



2024 Resource Program

Public Workshop

April 30th 2024



Prior Workshops

- June 2023
 - Overview of planned scope and key expected innovations for RP24;
 - Relationship between RP24, PoC, RP26, and resource acquisition
- November 2023
 - Data, methods, and results of forecasting for BPA obligations and regional TRL;
 - Needs Assessment overview

Agenda

Start	End	Time	Topic	Presenter/Facilitator
9:00 AM	9:25 AM	25	Workshop Agenda; RP24 Timeline and Planning Framework	Brian Dombeck
9:25 AM	10:10 AM	45	Load Forecasts and Planned Needs Assessment Sensitivities	Esther Neuls
10:10 AM	10:30 AM	20	Stakeholder Suggested Sensitivities and BPA Response	Ryan Egerdahl
10:30 AM	10:55 AM	25	Hydro Modeling	Milli Chennell
10:55 AM	11:10 AM	15	BREAK	
11:10 AM	11:45 AM	35	Discussion and Q&A	Ryan Egerdahl
11:45 AM	12:00 PM	15	Wrap up and Conclude	Brian Dombeck
12:00 PM			Conclusion	
Total		180		

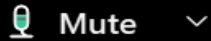
Format

- Presenters will communicate their preference for taking questions, which will be addressed in the order received
- Webex participants can adjust magnification of shared screen using (-/+) buttons
- If a question/opportunity for feedback arises during a presentation, please:
 - In-person: Raise your hand
 - Webex: Write it in the Webex Q&A or use the Webex “raise hand” feature; when called on, mute/unmute yourself.
 - Both: State your name and organization

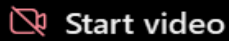
Note: The “Chat” feature in Webex has been disabled for this meeting. Please raise your hand or type questions in the “Q&A” box and it will be reviewed by facilitators.

Webex:

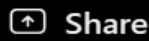
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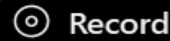
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Start video



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Raise Hand

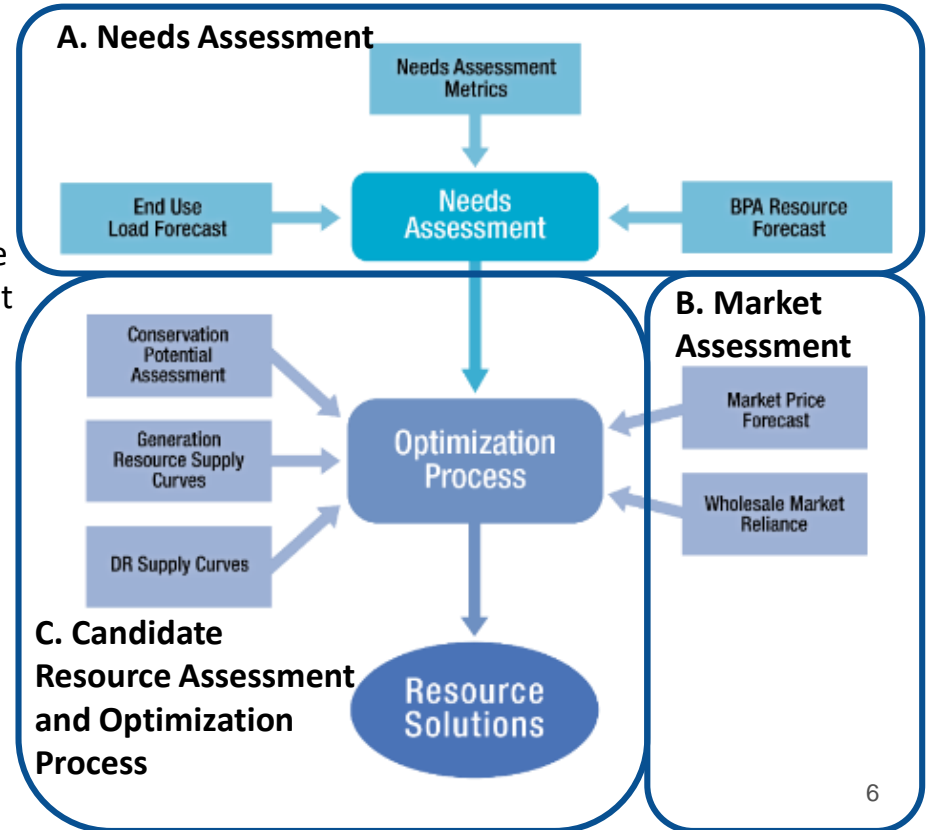
Reminder: Power Planning at BPA



- Each year, BPA publishes the Pacific Northwest Loads and Resources Study – often referred to as the **White Book** - which analyzes BPA's projections of retail loads, contract obligations, contract purchases, and resource capabilities over a 10-year study horizon and describes expected energy and capacity surplus/deficits under varying water conditions.
- On a biennial basis, BPA conducts an IRP-like assessment collectively referred to as the **Resource Program** which examines uncertainty in loads, water supply, natural gas prices, and electricity market prices to develop least-cost portfolios of resources that meet BPA's obligations.
- These processes are voluntarily undertaken to inform acquisition strategies and provide valuable insight into how Bonneville can meet its obligations cost-effectively. They are neither decision documents nor a process required by any external entity.

Resource Program Process

- A. The **Needs Assessment** measures the federal system’s expected generating resource capabilities to meet projected load obligations
- B. The **Market Assessment** simulates the evolution of power markets in the Western Interconnect to generate a long-term forecast of Mid-Columbia prices and market availability under a variety of generation, load, and economic conditions
- C. The **Candidate Resource Assessment and Optimization Process** explores how the varying costs, performance, and availability of candidate demand-and-supply-side resources (including conservation, demand response, market purchases, and generating resources) as well as wholesale market reliance can be used to provide a least-cost resource strategy for meeting identified needs



Resource Program and Provider of Choice



2024 Resource Program

- ➔ 2024 RP Development Processes
- ➔ Stakeholder Engagement continues (Spring/Summer 2024)
- ★ 2024 RP Doc. Published (Sep 2024)

Provider of Choice

- ★ Final Policy & ROD (Mar 2024)
- ➔ Policy Implementation and Contract Development (Mar 2024 - Sep 2025)
- ★ Contracts Signed (Dec. 2025)
- ★ Power Deliveries Under New Contracts Begin (Oct. 1, 2028)

2026 Resource Program

- ➔ 2026 RP Development Processes
- ★ 2026 RP Doc. Published (Sep. 2026)

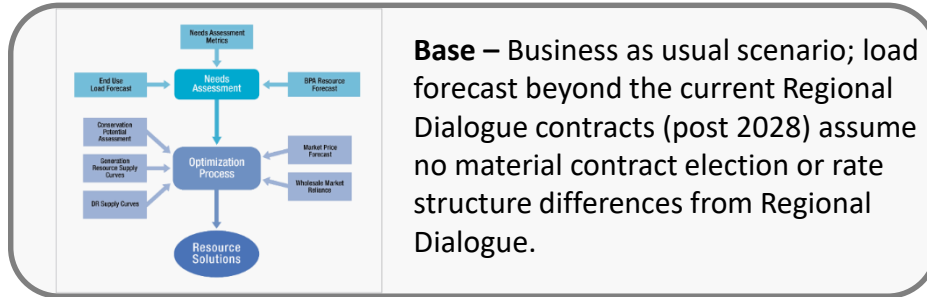
Key Takeaways

1. 2024 Resource Program concludes *before* PoC Contracts are executed
2. PoC contract election to occur at mid-point of 2026 Resource Program development

Planning Framework

Scenarios

Scenarios are comprised of a set of inputs that are consistently developed for a future outlook

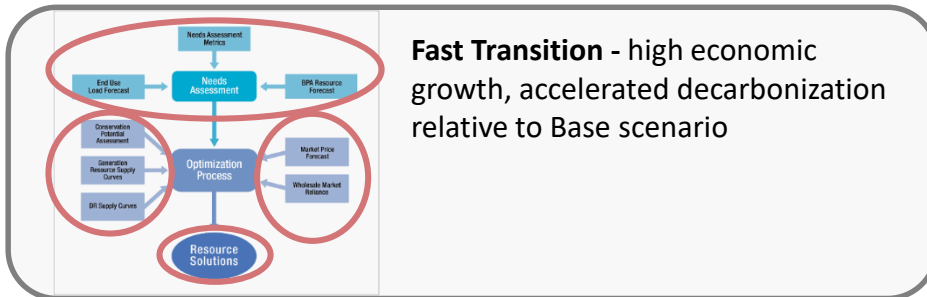


Base – Business as usual scenario; load forecast beyond the current Regional Dialogue contracts (post 2028) assume no material contract election or rate structure differences from Regional Dialogue.

Sensitivities

Changes to individual input assumptions (or smaller subsets of input assumptions) within a given scenario

- Provide BPA decision-makers with additional options to address key strategic interests (PoC / Carbon Vision, etc)
- Evaluate solution sensitivity to specific assumptions
- Assess solution robustness



Fast Transition - high economic growth, accelerated decarbonization relative to Base scenario

Planned Sensitivities

Loads and BPA Resources

- Flat block/NR Load Service
- Above-RHWM Load Service
- B2H Delay
- T1 System Size

Market and Candidate Resources

- Wholesale market price
- Wholesale market availability
- Supply side resource costs
- UCT vs TRC Costs for EE/DR Measures

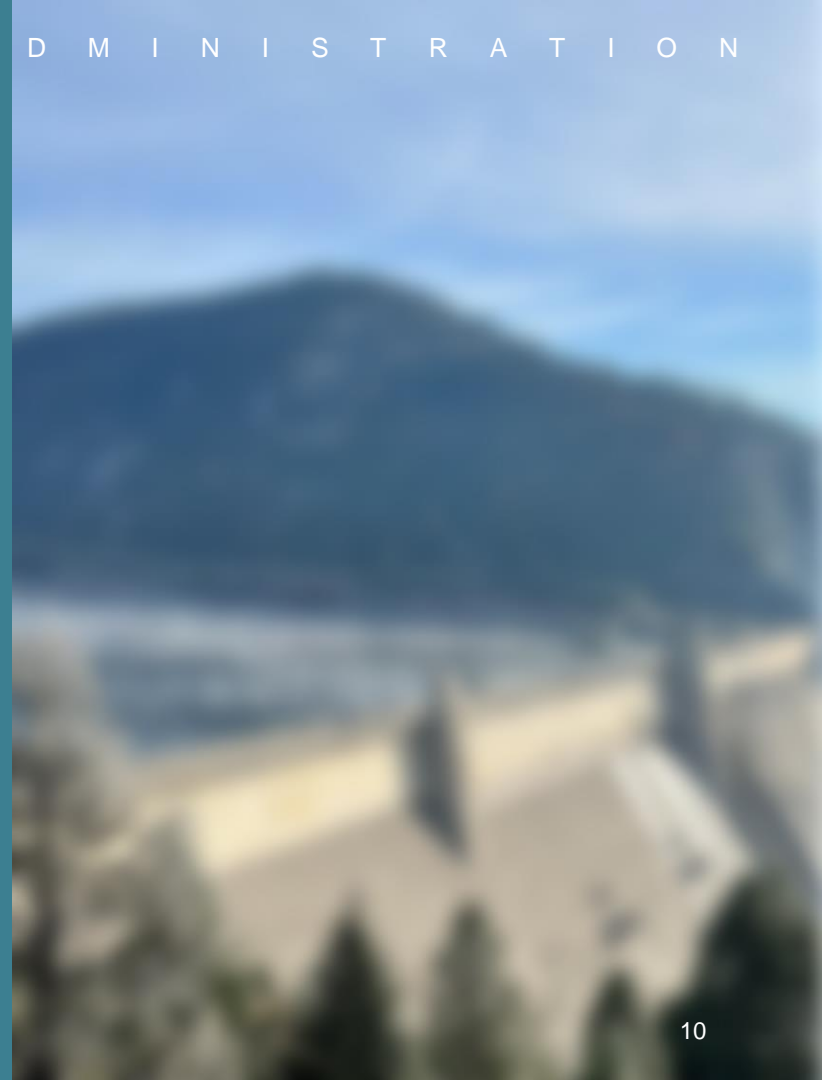
Resource Solutions

- Study Horizon
- Incremental needs vs economics
- Carbon price adder

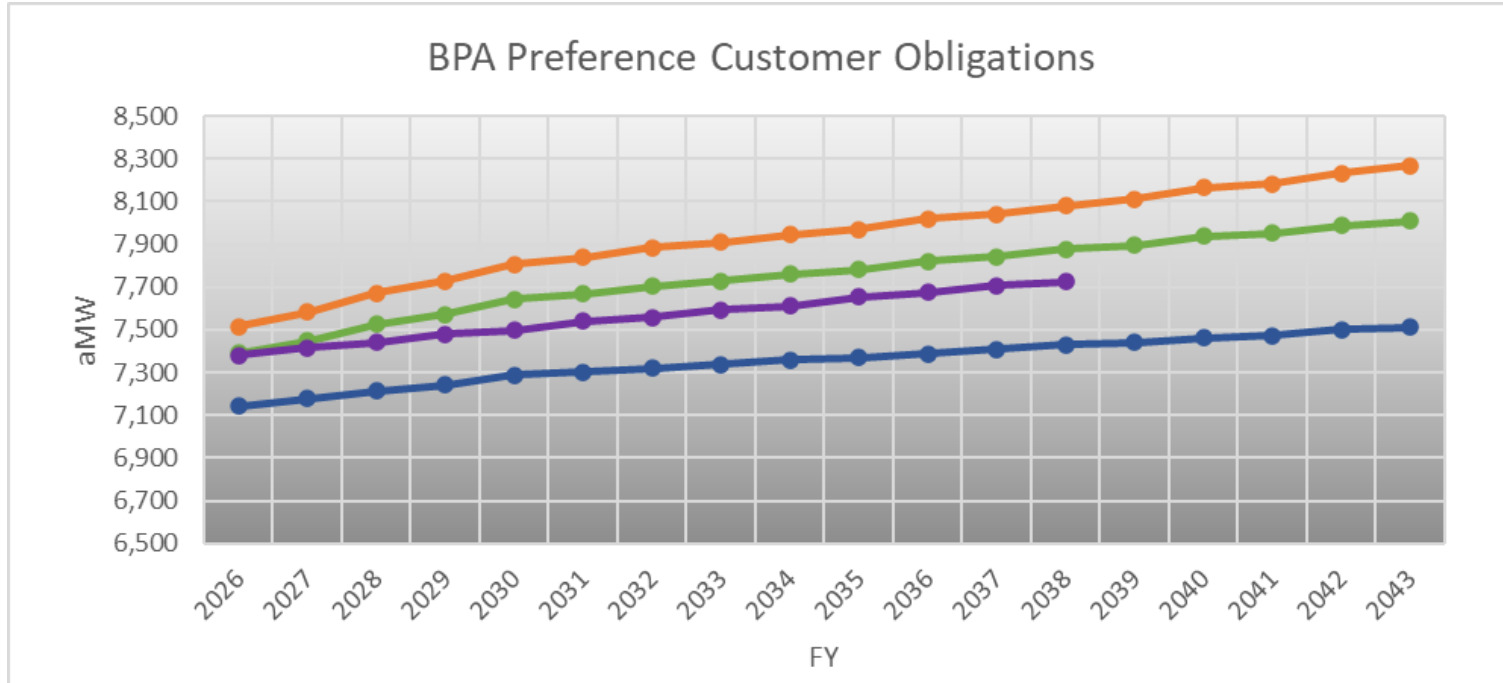
Load Forecasts and Planned Needs Assessment Sensitivities

Esther Neuls

Needs Assessment Study Lead

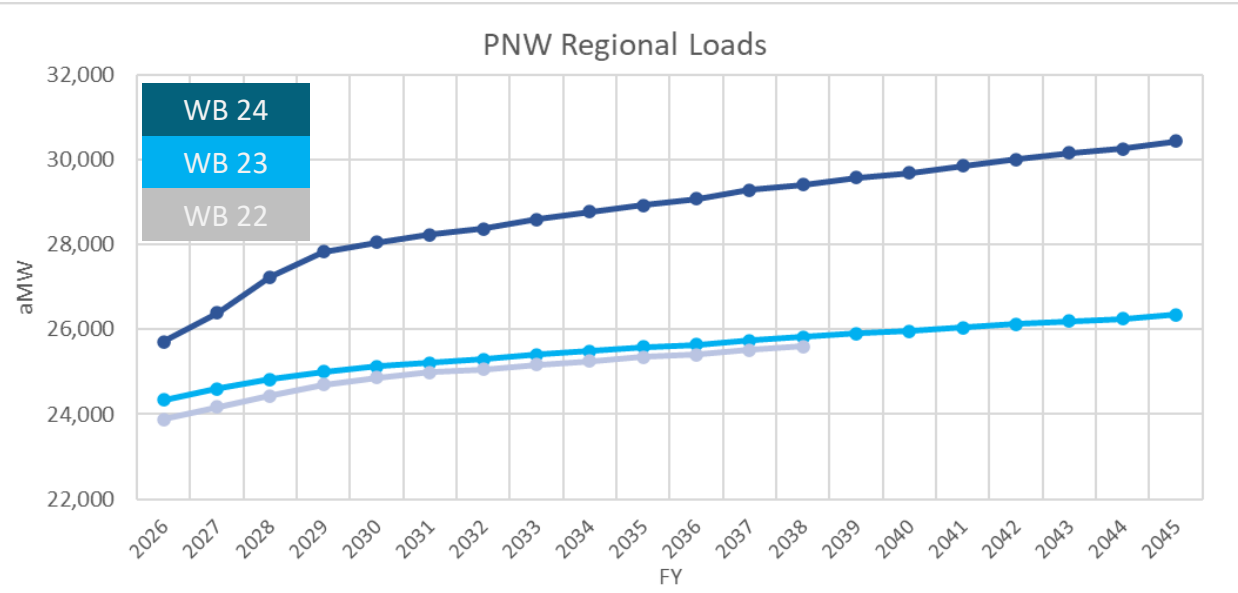


BPA Preference Customer Obligations (preliminary) - Annual



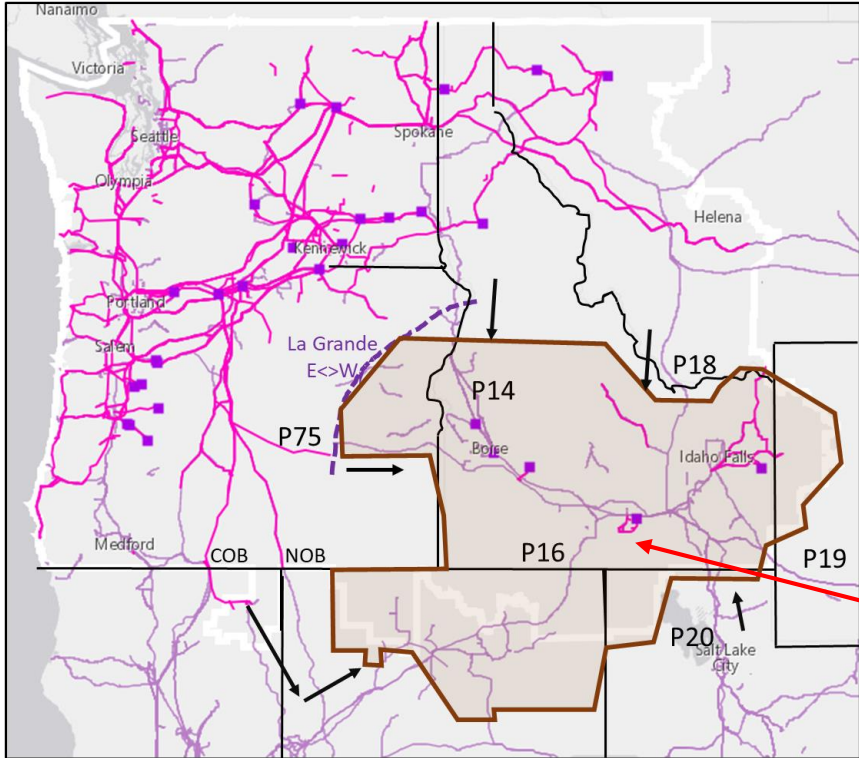
- WB24, RP24 Base & FT use slice right to power proxy. All exclude Contract Deliveries.

Pacific Northwest Regional Forecast - Expected



- Expected loads aka White Book (WB) load Forecasts
- Investor-Owned Utilities (IOU) loads included
- Not Include:
 - Inflation Reduction Act (IRA)
 - Climate Change adjustments
 - Exports

WRAP & RP24 Zones: Mid-C & SWEDE



Western Resource Adequacy Program (WRAP) likely requires BPA load in each zone to be served with a combination of physical resources (with qualifying capacity) and firm transmission (from resource to the load).

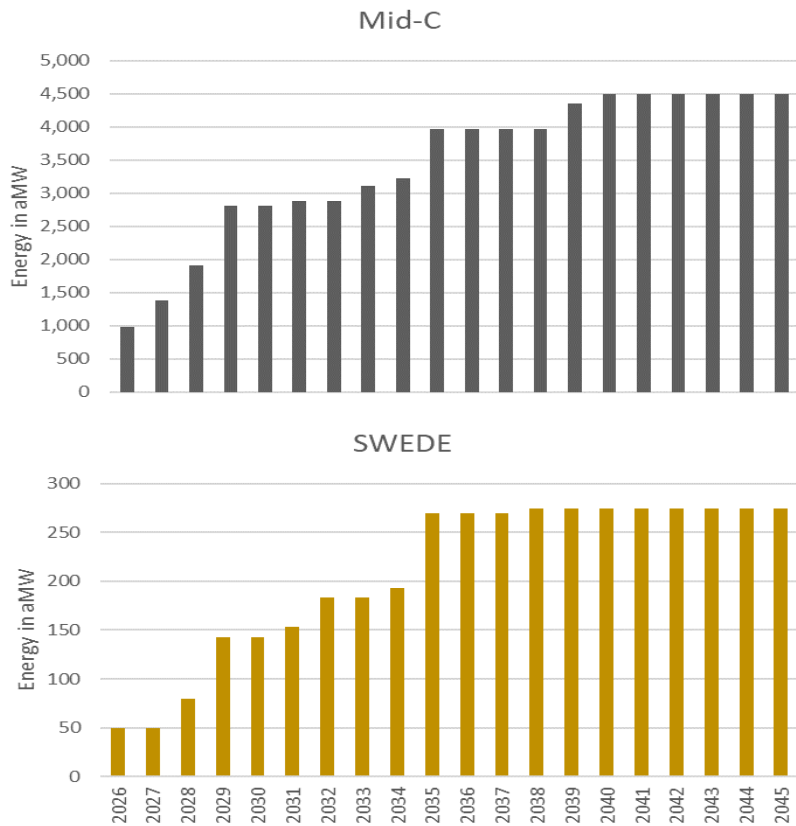
Currently, without B2H, the SWEDE region has heavily constrained transmission paths.

Mid-C (outside of the shaded enclosure)

BPA SWEDE (South-West East Diversity Exchange)

Pink lines are BPAT, purple dots are Hydropower, purple lines are other transmission, P# is a WECC path

Flat Block/NR Load Service Sensitivity

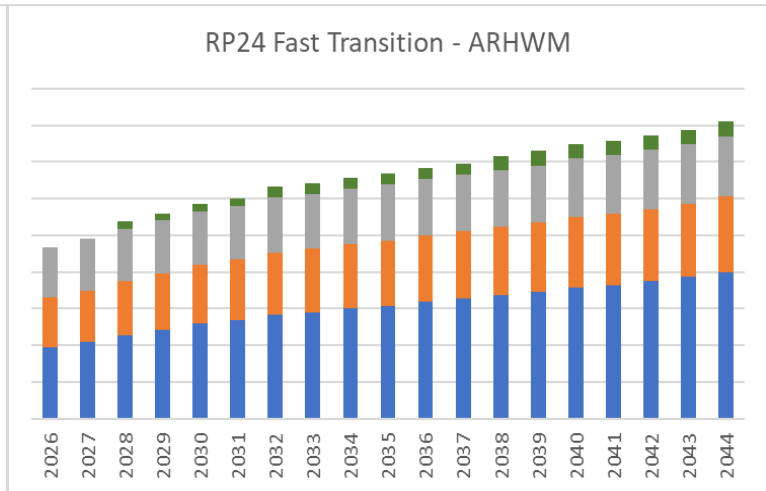
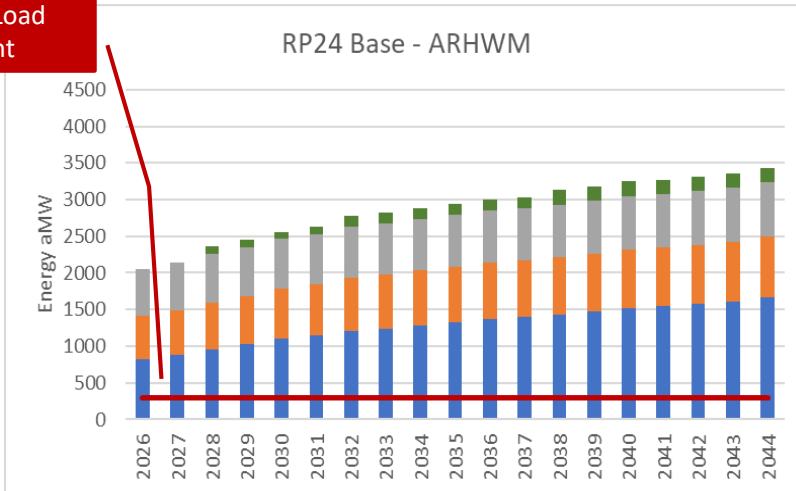


- Flat Block/ New Resource (NR) loads include potential load from:
 - NLSL
 - Data Center Loads in the region
 - Non-data center large industrial loads from public utilities
 - Future potential IOU loads

Above-RHWM Load Service Sensitivity

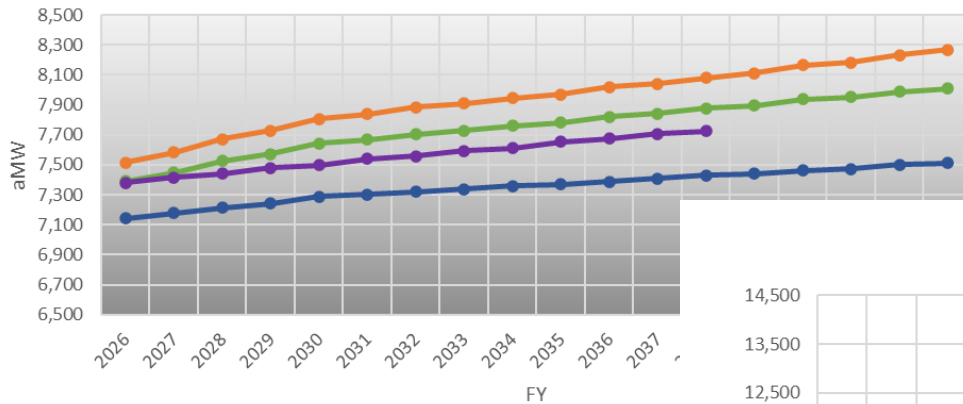
Load Type	As of BP24	Total Potential A-RHWM load
New PUDs	RHWM Augmentation	New loads Served by BPA
Block	None Served	All Served by BPA
Slice	None Served	All Served by BPA
Load Following	Combination of T2 & Self-Served	All Served by BPA

BP24 T2 Load Amount



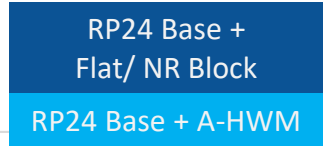
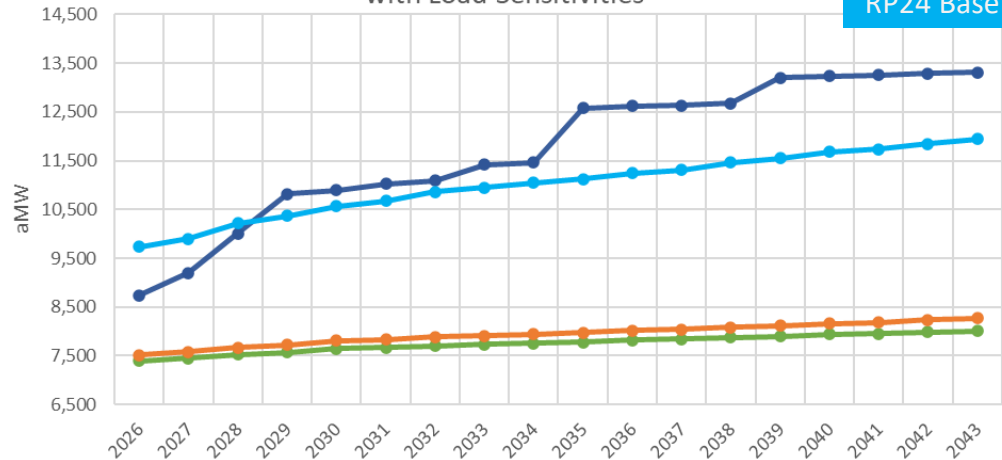
BPA Preference Customer Obligations (preliminary) – Annual (Recall)

BPA Preference Customer Obligations



- WB24, RP24 Base & FT use slice right to power proxy.
- All exclude Contract Deliveries.

BPA Preference Customer Obligations
with Load Sensitivities



T1 System Size Sensitivity

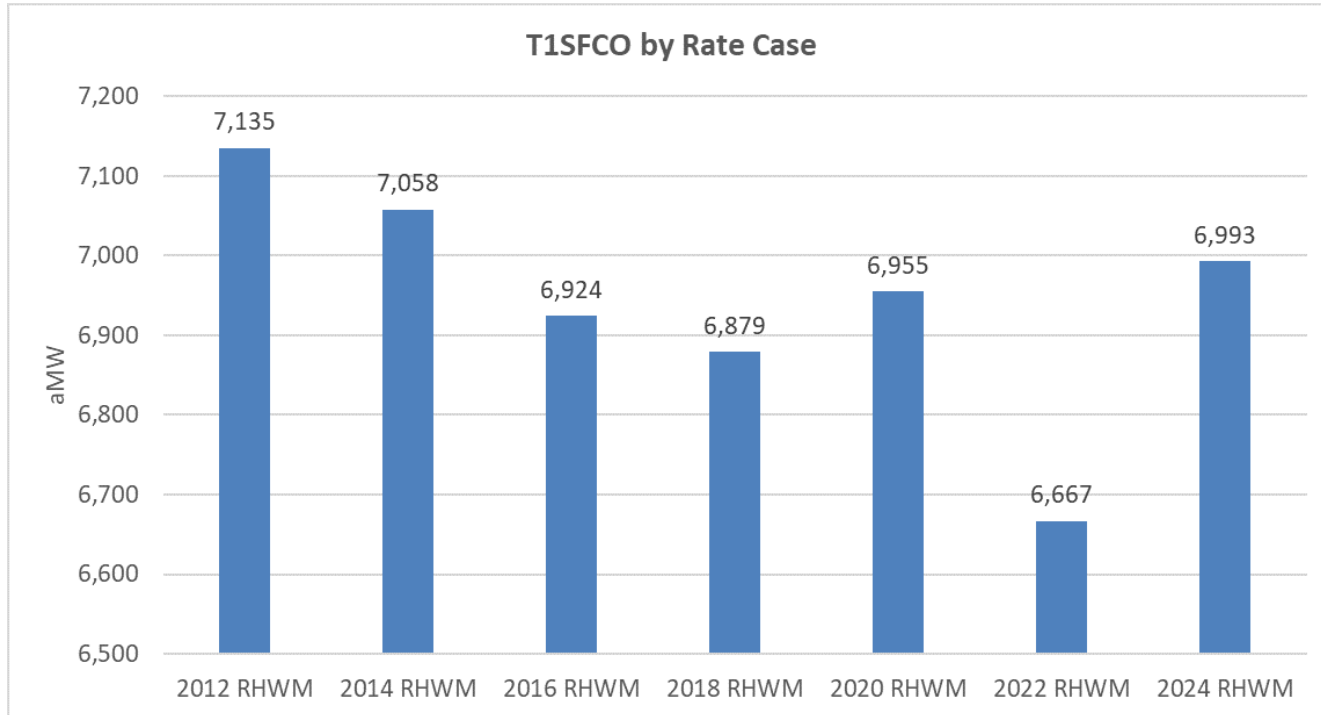
- Determine resource capability needs associated with growing T1 system to 7250 aMW starting with PoC contract deliveries (FY2029)
- Incremental needs to be shaped based on expected T1 load shape
- Resource options may differ from those considered in other scenarios/sensitivities to align with rates constructs

T1 System Size for BP24

Federal Tier 1 System Firm Critical Output Projection - 2-Year Average RHWM Process for BP-24 Rate Period S232-RC-20220530-195059				
		A	B	C
1.	TISFCO Projections Energy in aMW	2024	2025	Average
2.	Total Federal System Hydro Generation <i>(TRM Table 3.1)</i>	6,633	6,686	6,660
3.	Total Designated Non-Federally Owned Resources <i>(TRM Table 3.2)</i>	1,140	1,018	1,079
4.	Total Designated BPA Contract Purchases <i>(TRM Table 3.3)</i>	135	135	135
5.	Total Designated System Obligations <i>(TRM Table 3.4)</i>	-881	-880	-881
6.	Federal Tier 1 System Firm Critical Output (sum of Lines 2-5)	7,027	6,958	6,993

T1 System Size by Rate Case

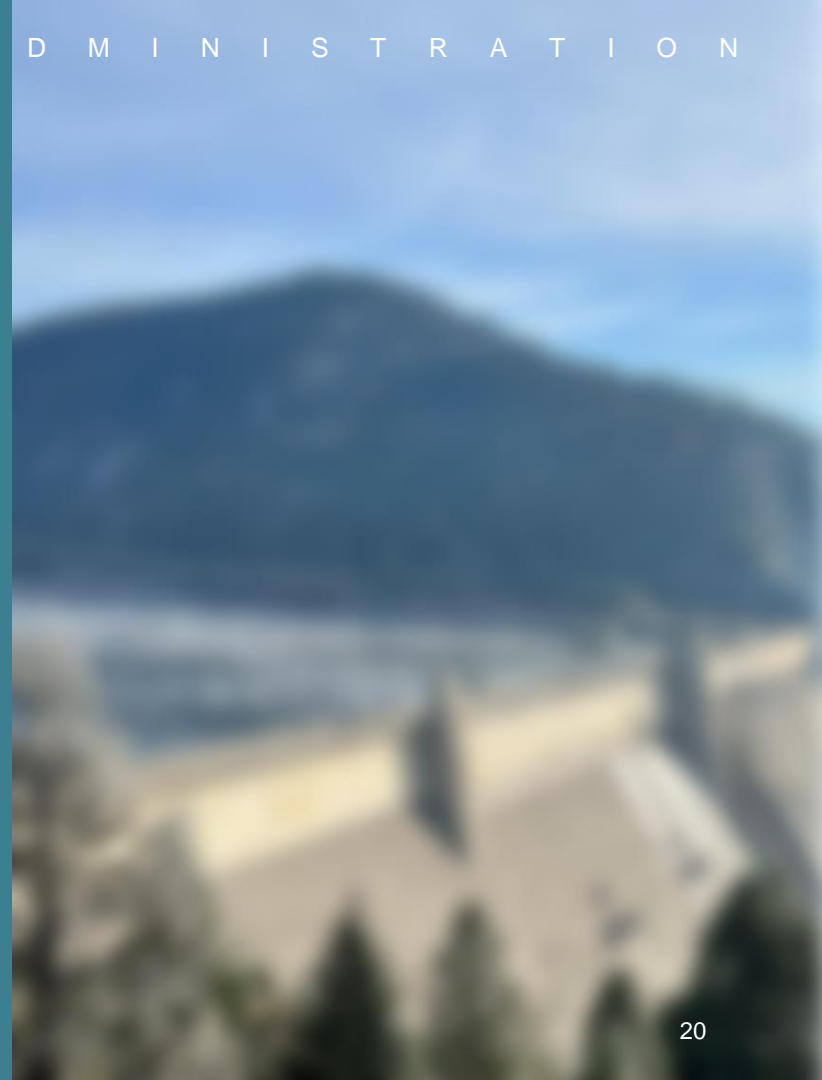
- T1SFCO = Tier 1 System Firm Critical Output



Stakeholder Suggested Sensitivities and Response

Ryan Egerdahl

Manager, Long Term Power Planning



Stakeholder Suggested Sensitivities

BPA Loads

- More extreme weather events/peakier loads
- All PF contracts are Load Following

BPA Resources

- FCRPS capability loss
- FCRPS balancing reserves
- FCRPS shaping and flattening services

Carbon Policy

- 100% carbon free BPA power sales

BPA Response to Stakeholder Suggested Sensitivities

- We see the extreme weather, load following, and 100% carbon free BPA studies as being covered by existing scope
- Long-term balancing reserves study to be reintroduced for RP26, not RP24
- FCRPS capability loss will not be studied in RP24, but we can use the load growth sensitivity results as a proxy for capability loss

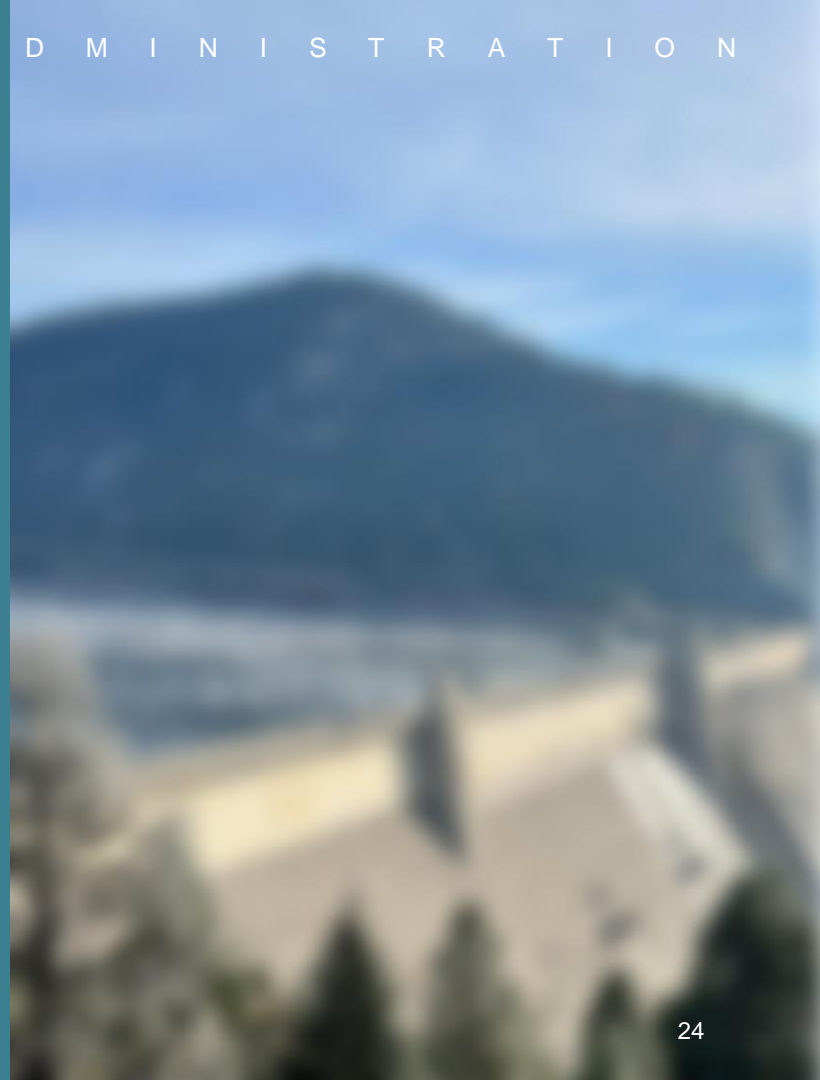
Needs Assessment Metrics

- **Annual Energy**
 - Evaluates the annual energy surplus/deficit under P10 by month-critical water conditions
- **P10 Heavy Load Hour (HLH)**
 - Evaluates the 10th percentile (P10) surplus/deficit over heavy load hours by month, given variability in hydro generation
- **P10 Superpeak**
 - Evaluates the P10 surplus/deficit over the six peak load hours per weekday by month, given variability in hydro generation
- **18-Hour Capacity**
 - Evaluates the ability to meet the six peak load hours per day over three-day extreme weather events assuming median water conditions.

Long Term Hydro Modeling

Milli Chennell

Long Term Hydro Study Lead



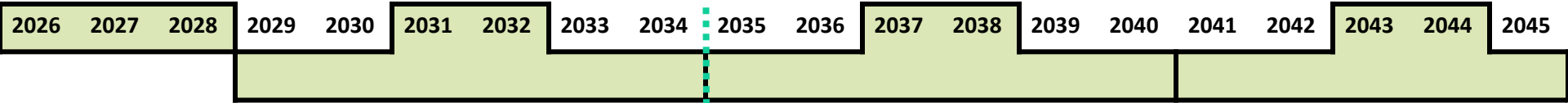
Hydro Resource Modeling Overview

- Hydro Modeling Consistent with Rate Case
 - HYDSIM for 14-period modeling
 - 12 months and 2 split months (April and August)
 - Provides month average generation for the Federal 14 projects
 - Other Federal hydro projects are considered “independent”
 - RiverWare for hourly modeling
 - Creates hourly shapes for 10 Federal projects
 - Month average generation consistent with HYDSIM
 - Models hydrologic operations rather than simply shaping energy

Typical and Special Updates

- Typical Updates
 - Pacific Northwest Coordination Agreement (PNCA) Data
 - Fish Operations
 - Canadian Operations
 - Project Outages
 - Reserves
 - Loads
- Special Updates
 - Stream Flows
 - Unit Upgrades

RP2024 Time Horizon and Sample Years



Hydro:	2020 Modified Flows (subset 1989-2018)	RMJOC-II Flows (2020-2049 & 2030-2059)
Fish Operations:	RCBA (December 14 th Agreement)	Columbia River System Operations (CRSO)

20XX Indicates simulated years.

- 2026-2028 all separately modeled
- 2031 & 2032 represent 6 years, 2029 to 2034
- 2037 & 2038 represent 6 years, 2035 to 2040 operations) (pairs of years to incorporate odd/even)
- 2043 & 2044 represent 5 years, 2041 to 2045

HYDSIM Run	2020-2029	2030-2039	2040-2049	2050-2059
	Subset of results used for 2035-2040			
		Subset of results used for 2041-2045		

Streamflows

- Modified flows (WY 1989-2018)
 - June 2022 [Letter to Region](#) represented a change in how BPA forecasted long-term hydrogeneration
 - 2022 Resource Program was a bridge into this methodology
- RMJOC-II
 - The RMJOC-II report was published in June 2018 and built on earlier climate change work from 2009-2011
 - Includes 80 statistically downscaled RCP8.5 climate projections, focusing on a 19-member subset
 - RP-24 used 3 of the 19-member subset from RMJOC-II

RMJOC-II Traces

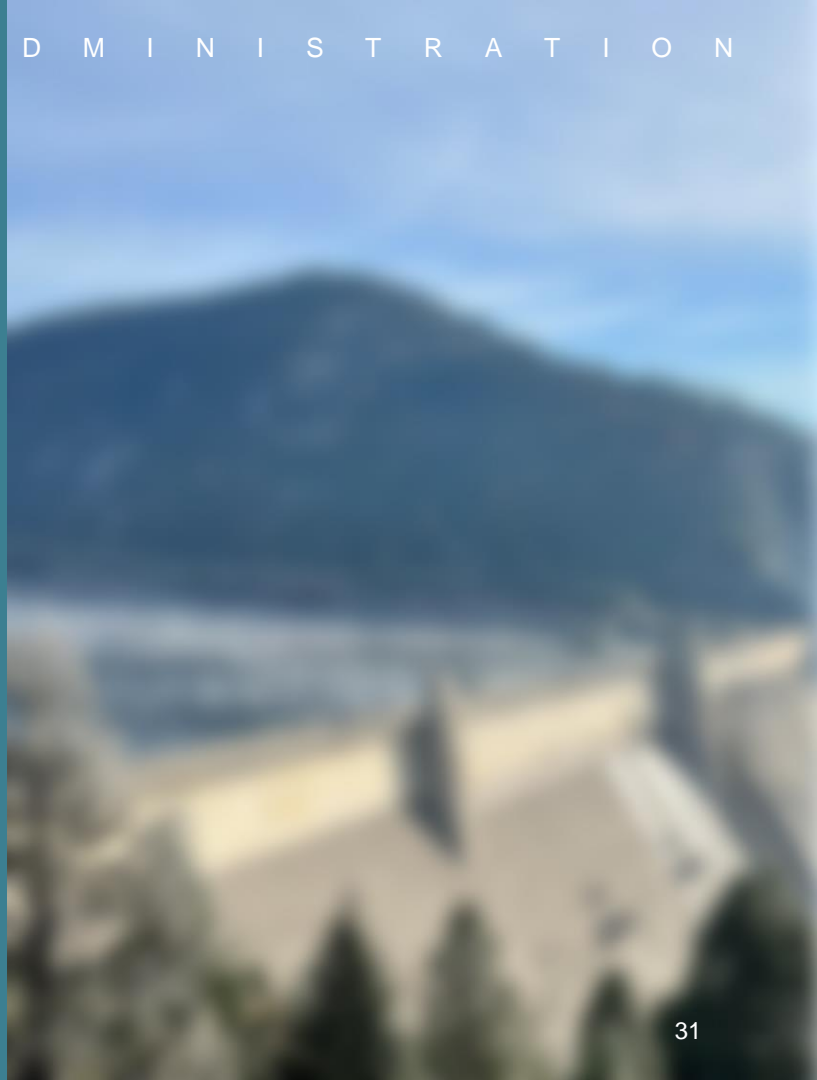
CRSO	RP24 Needs Assessment
CanESM2_RCP85_MACA_PRMS_P1	IPSL-CM5A-MR_RCP85_MACA_VIC_P2
MIROC5_RCP85_BCSD_VIC_P3	CNRM-CM5_RCP85_MACA_VIC_P1
HadGEM2-CC_RCP85_MACA_VIC_P1	CCSM4_RCP85_BCSD_VIC_P1
GFDL_ESM2M_RCP85_BCSD_VIC_P2	

- Evaluate GCMs
 - Different need/timeframe than CRSO led to different choices
- Balance Downscaling between MACA and BCSD
- Balance between hydrologic models (VIC_P1/VIC_P2/VIC_P3)
 - CNRM was switched to VIC_P1 after results showed late runoff in P3

Fish Operations

- RCBA (12/14 agreement) vs CRSO
 - RP-22 used BP-22 Final Proposal Hydro Studies consistent with CRSO Preferred Alternative
 - Overall generation impacts from RCBA
 - Less Spring generation, including March
 - More August generation
 - Slightly less Sept-Nov generation
 - Changes to flexibility

Questions?



Next Steps

- **Public Workshop Schedule (tentative)**
 - June 2024: Needs Assessment and Market Assessment results
 - August 2024: Resource Solutions for all scenarios and sensitivities
- **Final publication of 2024 Resource Program expected in September 2024**

Get in Touch

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