

Resource Adequacy and the Energy Transition in the Pacific Northwest

Phase 1 Study – Near-Term Energy and Capacity Needs

Committee of State Representatives

March 27, 2026



Energy+Environmental Economics

Arne Olson, Senior Partner

Overview of Phase 1 – Understanding the Region’s Challenges

Regional utilities and IPPs retained Energy + Environmental Economic (E3) to evaluate the state of resource adequacy in the region in the near term and into the future

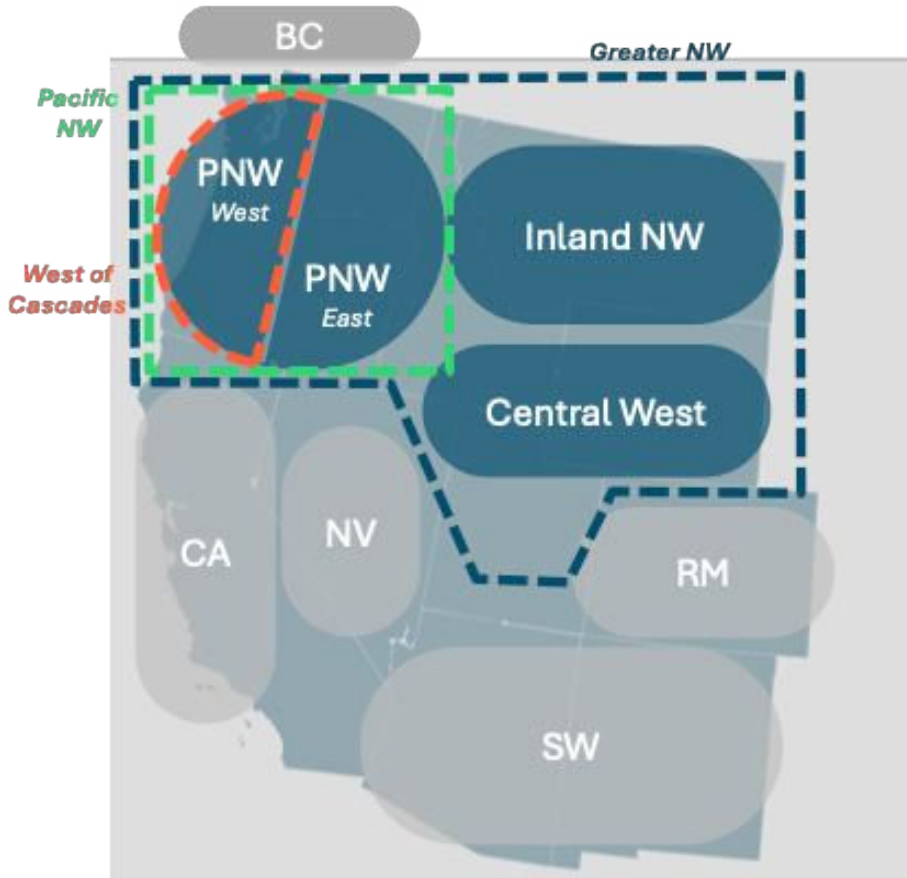
Key findings of Phase 1:

- 1. Electricity demand is rising quickly from data centers, EVs and manufacturing.**
- 2. Older power plants are retiring faster than replacement power is being built.**
- 3. Wind, solar and batteries make only a small contribution to meeting resource adequacy needs.**
- 4. The region faces elevated risk of power supply shortages beginning in 2026, especially during winter cold spells.**

STUDY SPONSORS

- Puget Sound Energy
- Public Generating Pool
 - Chelan Public Utility District
 - Clark Public Utilities
 - Cowlitz Public Utility District
 - Eugene Water & Electric Board
 - Grant Public Utility District
 - Lewis Public Utility District
 - Seattle City Light
 - Snohomish Public Utility District
 - Tacoma Power
- Avista Corporation
- Benton Public Utility District
- Douglas Public Utility District
- Emerald People’s Utility District
- Franklin Public Utility District
- Idaho Power
- Klickitat Public Utility District
- Mason Public Utility District No. 3
- Northwest & Intermountain Power Producers Coalition
- NorthWestern Energy
- Okanogan Public Utility District
- Pacific Public Utility District
- Portland General Electric

Phase 1 looks at the Resource Adequacy picture in the Greater Northwest from 2025-2030



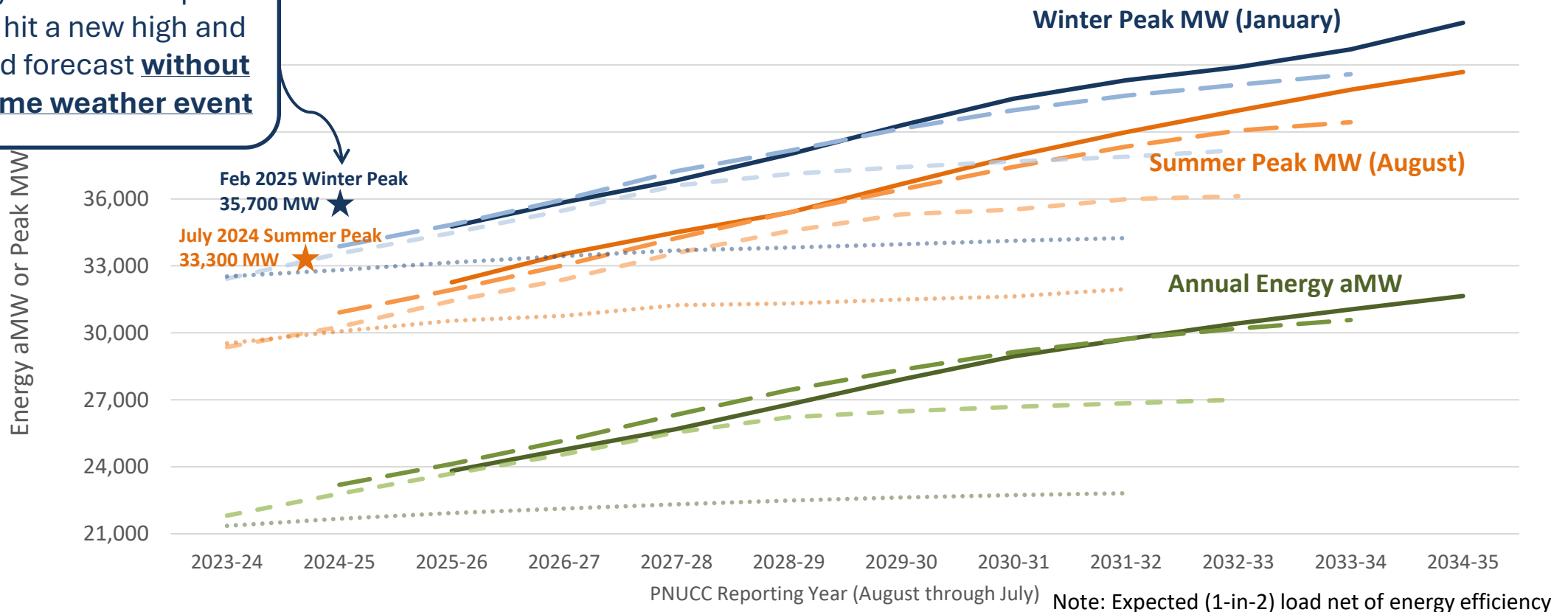
- + Transmission grid and energy markets are interconnected and span multiple states, making resource adequacy a regional issue
- + The “Greater Northwest” study region includes utility footprints across OR, WA, ID, MT, and portions of UT and WY
- + Study will also look at the RA picture in subregions that are potentially transmission constrained:
 - “Pacific Northwest” region (Oregon & Washington)
 - West of Cascades
- + Phase 2 will look at solutions to meeting reliability and clean energy goals through 2045

Load Forecasts Greater Than Anticipated – Especially Winter Peak

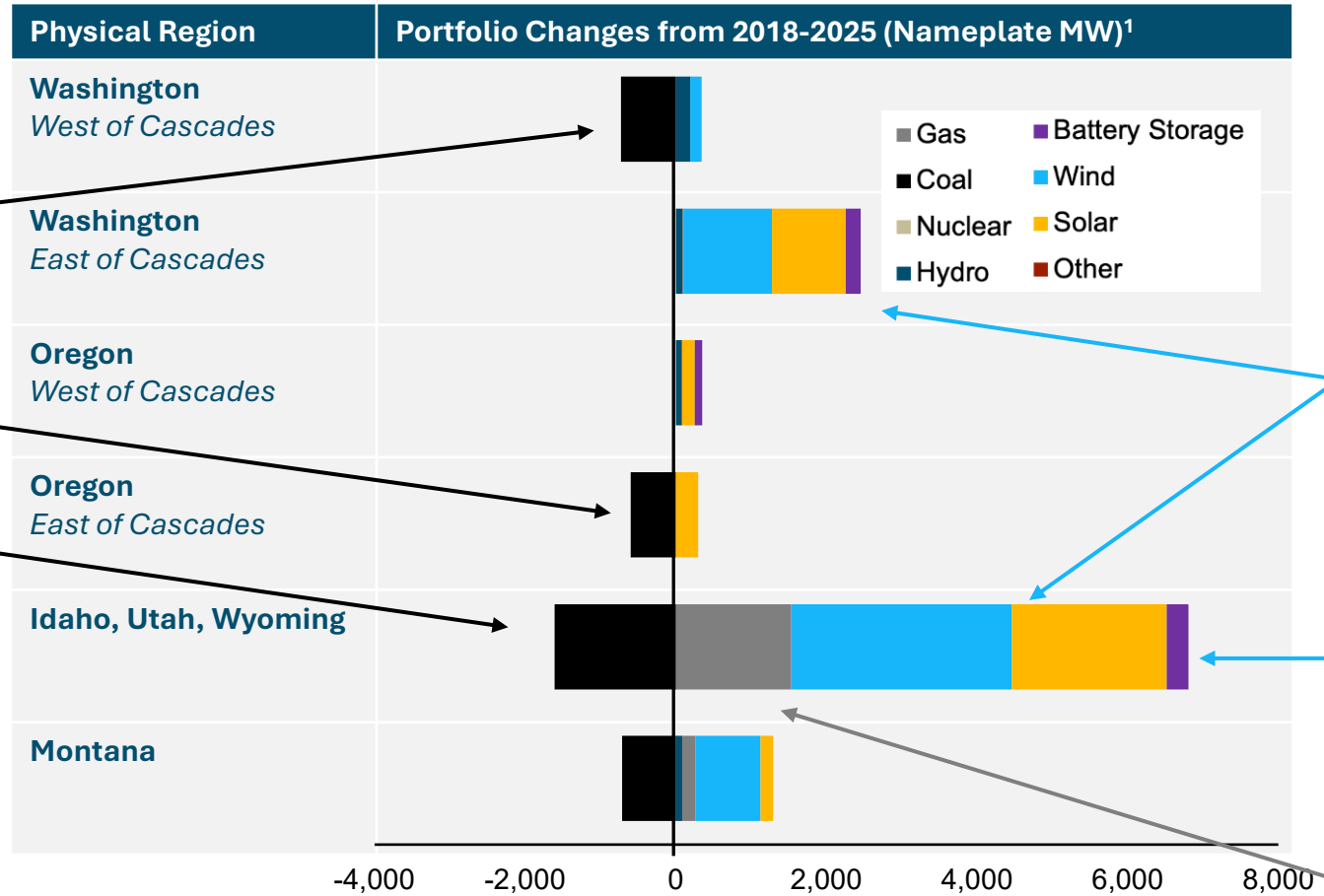
PNUCC 2025 Northwest Regional Forecast Energy aMW and Peak MW

2025 Load Forecast Compared to Previous Forecasts
2025 (solid line), 2024 (large dash), 2023 (small dash) and 2022 (dotted line)

February 2025 winter peak **actuals** hit a new high and exceeded forecast **without an extreme weather event**



Shifting Energy Resources in the NW – Location & Source



Coal retirements are reducing the quantity of firm capacity available in the region

Almost all new resources have been wind and solar

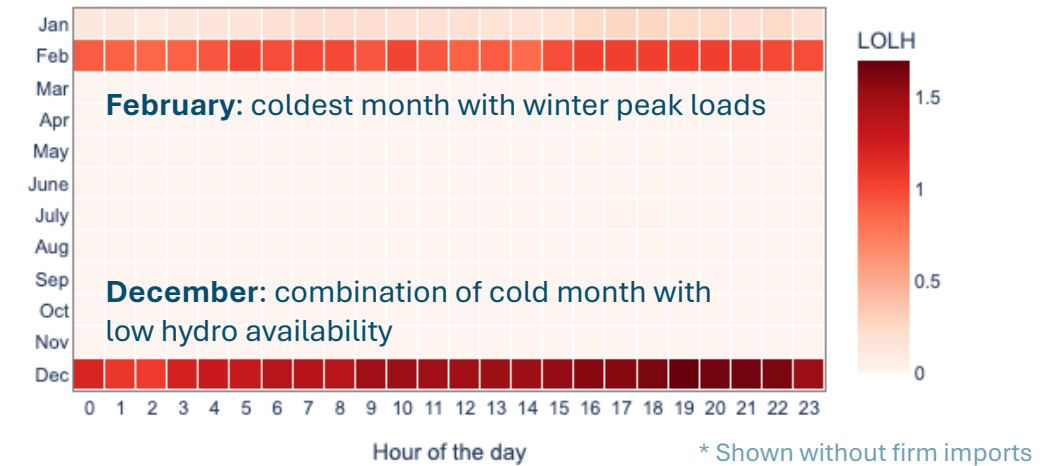
New resources are mostly being built in Wyoming and Utah

New firm capacity from coal to gas conversions

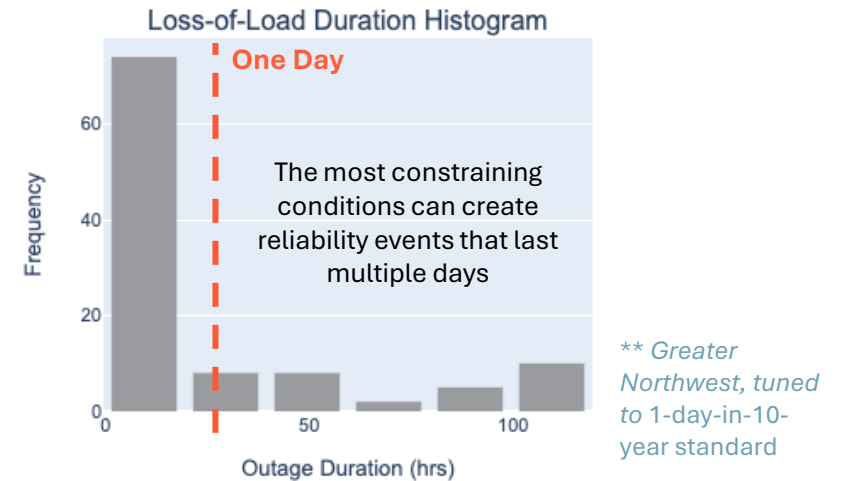
The region's biggest reliability challenge is a multi-day cold weather event that occurs during a low hydro year

- + About 50% of the region's energy comes from hydro, but its availability varies significantly from year to year
 - Water variability is critical for resource adequacy in our region → low water years create winter reliability risk
- + Most shortfall events occur during the cold winter months
 - Demand spikes while wind & solar produce less
- + Simulated reliability events can last multiple days (exceeding 50-100 hours)

Average Loss-of-Load Hours (LOLH) by Month x Hour*



Distribution of Loss-of-Load Events

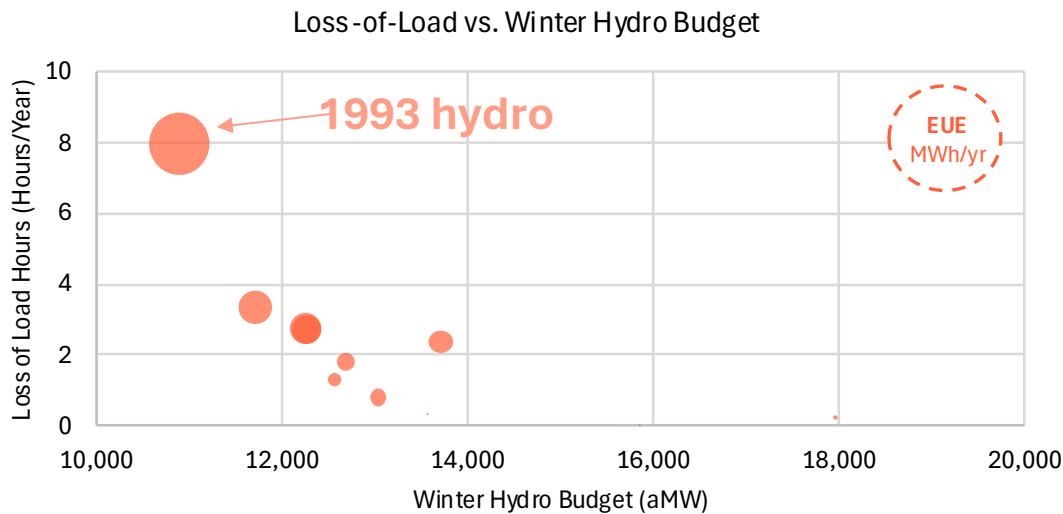


Addressing these events requires resources that can reliably deliver energy over long periods

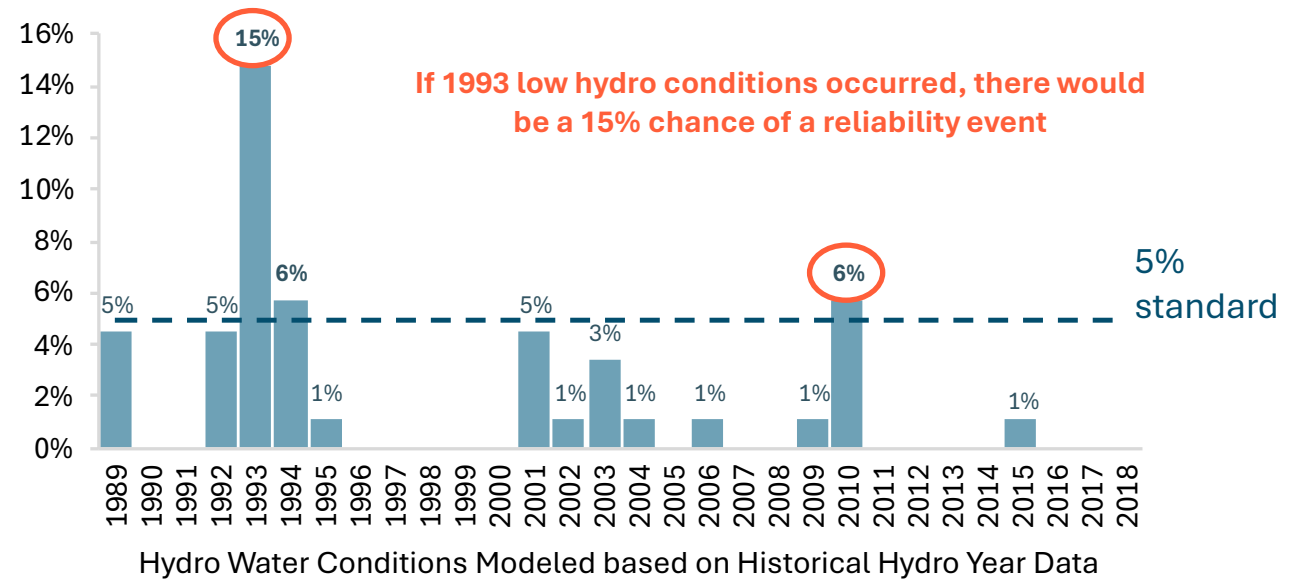
The vast majority of reliability events occur during years with very low hydro conditions

- + Loss of load events are concentrated during the lowest hydro years (1989, 1990, 1992, 1993, 1994, 2001, 2010)
- + January 2024 conditions were consistent with the very low hydro years simulated here

2025 Average Loss-of-Load Hours (LOLH) and Expected Unserved Energy (EUE) by Hydro Year

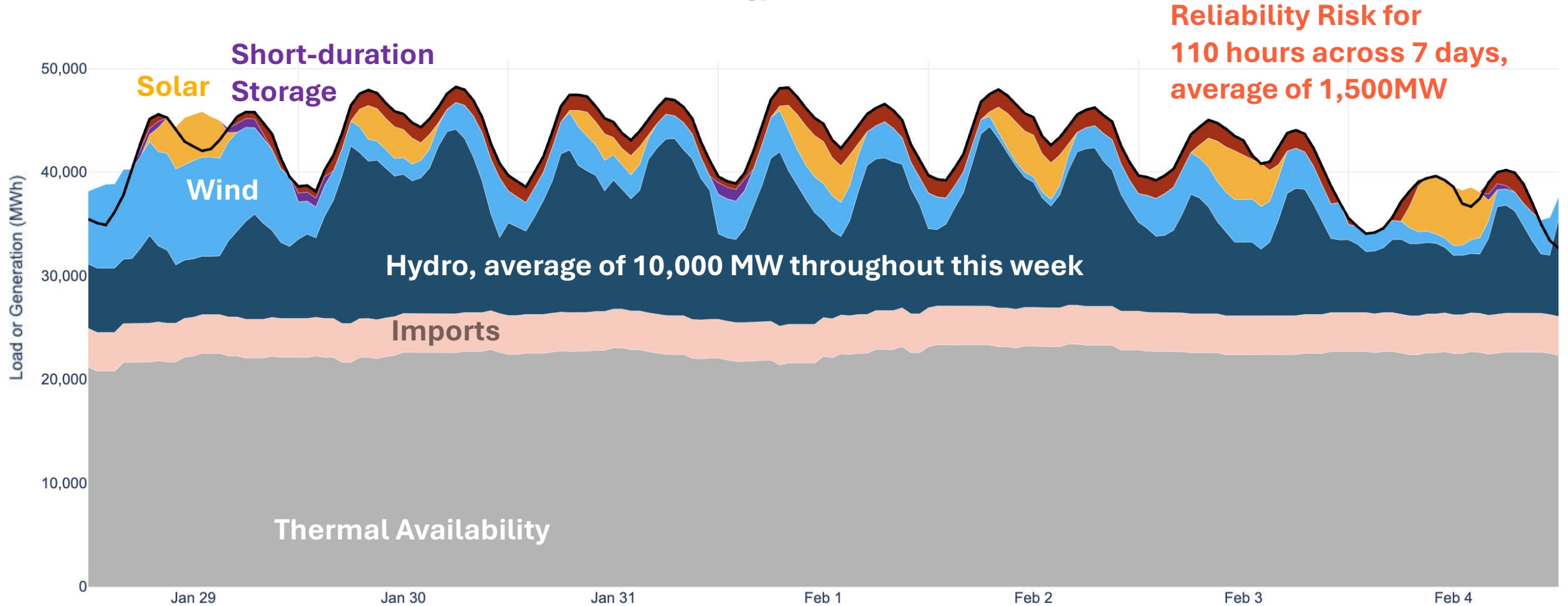


2025 Loss-of-Load Probability (LOLP) by Hydro Year



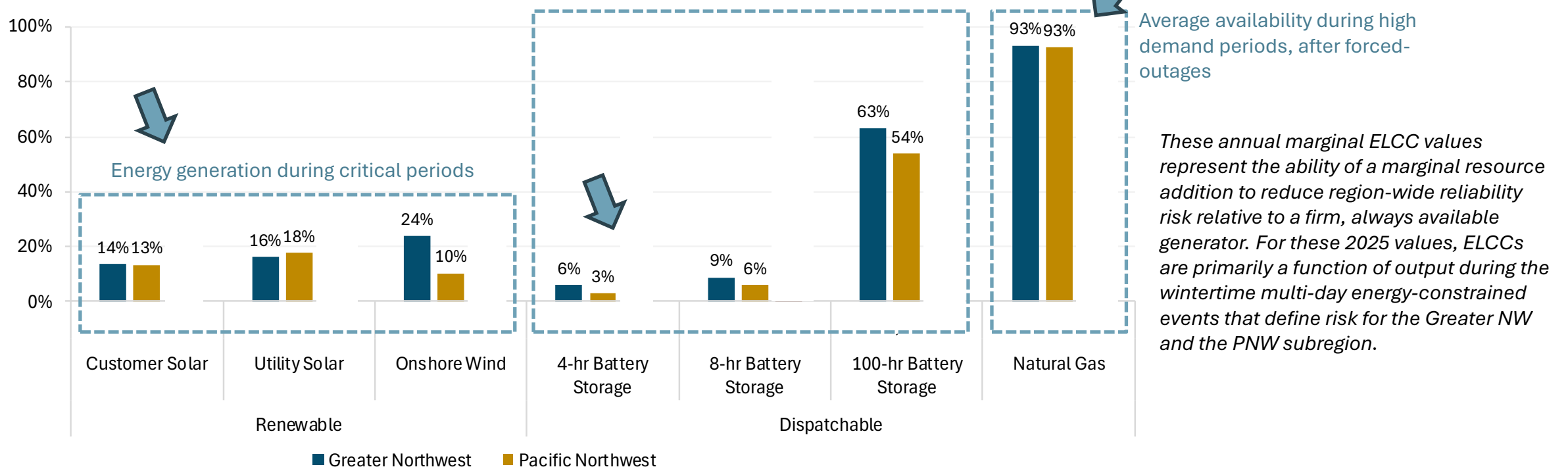
Resource availability example: February 2025 load levels simulated under 1996 temperatures + 1993 hydro conditions

Greater Northwest in 2025, RECAP simulated energy-limited event



Resource reliability contribution depends on ability to supply energy during multi-day cold snaps under low hydro conditions

Marginal ELCC (%)



- + Solar and wind are helpful but have relatively low availability during critical cold weather events
- + Short-duration energy storage does little to address multi-day energy shortages
- + Natural gas plants with firm fuel can run when needed
- + Emerging clean technologies may be able to help address the challenge in the future

Greater Northwest region faces a resource shortfall in 2026 and beyond

Greater Northwest Load and Resource Balance

Effective Capacity (ELCC) MW

	2025	2026	2027	2028	2029	2030
Total Resource Need*	49,245	50,737	52,499	54,184	55,879	57,195
Existing Portfolio w/ Retirements	46,716	45,666	45,395	45,388	45,098	44,757
Firm Imports	3,750	3,750	3,750	3,750	3,750	3,750
Reliability Position Surplus (+) / Shortfall (-)	+1,221	-1,321	-3,354	-5,046	-7,031	-8,689
ELCC from "In- Development"*** Firm Resources	-	296	407	580	770	1,114
ELCC from "In- Development" Wind, Solar and Battery projects	-	645	1,015	1,316	1,508	1,934

Available resources includes firm imports from other regions

The region faces a power supply shortfall starting in 2026 that grows to almost 9 GW by 2030

In development resources amount to only 3 GW of effective capacity, leaving 6 GW shortfall

* Total Resource Need includes median peak load + 9% PCAP planning reserve margin as well as obligation to serve the Columbia River Treaty Regime

** In-development resources are WECC ADS 2034 facilities with confirmed project location, project name, or can be verified online

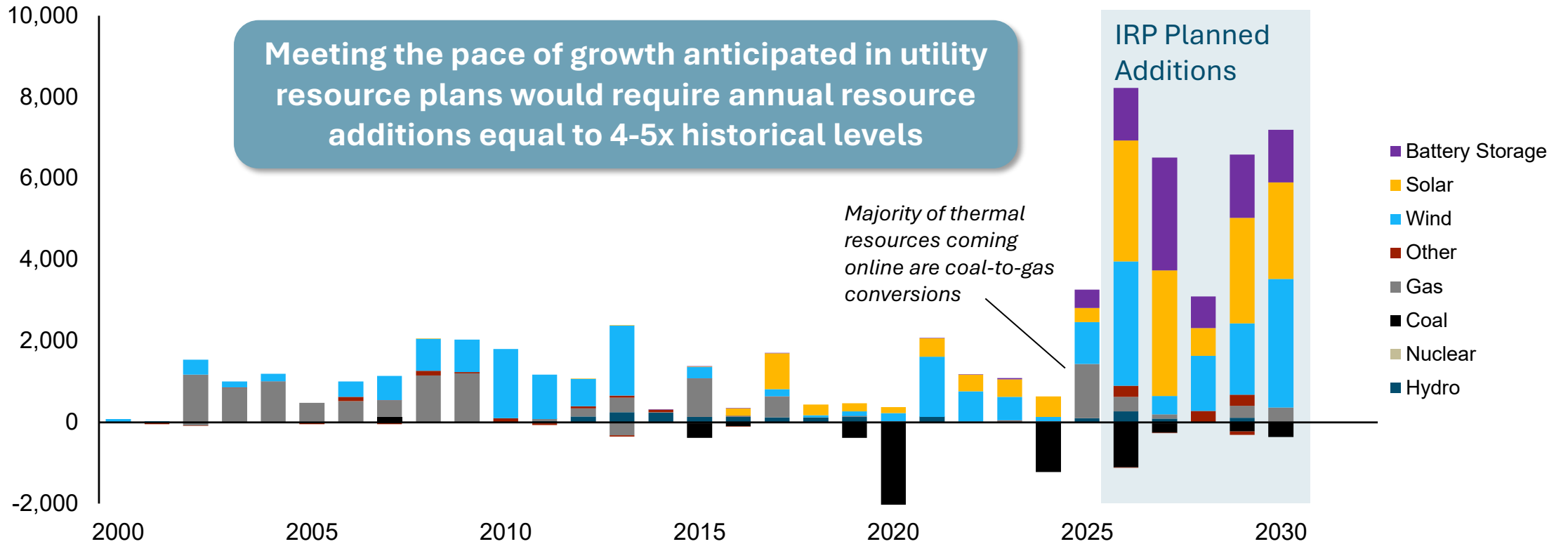
*** Centralia unit 2's repower from coal to gas is not included here and would bring down the shortfall by ~700 MW

Planned additions would meet need through 2030, but require an unprecedented pace of resource development

Retirements and New Installed Capacity Additions by Year

Annual Additions (Nameplate MW)

Greater NW

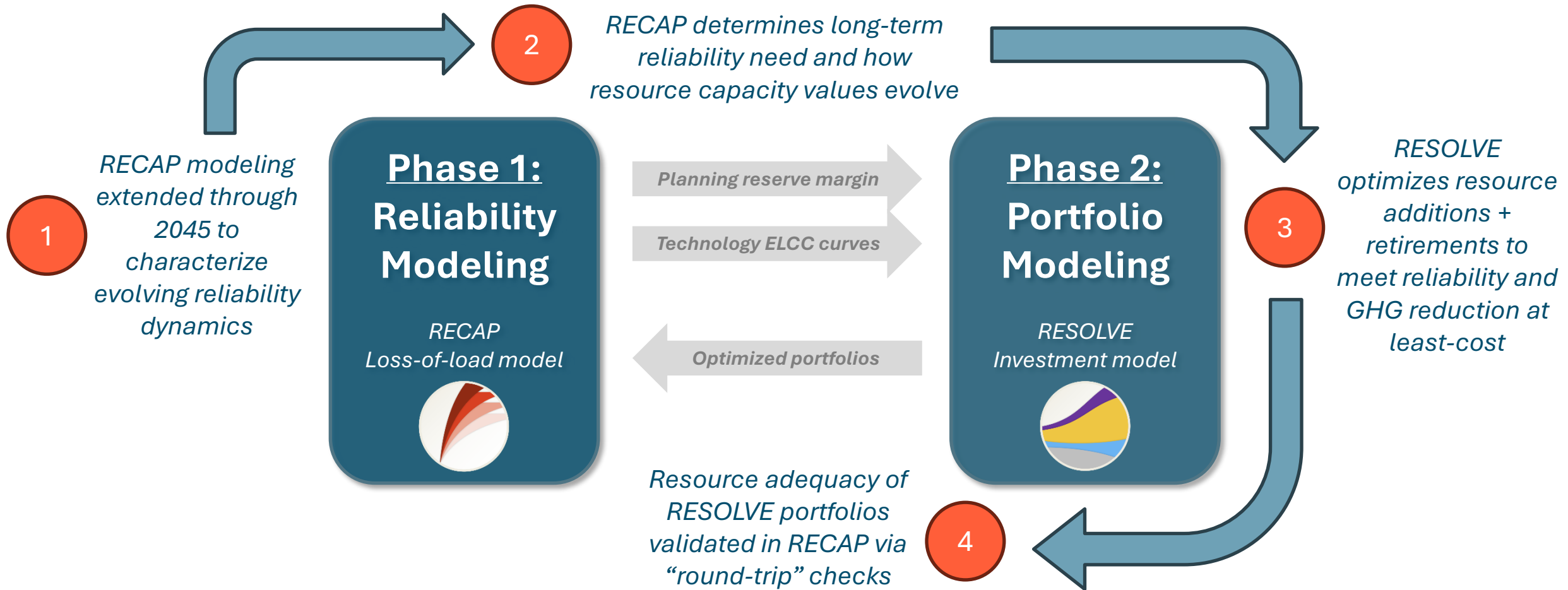


Key Finding #1: Near-term resource needs are significant

1. Accelerated load growth and continued retirements create a resource gap that grows to *9 GW of effective capacity by 2030* and *14-18 GW by 2035*

- + Load forecasts continue to increase
- + Retiring firm capacity is mostly being replaced with wind, solar, and batteries
- + Few resources have been added in Washington or Oregon
- + The region faces a multi-day reliability challenge driven by cold snaps and low hydro conditions

Phase 2: Least-cost portfolios for achieving reliability and clean energy needs through 2045



Thank you!

Arne Olson, Senior Partner

arne@ethree.com



Energy+Environmental Economics