WECC

Keeping the Lights on in the West

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President and CEO

NCPA Annual Conference

Electric Reliability & Security for the West

September 25, 2025

Everything, Everywhere, All at Once

- The Western Interconnection is changing at a magnitude and pace that is unprecedented. These changes all threaten reliability and security and include:
  - Increasingly recurrent **extreme natural events**;
  - Large-scale **generator retirements** to meet aggressive clean energy goals;
  - Massive amounts of **new generators** coming online that bring new technological and dispatchability challenges;
  - Evolving and increasing **cyber-threats** and **physical threats**;
  - Risks and opportunities posed by **artificial intelligence**;
  - Rapidly changing demand brought about by **electrification**;
  - The proliferation of data centers and other technologies with their accompanying **large loads**.

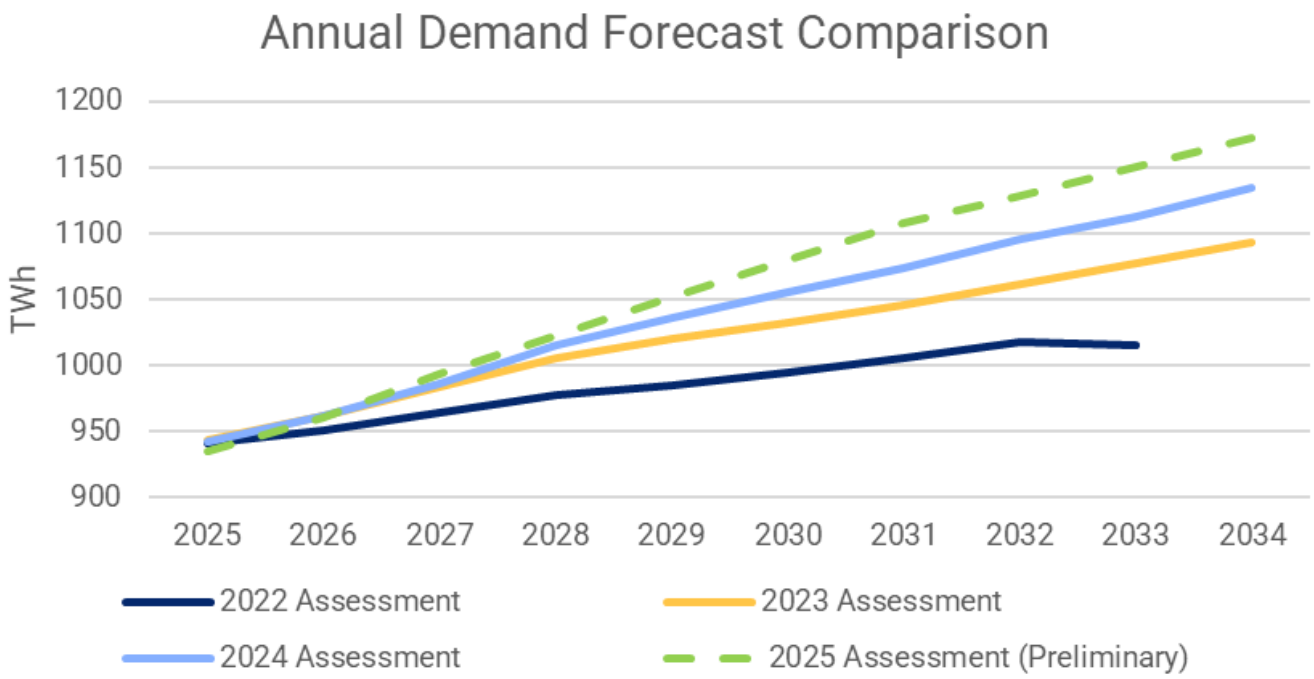
Resource Adequacy

WECC Western Assessment of Resource Adequacy (WARA)

- Western Interconnection-wide analysis
  - Also reported by subregion
- Considers subregion-to-subregion transfer limitations
- Probabilistic, hourly analysis
  - Evaluates the next ten years
- Uses data submitted to WECC by Balancing Authorities
- Builds on the NERC Long-Term Reliability Assessment (LTRA)

Load Growth: 2024 WARA

- Annual demand estimated growth: 20.4% from 2025 to 2034
  - Historical growth rate: 4.5% (2013–2022)
- Large loads are a major driver
  - e.g., data centers, large manufacturing facilities, cryptocurrency mining
  - Uncertainty in magnitude and timing of new large loads creates forecast challenges
  - Creates system planning challenges, e.g., modeling accuracy

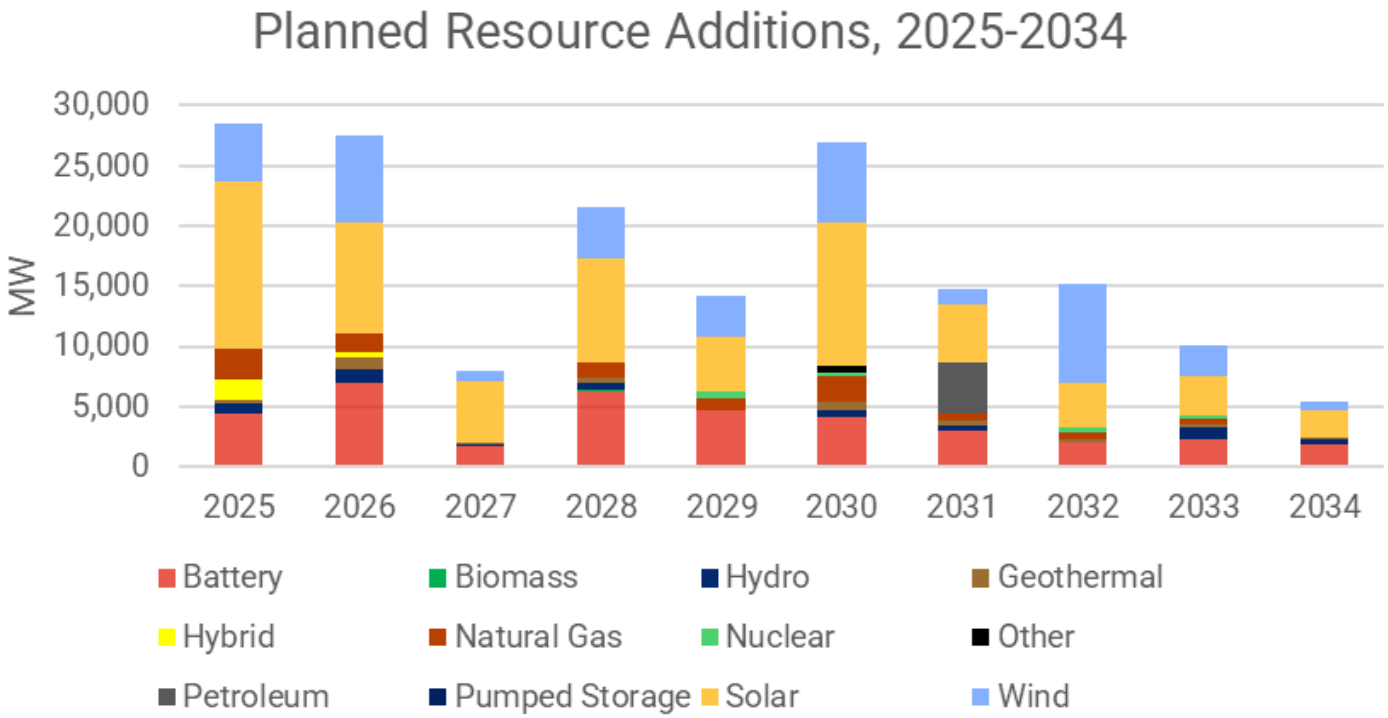


"The forecast rate of demand growth over the next decade is double what was forecast just two years ago."

Resource Additions: 2024 WARA

- 172 GW of new generation capacity planned over the next decade
- 74 GW added in the last 10 years
- More than 85% of new capacity is battery storage, solar, and wind

"The West has never built new generation at the rate planned for the next decade."

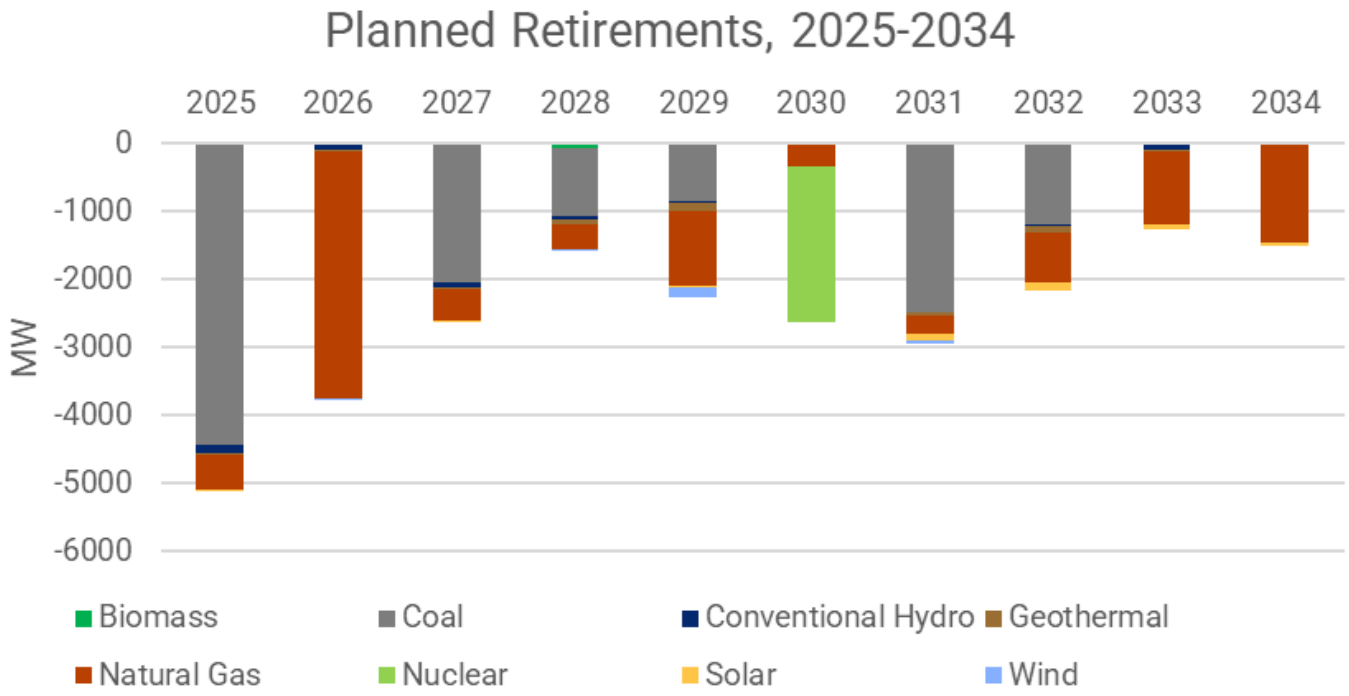


Resource Retirements: 2024 WARA

- 26 GW of generation retirements over the next 10 years
- >24 GW dispatchable generation (e.g., coal, natural gas, nuclear)

"Retirement of so much baseload generation, combined with 147 GW of new energy-limited resources, increases variability.

This increases uncertainty and creates planning and operation challenges."



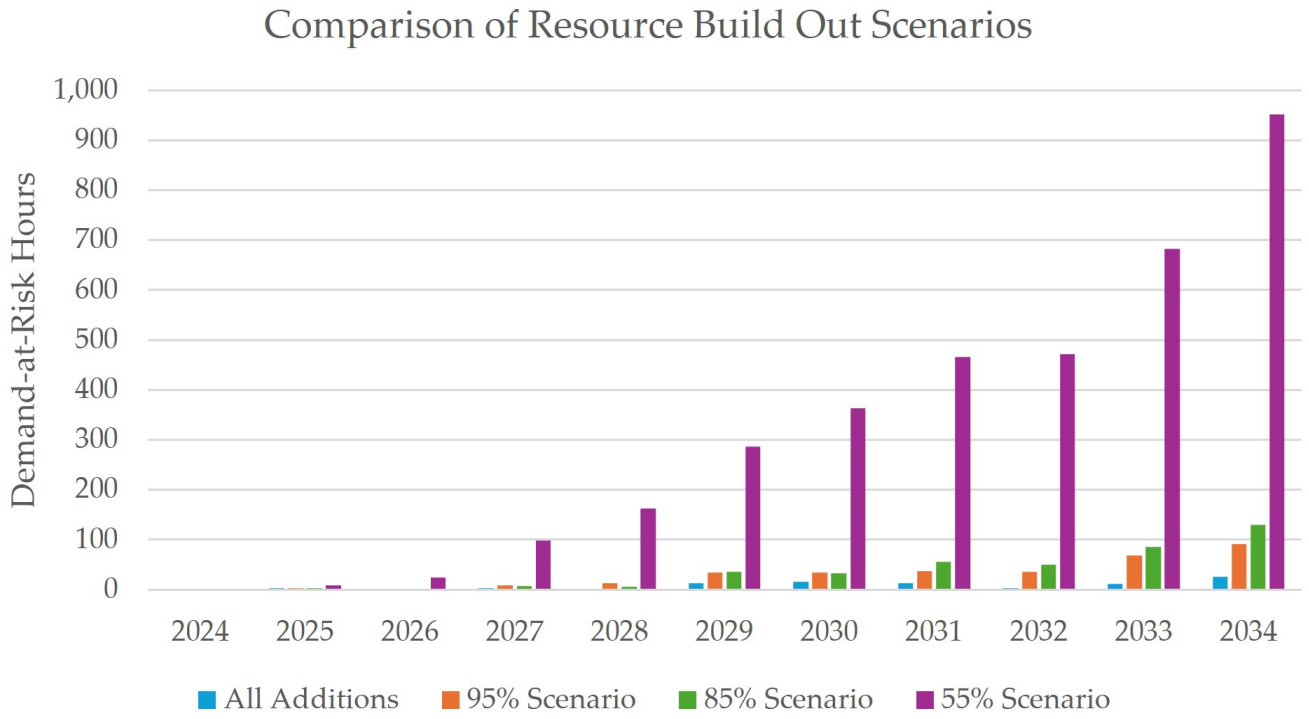
Delayed Resource Build Scenarios: 2024 WARA

Sensitivity Analysis

- Build outs as a percentage of planned resource additions

Context

- Between 2018 and 2023, approximately 76% of the proposed resource additions came online in the year scheduled
- In 2023, 53% of new resources planned to come online actually came online



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Large Loads

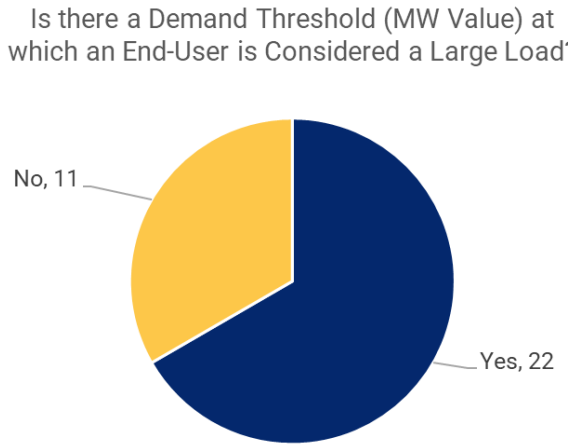
Definition(s) of Large Load

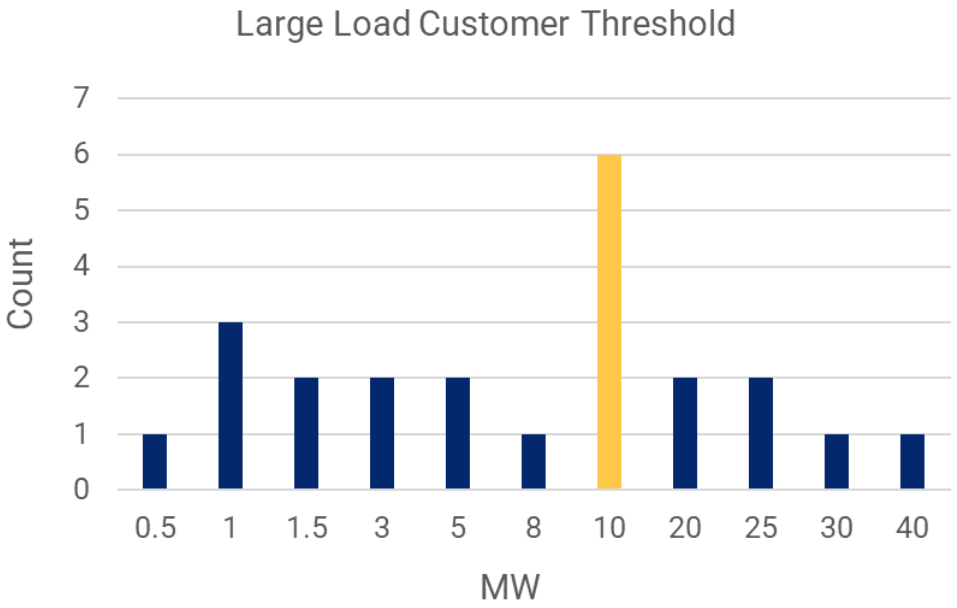
Definitions of “large loads” vary:

- Size thresholds: 0.5 MW–40 MW
- 69% of respondents have a threshold of demand that categorizes a customer as a “large load”

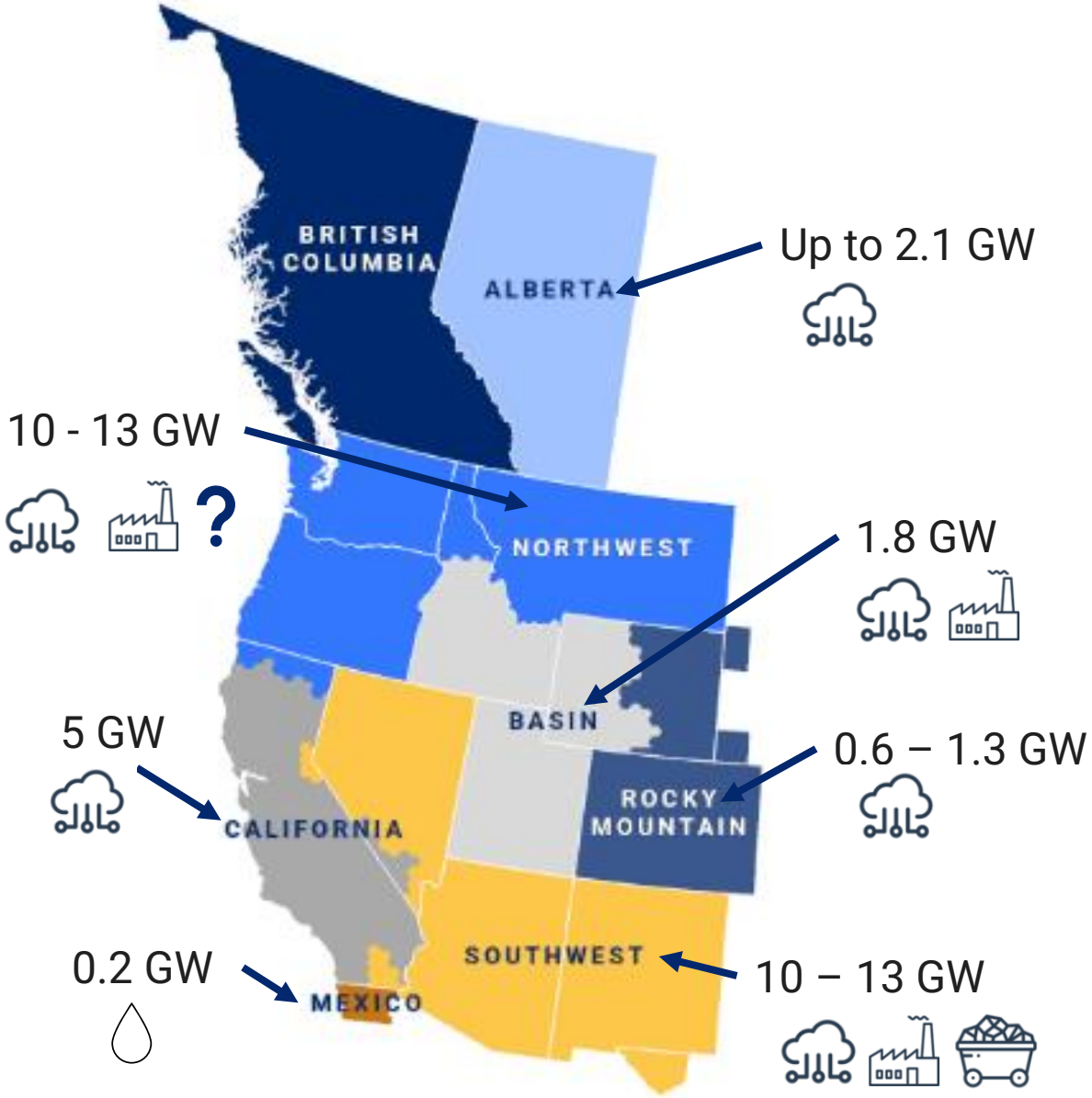
NERC task force “large load” definition:

- *“Any commercial or industrial individual load facility or aggregation of load facilities at a single site behind one or more point(s) of interconnection that can pose reliability risks to the BPS due to its demand, operational characteristics, or other factors.”*





Large Load Additions by Region

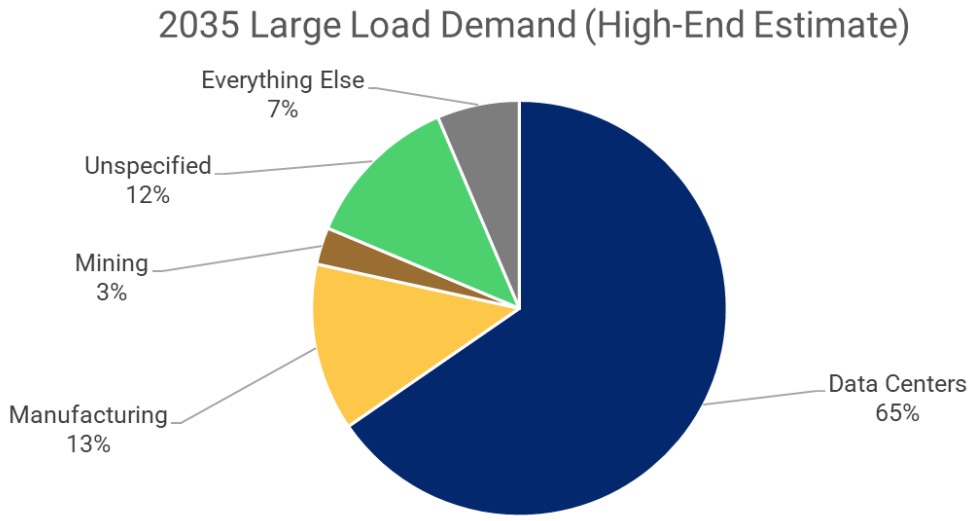


2022–2035 Western Interconnection Large Load Growth

- 2022 = 7 GW
- 2024 = 8 GW
- 2027 = 14 to 18 GW
- 2030 = 21 to 29 GW
- 2035 = 27 to 37 GW
- Interconnection Queue (2024) = 45 GW

Data Centers
Manufacturing
Municipal
Mining
? Unspecified

Large Load Additions by Type

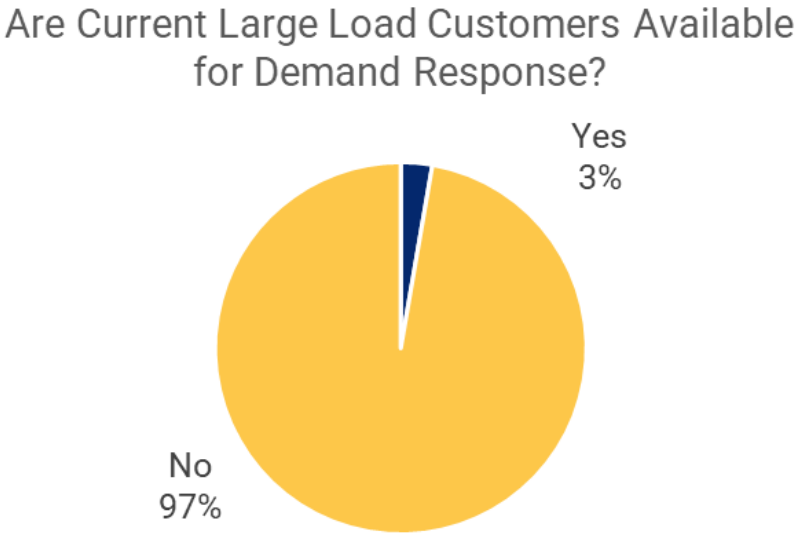


Large Load Demand by Type (GW)	
Data Centers	24.3
Manufacturing	4.8
Mining	1.1
Unspecified	4.6
Everything Else	2.4
Total	37.2

Everything Else: Agriculture, Cryptomining, Hydrogen Electrolysis, Irrigation, Municipal, Natural Gas Processing, and Oil Extraction.

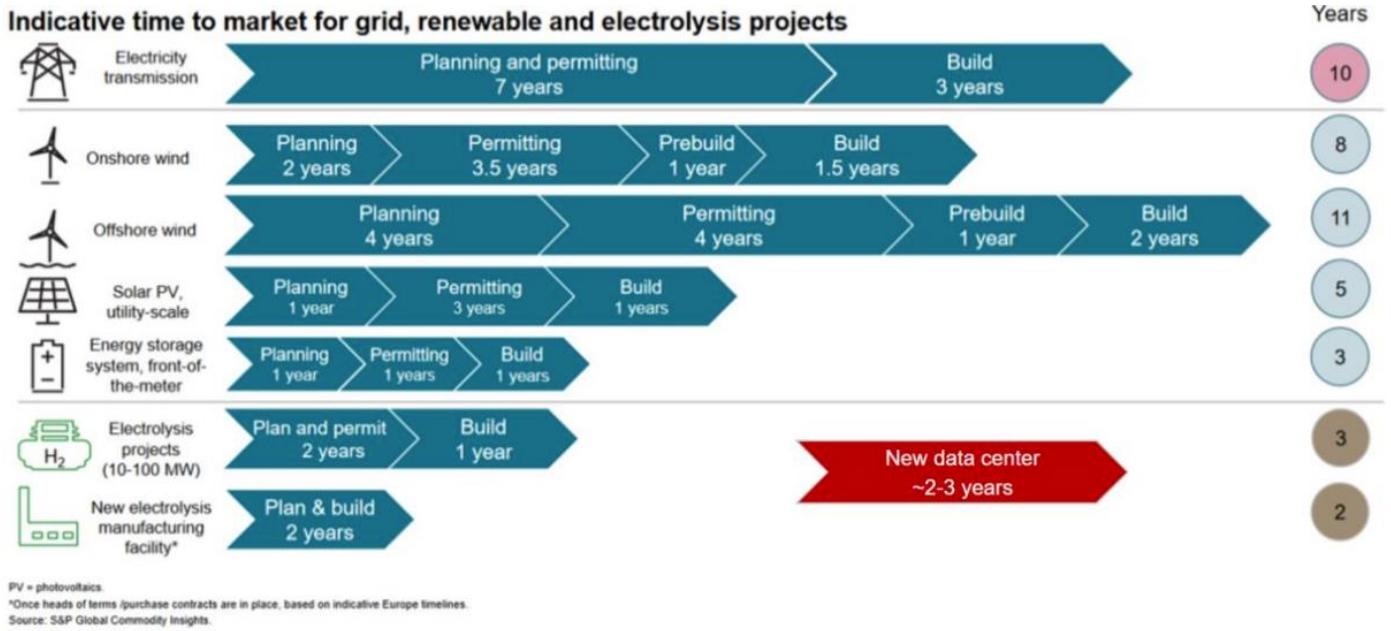
Large Load Diversity (YE 2035)

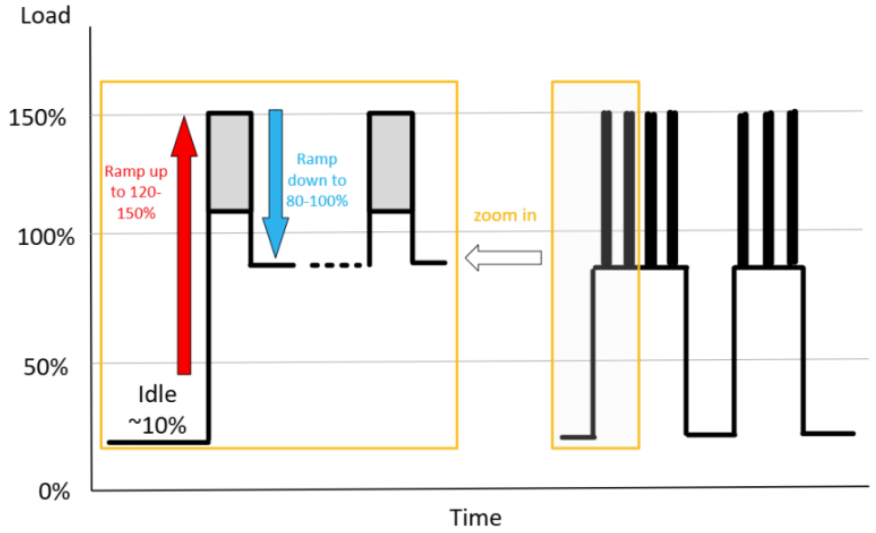
- Data centers and manufacturing account for 78% of large load customer demand
- Minimal crypto demand (≈ 0.3 GW)
- <300 MW stated as available for demand response (YE 2024)



Large Loads: Do They Pose a Reliability Concern?

- **Customer Materialization**: Resource adequacy concern if demand is under forecast, or economic risk if demand is over forecast
- **Lack of Data Transparency**: Ramping, price sensitivity, variability, uptime, frequency and voltage protection settings, uninterruptable power supply (UPS) configuration, dynamic controls, harmonics
- **Rapid Changes in Demand (AI)**: Inter-area oscillations, flicker, large deviations in frequency and intertie flow, large swings in voltage, and reducing lifespan of BPS equipment
- **Ride-through Performance**: Instability, uncontrolled separation, and cascading

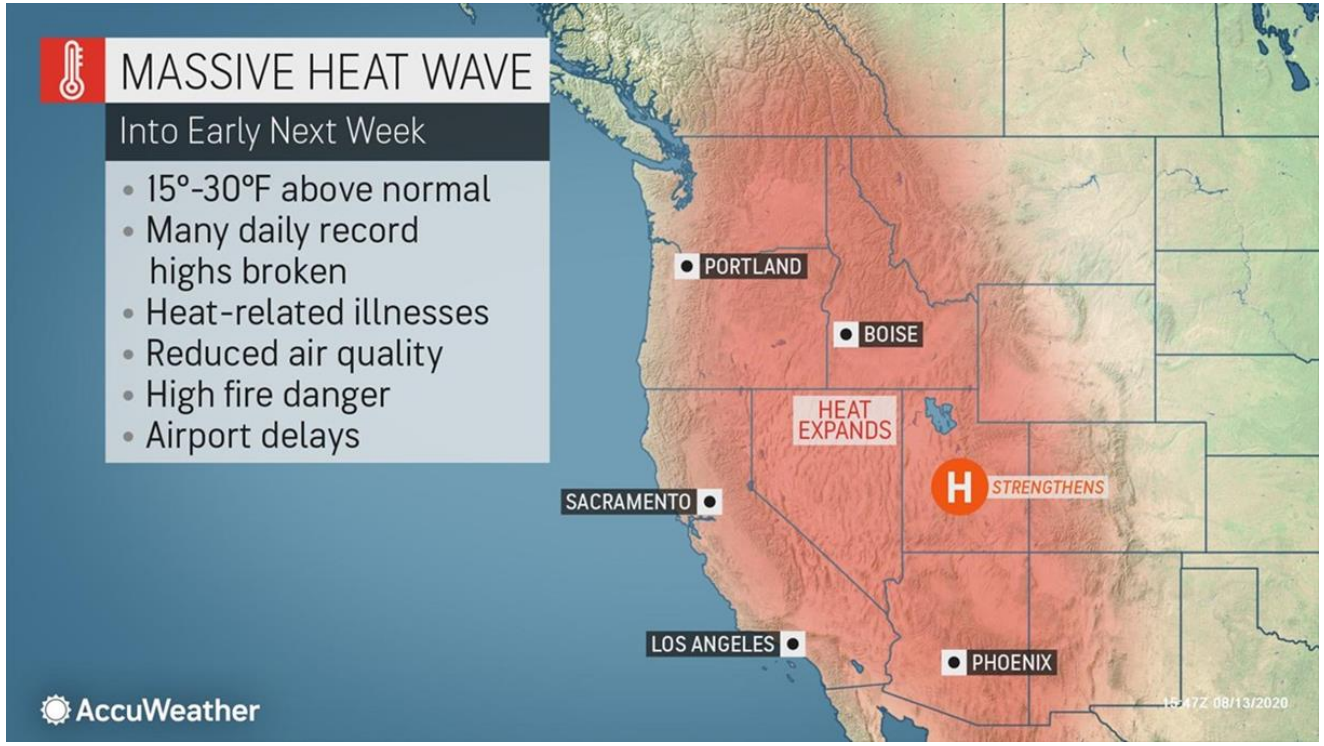




Extreme Weather Events

Case Study: August 2020 Heat Wave Event

- Extremely hot conditions across the West
- Firm load was shed on Aug 14 (1,087 MW) and Aug 15 (692 MW)
- WECC Summer Peak Load (at that time) occurred on Aug 18 at 162,017 MW

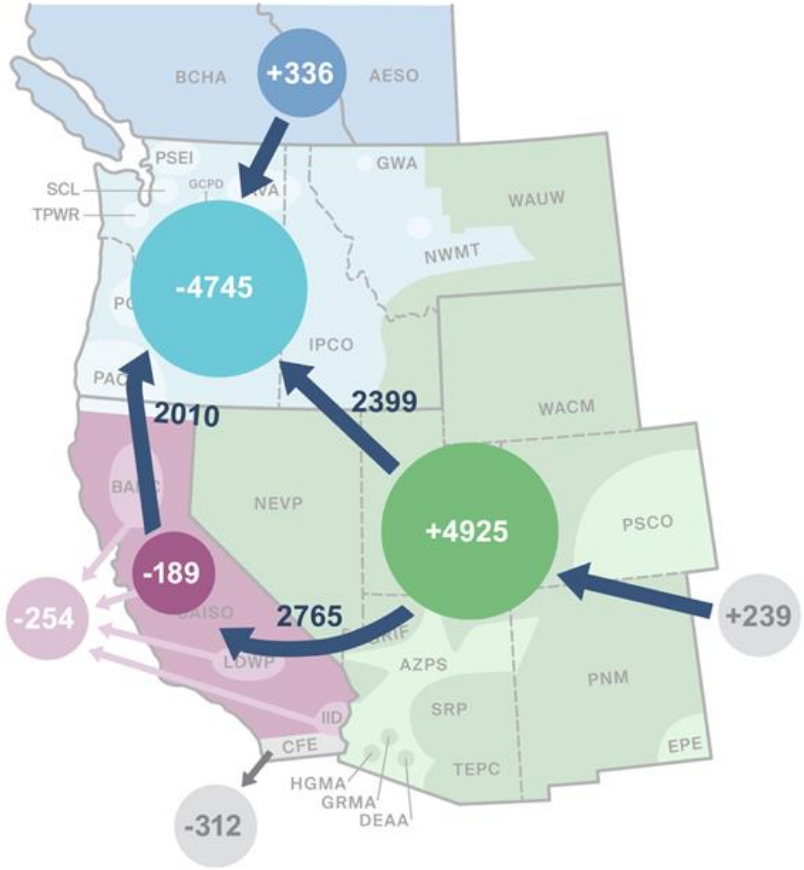


Source: https://www.abc10.com/article/weather/accuweather/heat-wave-weather-forecast-western-us/507-f22bddea-cbed-4122-9828-0d60ae22a887

Case Study: January 2024 Arctic Storms

- Extremely cold temperatures across the Pacific Northwest, British Columbia, and Alberta due to Winter Storms Gerri and Heather
- Record peak demand for several utilities
- Atypical flows in the U.S. Northwest
- Zero system operator-initiated load shed
- Natural gas facility impacts

Average Net Imports and Exports During Peak Demand Hours (4-8 pm)



Source: Powerex Analysis of the January 2024 Winter Weather Event. Data from Open Access Same-Time Information Systems (OASIS) Transaction Schedules (scheduledetail), BPA Transmissio Operations Data (AC Intertie Path data), Form EIA-930 Interchange

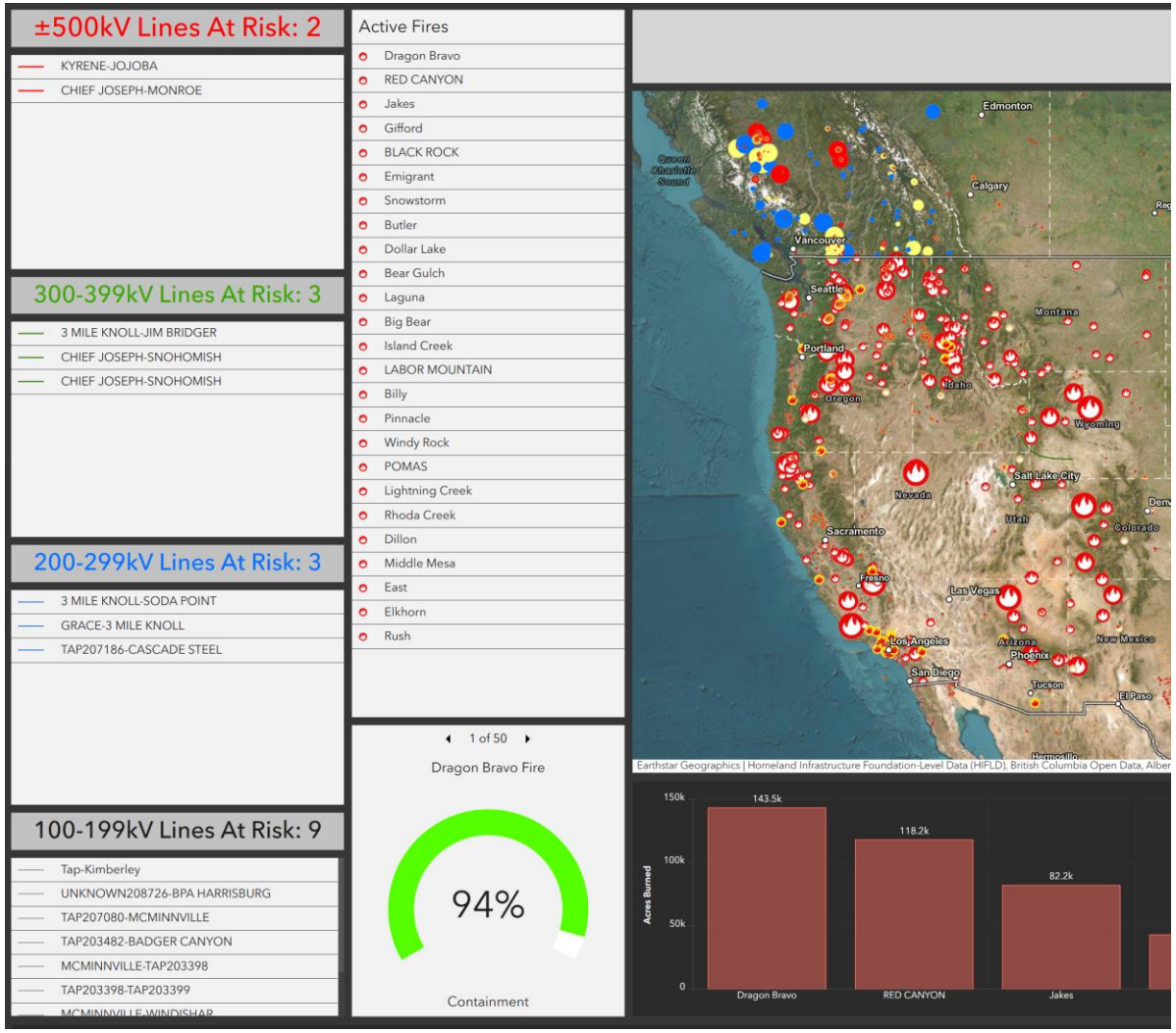
Case Study: June 19, 2025 Rancho Fire

- 157 acres burned in Northern California
- Effects on transmission facilities and the overall Bulk Power System
- Exacerbating impacts

Source: https://krcrtv.com/weather/wildfires-and-water/rancho-fire-cottonwood-shasta-county-cal-fire-shasta-trinity-unit-breaking-news-wildfire-california-norcal-update

Wildfire Mitigation and Bulk Power System Impacts in the West

- State Wildfire Mitigation Plans
  - 6 of 11 states require plans
- Public Safety Power Shutoff (PSPS) programs in the West
  - 2023: 8 entities
  - By the end of 2025: 30 entities
- Encroachment events
- System hardening and advanced detection

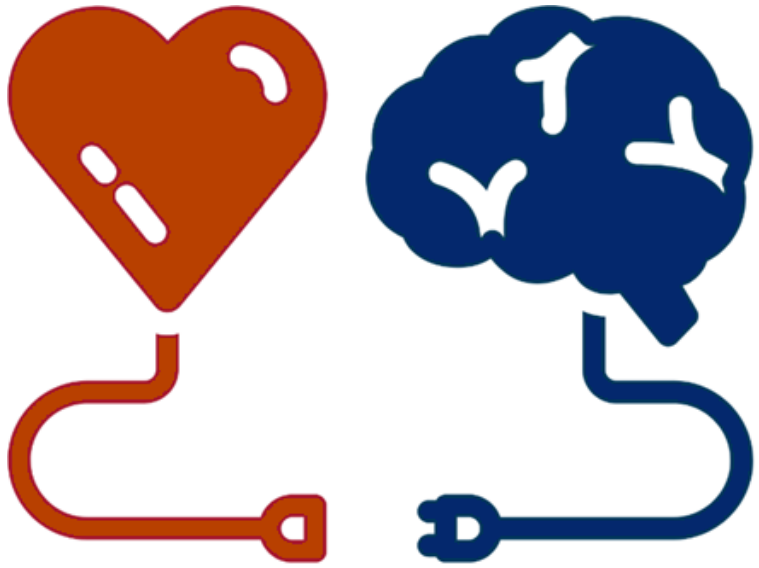


Source: WECC Wildfire Risk Dashboard (www.wecc.org)

Our Why

"Electricity is an integral part of the fabric of modern life.

WECC strengthens that fabric to preserve and improve society's future."



What happens when the power goes out?

WECC

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