality	Weighted Average Days Exceeding Healthy Levels
Energy Availability	Average Outage Duration
Greenhouse Gas Emissions	Regional GHG Emissions by Sector
Supplier Diversity	Supplier diversity at 11 percent by 2035 (goal)
Indoor Air Quality	In development

How will the IRP address CBI's?

- Directly related IRP CBI's will be quantitatively forecasted in the IRP.
  - including of non-energy impacts and transitioning to 100% clean energy by 2045 may improve these indicators
- Indirectly related IRP CBI's will be qualitatively discussed in the IRP.
- In the event an indicator does not improve
  - Describe why the indicator is not improving
  - Document options for improvement, including impacts to other CBI's
- Other ideas?

CBI List

Participation in Company Programs	Participation in Energy Efficiency and Weatherization (“other”) Saturation Rate for Energy Assistance Programs
Number of Households With High Energy Burden	Energy Burden by All Customers and Named Communities
Availability of Methods/Modes of Outreach / Communication	Number of Outreach Contacts Number of Marketing Impressions
Transportation Electrification	Number of Annual Trips to CBOs and passenger miles for individuals utilizing electric transportation Number of Public Charging ports available to public in Named Communities
Named Community Clean Energy	Percent of Non-Emitting/Renewable Energy in Named Communities
Investment in Named Communities	Incremental annual spending of investments in Named Communities Number of customers and/or CBOs served each year
Energy Availability	Average Outage Duration Resource Adequacy Planning Margin
Energy Generation Location	Percent of Generation Located in Washington or Connected to Avista TX system
Outdoor Air Quality	Weighted Average Days Exceeding Healthy Levels Avista Plant Air Emissions (SO2, Mercury, Nox, VOC)
Greenhouse Gas Emission	Regional GHG Emissions by Sector Avista’s GHG emissions
Public Health	Employee and Supplier Diversity Indoor Air Quality

2023 IRP Draft Work Plan

2023 Electric IRP

TAC 1 – December 8, 2021

John Lyons, Ph.D. – Senior Resource Policy Analyst

2023 IRP Work Plan

- IRP regulations require an IRP to be filed in Idaho on April 1, 2023, and a progress report in Washington on January 1, 2023.

- Avista will ask Commissions to extend the filings to June 1, 2023, to allow for the completion of the 2022 All-Source RFP which will fundamentally change the resource strategy.
  - For the progress report in Washington, Avista will have 3 of the 4 requirements for the report by January 2023 but would prefer to hold off on filing a resource strategy until new contracts are signed.

- The IRP will incorporate resource selections from the 2022 All-Source RFP and meet capacity requirements in the Northwest Power Pool's Resource Adequacy Program.

2023 IRP Work Plan – Modeling

- Use Aurora for electric market prices, resource valuation and Monte-Carlo style risk analyses of the electric marketplace.
- Aurora modeling results will be used to select the PRS and alternative scenario portfolios using Avista's proprietary PRiSM model.
- Qualitative market risk evaluations involve separate analyses with Avista's ARAM model or Plexos.
- Applied Energy Group (AEG) is conducting energy efficiency and demand response potential studies.
- DNV is conducting non-energy impact study for supply-side resources to improve customer benefit indicators for Washington customers. DNV recently completed a similar study for energy efficiency.

Tentative 2023 Electric IRP TAC Schedule

- **TAC 1 (Wednesday, December 8, 2021):** 2021 IRP Action Item Review, Summer 2021 Heat Event Review, NWPP Resource Adequacy Program Overview, Resource Adequacy Program Impact to the IRP, IRP Resource Adequacy/Resiliency Planning Discussion, TAC Survey Results and Discussion, Washington State Customer Benefit Indicators, and 2023 IRP workplan.

- **TAC 2 (Tuesday, February 8, 2022):** Process Update, Demand and economic forecast, and Preliminary Load & Resource Balance.

- **TAC 3 (Wednesday, March 9, 2022):** Preliminary natural gas market overview and price forecast, Preliminary wholesale electric price forecast, Non-Energy Impact Study by DNV, and Existing resource overview.

Tentative 2023 Electric IRP TAC Schedule

- **TAC 4 (Late July 2022):** Conservation Potential Assessment (AEG), Demand Response Potential Assessment (AEG), energy efficiency inclusion of Social Cost of Greenhouse Gas (WA only)

- **TAC 5 (Early August 2022):** IRP transmission planning studies, distribution planning within the IRP, and NWPP Resource Adequacy Program update

- **TAC 6 (August 2022):** Supply side resource cost assumptions including DERs, ancillary services and intermittent generation analysis, update on All-Source RFP, update to energy and peak forecast, and update to Load & Resource balance

- **TAC 7 (September 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 forecast, and discuss portfolio and market scenarios options

Tentative 2023 Electric IRP TAC Schedule

- **Technical Modeling Workshop (October 2022):** PRiSM model overview, risk assessment overview (Plexos or ARAM), and 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, and market risk assessment
- ***Virtual Public Meeting- Natural Gas & Electric IRP (February/March 2023)***
- **TAC 9 (March 2023):** Final Preferred Resource Strategy, portfolio scenario analysis, final report overview and comment on plan, and Action Items
- Agendas, presentations & minutes: https://myavista.com/about-us/integrated-resource-planning

Tentative 2023 Draft Electric IRP Timeline

Task	Target Date
Update and finalize energy & peak forecast	May 2022
Transmission & distribution studies complete	June 2022
Identify Avista's supply resource options	July 2022
Finalize demand response options	July 2022
Finalize energy efficiency options	July 2022
Finalize natural gas price forecast	August 2022
Finalize electric price forecast	September 2022
Determine portfolio & market future studies	October 2022
Due date for study requests from TAC members	**October 1, 2022**
Finalize PRiSM model assumptions	October 2022
Simulate market scenarios in Aurora	November 2022
Portfolio Analysis	February 2022

Tentative 2023 IRP Writing Tasks

Writing Tasks	Target Date
File 2023 IRP Work Plan	January 1, 2022
Washington Partial Progress Report	January 1, 2023
External draft released to the TAC	March 17, 2023
Public Comments from TAC due	**May 12, 2023**
Final IRP submission to Commissions and TAC	June 1, 2023

Tentative 2023 Electric IRP Timeline – Public Data Releases

Task	Targeted Release
Peak & Energy Load Forecast	June 2022
Supply Side Resource Options	July 2022
Energy Efficiency Potential Study	July 2022
Demand Response Potential Study	July 2022
Transmission Interconnect Costs	July 2022
Wholesale Natural Gas Price Forecast	August 2022
Wholesale Electric Price Forecast	September 2022
Climate Change Impact Study Data	October 2022
Load Scenario Data	October 2022
PRiSM Model Available	November 2022
Draft PRiSM Model & Results	February 2023
Final PRiSM Model & Results	March 2023

2023 Electric IRP Draft Outline

1. **Executive Summary**

2. **Introduction, Stakeholder Involvement, and Process Changes**

3. **Economic and Load Forecast**
   - Economic Conditions
   - Avista Energy & Peak Load Forecasts
   - Load Forecast Scenarios

4. **Existing Supply Resources**
   - Avista Resources
   - Contractual Resources and Obligations
   - Customer Generation Overview

2023 Electric IRP Draft Outline

5. **Long-Term Position**
   - Regional Capacity Requirements
   - Energy Planning Requirements
   - Reserves and Flexibility Assessment

6. **Transmission Planning & Distribution**
   - 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

2023 Electric IRP Draft Outline

7. **Distributed Energy Resources**
   - Energy efficiency potential
   - Demand response potential
   - Supply side resource options
   - Named Community Actions

8. **Supply Side Resource Options**
   - New Resource Options
   - Avista Plant Upgrades
   - Non-Energy Impacts

2023 Electric IRP Draft Outline

9. **Market Analysis**
   - Wholesale Natural Gas Market Price Forecast
   - Wholesale Electric Market Price Forecast
   - Scenario Analysis

10. **Preferred Resource Strategy**
   - Preferred Resource Strategy
   - Market Exposure Analysis
   - Avoided Cost
   - Customer Benefit Indicator Impact
   - Clean Energy Action Plan Update

2023 Electric IRP Draft Outline

9. **Portfolio Scenarios**
   - Portfolio Scenarios
   - Market Scenario Impacts

10. **Action Plan**