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January 4, 2023

MEMORANDUM

TO: Council Members

FROM: Jennifer Light

SUBJECT: Remarks from CEO of CAISO, Elliot Mainzer, on September 2022 Heat Wave

BACKGROUND:

Presenter: Elliot Mainzer, CEO, California Independent System Operator (CAISO)

Summary: In early September 2022, California experienced a 10-day uninterrupted stretch of extreme heat, with daily temperatures continually hitting the triple digits and little cooling during the night. On September 6, a day when record temperatures were set across California, the California Independent System Operator (CAISO) experienced a record peak in demand of 52,061 MW. Throughout this event, the CAISO was able to keep electricity flowing, relying on a variety of actions including increased resource adequacy procurement, market enhancements, and demand side actions. Elliot will present on the actions taken by the CAISO leading up to and during this event that enabled California to keep the lights on. He will also highlight lessons learned that inform preparations the CAISO is making for the coming summer.

Relevance: Over the past several years, there have been several extreme weather events across the US that have strained the power system. Understanding these events, and the actions taken to maintain system adequacy, is important for power system planning. Northwest planners have traditionally paid special attention to events in California due to the large

intertie connection and seasonal exchanges of energy. California used to rely on Northwest hydro resources as a hedge against high natural gas prices, and to a much lesser extent the Northwest would rely on California resources in low hydro years. This interdependency has changed from a Northwest perspective in recent years as California transitions away from on-call fuel resources like natural gas to less expensive but more uncertain resources like solar and wind.

Bio: Elliot Mainzer is the President and Chief Executive Officer of the CAISO. The CAISO is responsible for managing the flow of electricity that serves 80 percent of California and a small portion of Nevada. The CAISO also runs a real-time energy market for utilities in eight western US states and conducts reliability coordinator services for most balancing authorities in the West.

Mr. Mainzer is committed to using leading-edge policies and new technologies to accelerate California's drive towards the reliable decarbonization of its electric power grid. He started in his new role at the CAISO on September 30, 2020 following a successful 18-year career at the Bonneville Power Administration (BPA) where he was at the forefront of transformational changes in the western electricity market.

While serving as BPA's administrator and CEO from 2013-2020, Mr. Mainzer effectively navigated the agency through a period of tremendous industry change and economic headwinds by improving the agency's long-term cost competitiveness and financial resiliency, modernizing assets and system operations, and positioning BPA as a more responsive and agile business partner.

In recent years, Mr. Mainzer has co-chaired the Western Electric Industry Leaders Group to support greater western market and policy coordination on such topics as resource adequacy, transmission development, and carbon accounting. He has also served as the Chair of the U.S. Entity for the Columbia River Treaty with Canada and on the boards of the Electric Power Research Institute, and the Utility Wind Integration Group.

A native of San Francisco, Mr. Mainzer has an undergraduate degree in geography from U.C. Berkeley, and master's degrees in Business Administration and Environmental Studies from Yale University. Mainzer and his wife Margaret have twin boys. He is also an amateur jazz saxophonist and dedicated student of jazz theory and history.

SEPTEMBER 2022 HEAT WAVE RETROSPECTIVE

Elliot Mainzer

President & CEO

California Independent System Operator

NW Power and Conservation Council

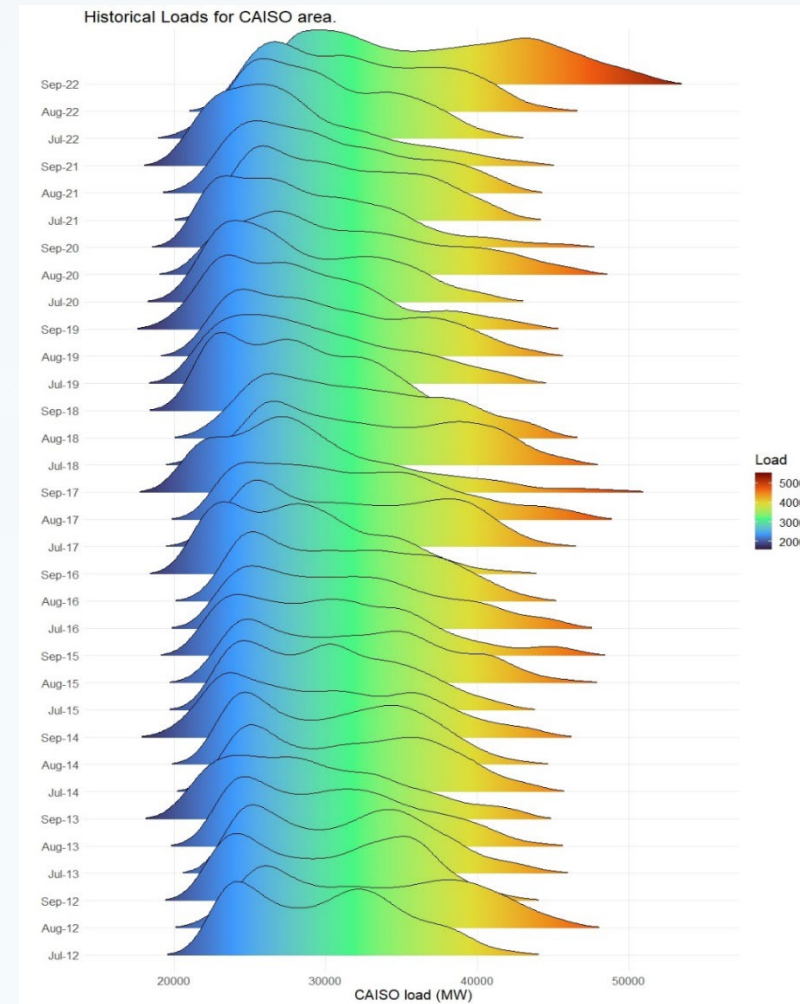
January 10, 2023



California ISO

HEAT WAVE

The September heat wave was extraordinary in duration and intensity



HEAT RECORDS – SEPTEMBER 1-10

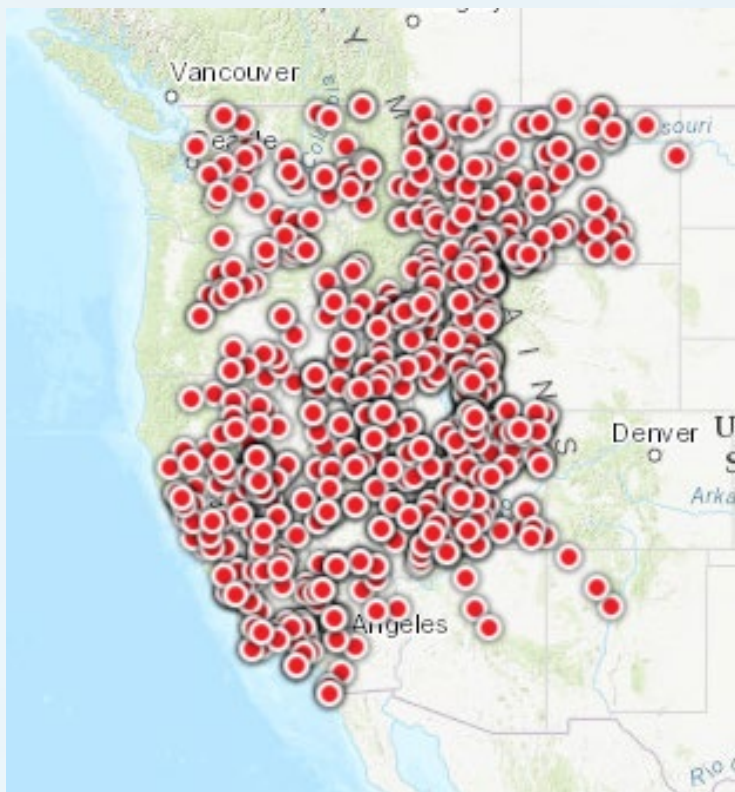
28 California cities broke or tied all-time records for maximum temperatures.

- Sacramento – 116
- San Jose – 109
- Livermore – 116

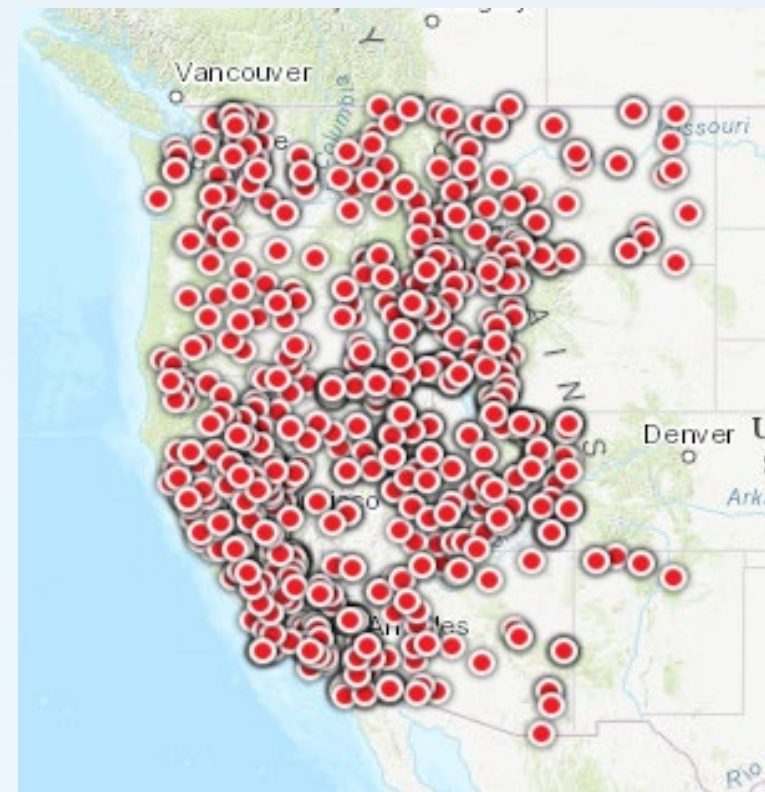
Across the West:

- 2,864 daily highest maximum temperature records tied or broken
- 2,074 daily high minimum records tied or broken

Highest **maximum** temperature records



Highest **minimum** temperature records

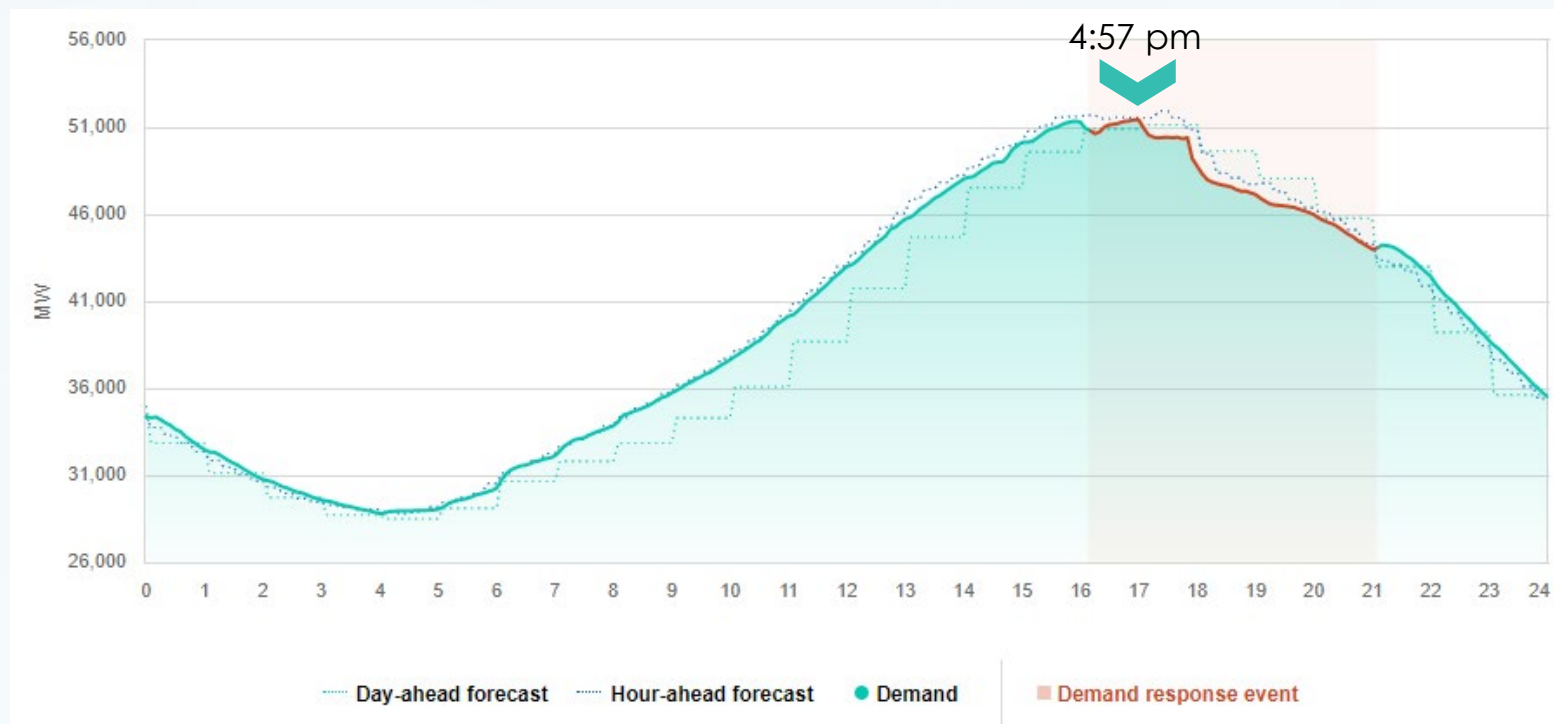


DEMAND RECORDS FOR SEPTEMBER 6, 2022

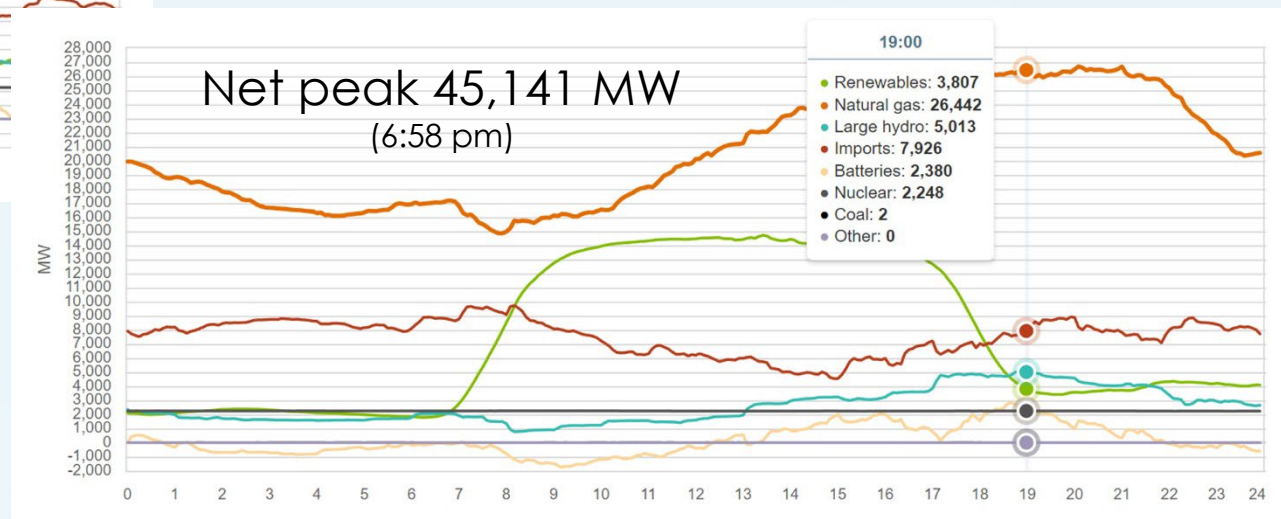
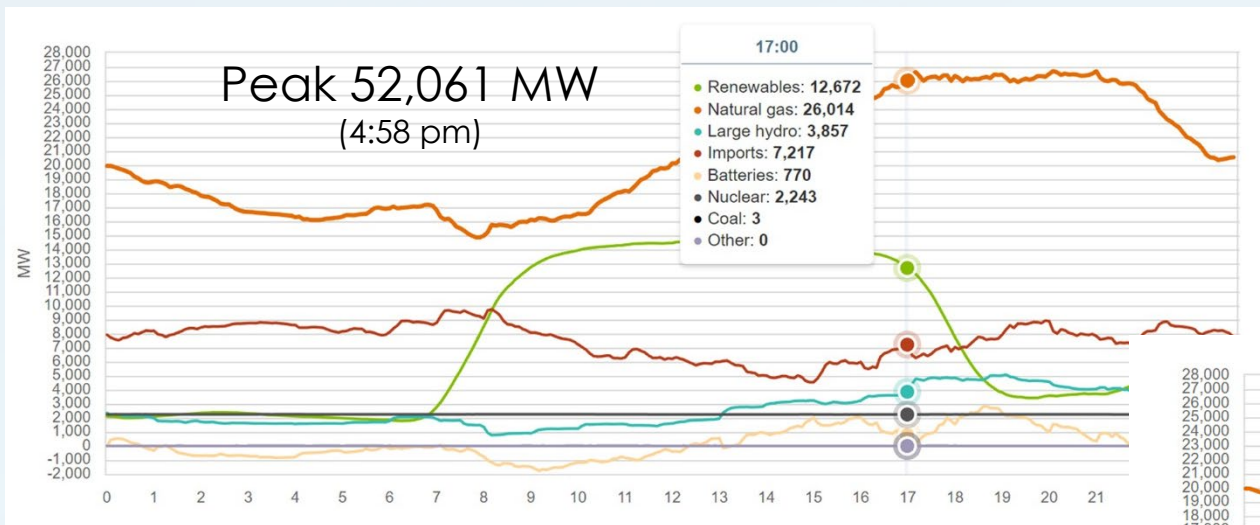
ISO all-time record
52,061 MW

Western Interconnection record
167,500 MW

RC West record
130,920 MW



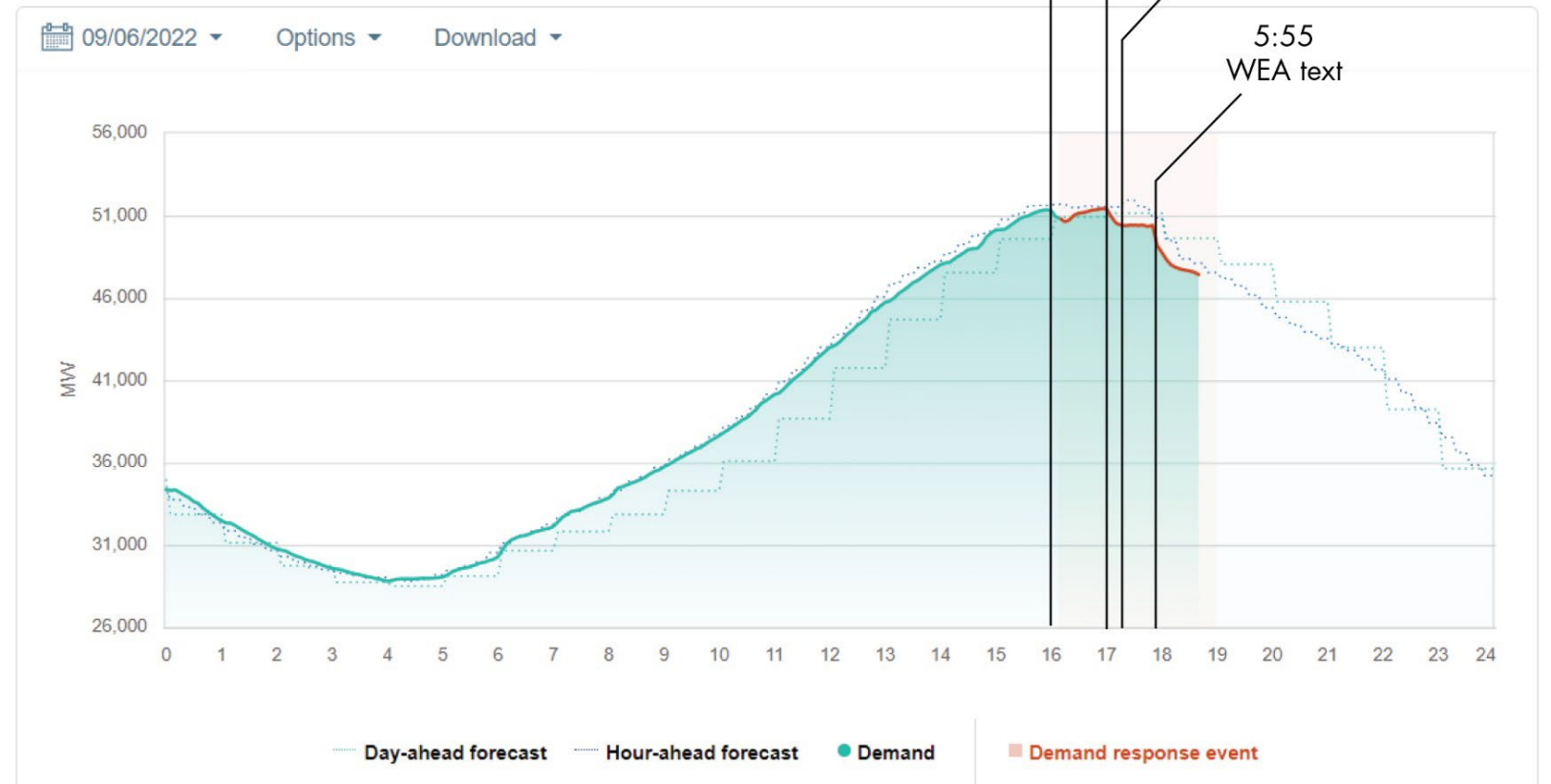
SEPT 6 PEAK AND NET PEAK RESOURCE STACK



SEPT 6 DEMAND RESPONSE & EMERGENCY RESOURCES

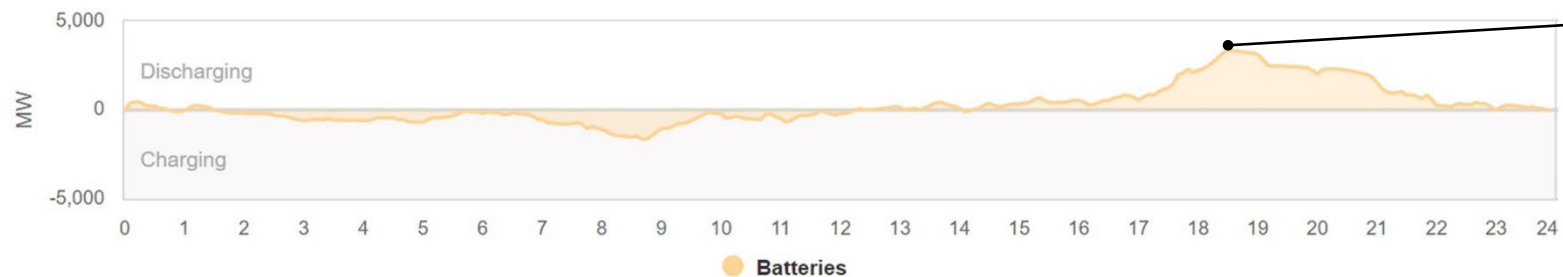
Demand trend

System demand, in megawatts, compared to the forecasted demand in 5-minute increments.

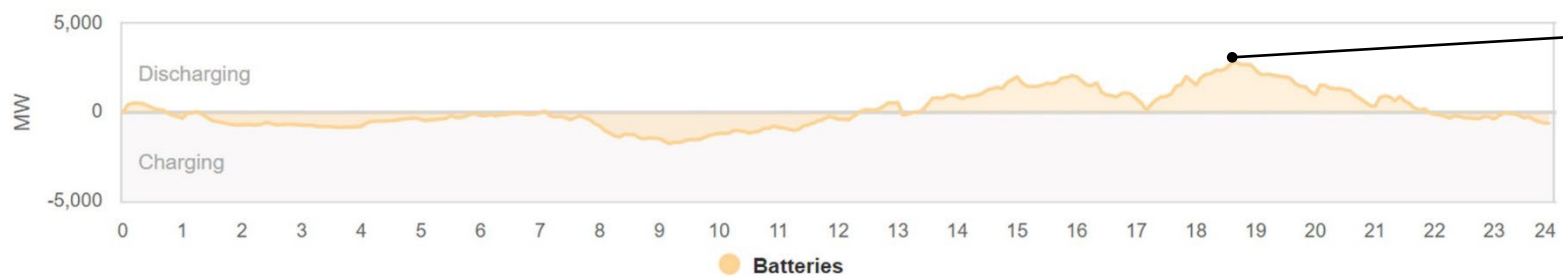


4-HOUR LITHIUM-ION BATTERY DISPATCH

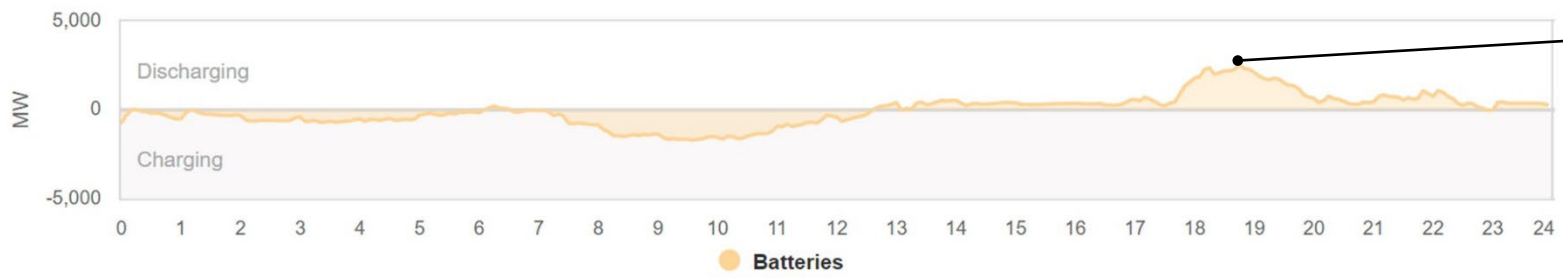
SEPT 5



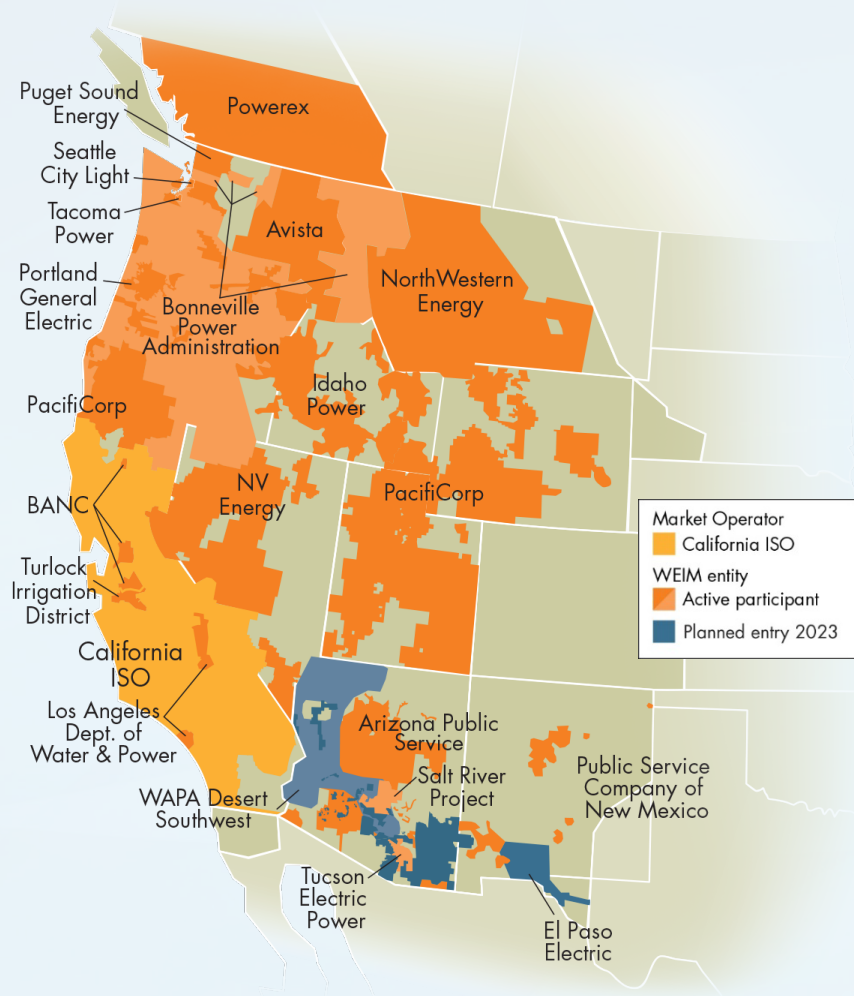
SEPT 6



SEPT 7



WESTERN ENERGY IMBALANCE MARKET (WEIM)



- Excellent performance during heat wave.
- Efficiently cycled energy between utility systems across the West and supported reliability during very stressed grid conditions.
- Demonstrated value of wide-area coordination across the Western US and highlighted potential additional reliability and cost-saving benefits of an Extended Day-Ahead Market (EDAM).

WHAT WENT WELL

- New clean energy capacity
- Improved communication and coordination
- Advance preparation and exercises
- Effective pre-emptive maintenance and outage coordination
- Excellent overall fleet performance
- Meaningful amount of DR
- Westerners demonstrated their ability to support each other
- Strong Western Energy Imbalance Market performance
- Geographic diversity of weather and good NW hydro conditions



OPPORTUNITIES FOR IMPROVEMENT

- Strengthen resource adequacy and planning models
- Expedite construction of infrastructure
- Improve load flexibility capabilities
- Broaden system visibility and improve liquidity and reliability with EDAM
- Align storage market design with grid needs
- Establish strategic reserve resources for extreme events
- Continue to strengthen communication and coordination

