



California ISO Overview to: Sons in Retirement, Branch 146

Deb Le Vine

Director Infrastructure Contracts and Management

March 9, 2023

The information contained in these materials is provided for general information only and does not constitute legal or regulatory advice. The ultimate responsibility for complying with the ISO FERC Tariff and other applicable laws, rules or regulations lies with you. In no event shall the ISO or its employees be liable to you or anyone else for any decision made or action taken in reliance on the information in these materials.

ISO PUBLIC – © 2023 CAISO

What we will cover today

AGENDA



- Background
 - History, Roles, Structure and Coordination
- ISO Overview
 - Planning, Markets, Reliability
- Markets, Operations and Processes
 - Policies & Initiatives, Stakeholder Process, ISO web tools, Training
- Summer 2022 Heat Wave

History – How did we get here?

- **Federal**

- Order No. 888 – promoting wholesale competition and open access to transmission service (May 1996)
- Order No. 889 – open access same-time information system and standards of conduct (April 1996)
- ISO and Power Exchange – run grid and competitive market
 - Phase I – conceptual filing of two entities (October 1996)
 - Phase II – detailed design (Oct/Dec 1997)

- **California**

- California Public Utilities Commission
 - Yellow Book – customer choice (February 1993)
 - Blue Book – restructure electric utility industry (April 1994)
- AB 1890 – restructured electric utility industry (September 1996)
- ISO began operations (April 1998)

The ISO is a nonprofit, public benefit corporation

Our responsibilities are to...



The ISO is a Grid Operator and Market Operator



grid operator

maintains reliability by:

- balancing supply and demand
- operating transmission system within limits
- ensuring grid is secure in case of a contingency event
- orchestrating restoration in case of a system outage

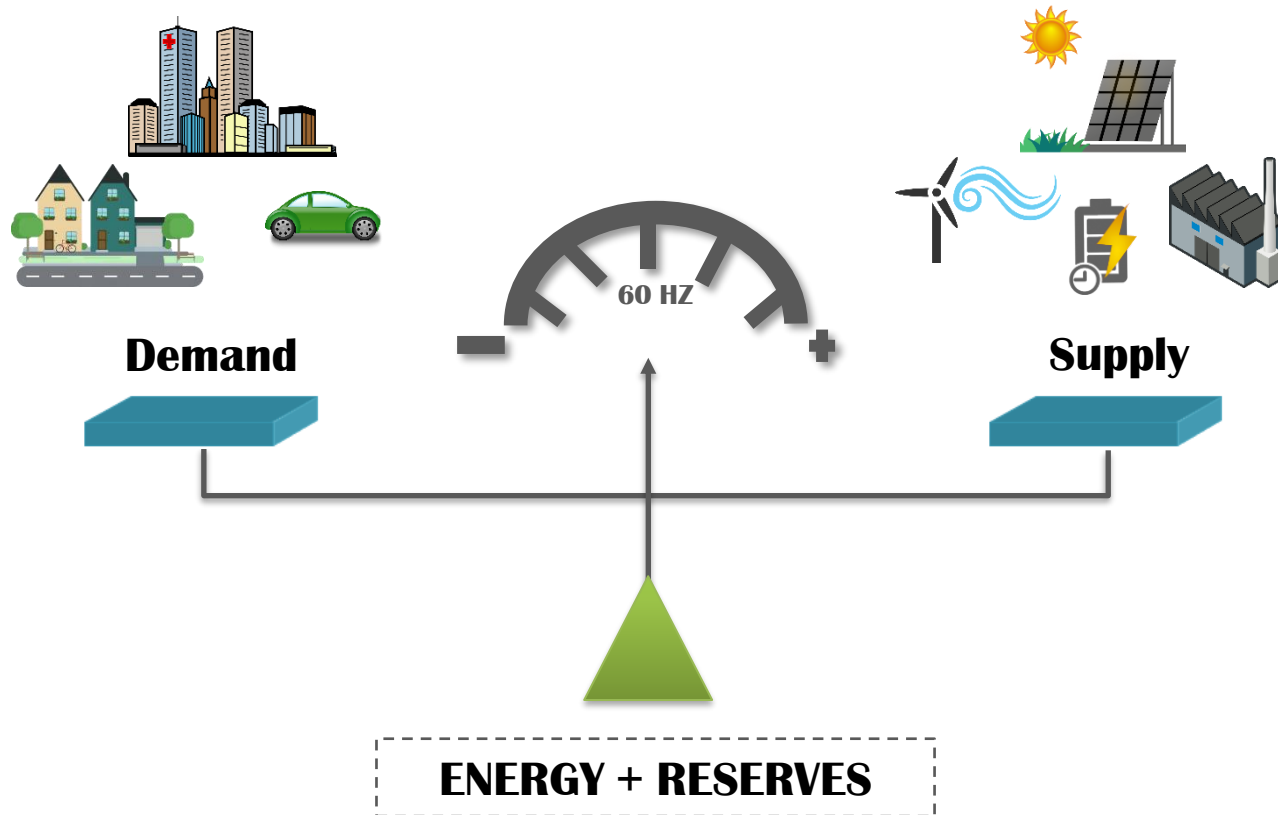


market operator

supports reliability by providing:

- a larger operational footprint
- cost minimization to balance supply and demand
- non-discriminatory grid access to supply and demand
- price transparency reflective of system conditions
- compensation for grid services

The goal is to keep the electric system balanced



The ISO adheres to strict oversight

FERC

Regulated by the **Federal Energy Regulatory Commission**

- Regulates the interstate transmission of electricity, natural gas and oil

NERC

Compliant with the **North American Electric Reliability Corp**

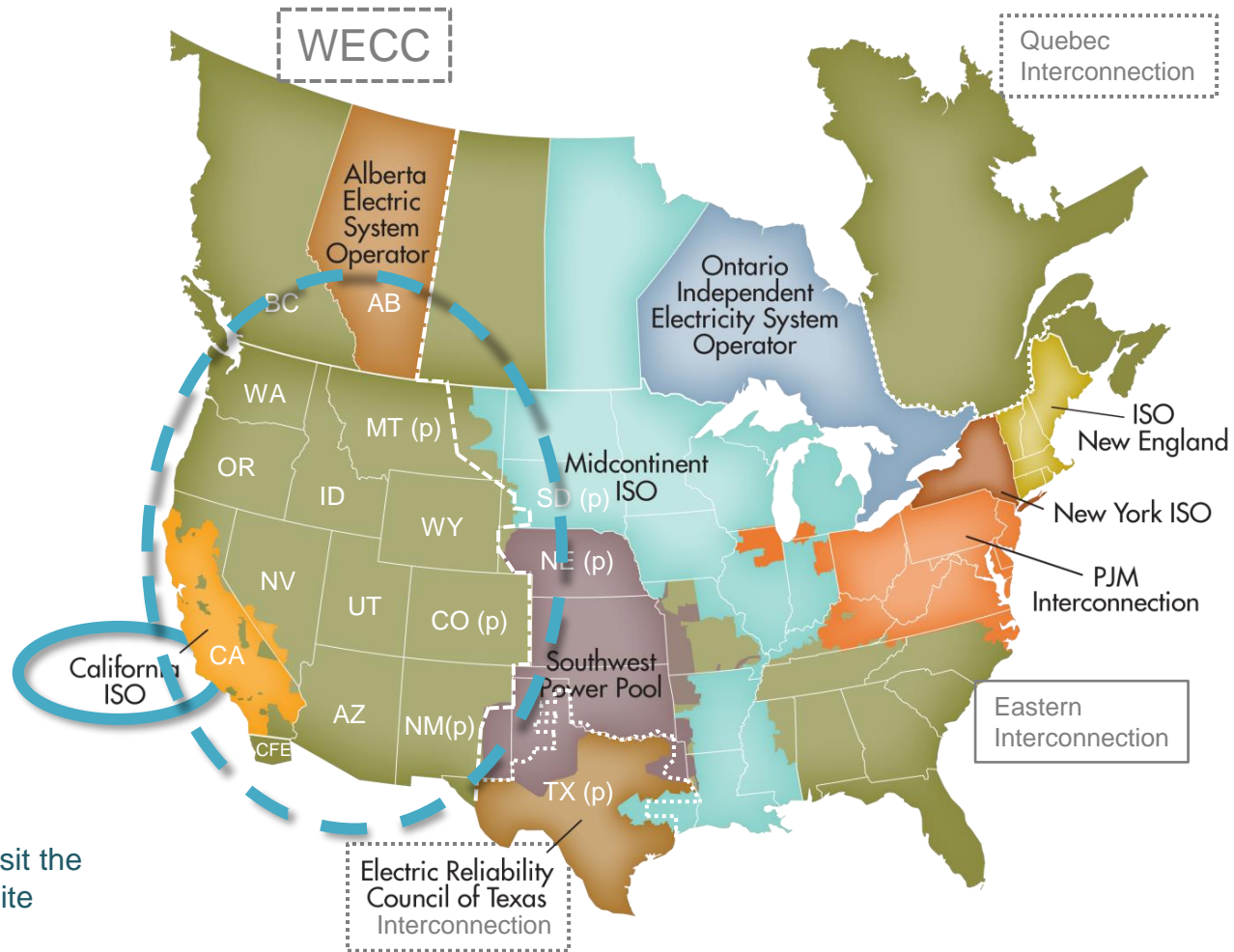
- Regulates the North American grid through the adoption and enforcement of reliability standards

WECC

Members of the **Western Electricity Coordinating Council**

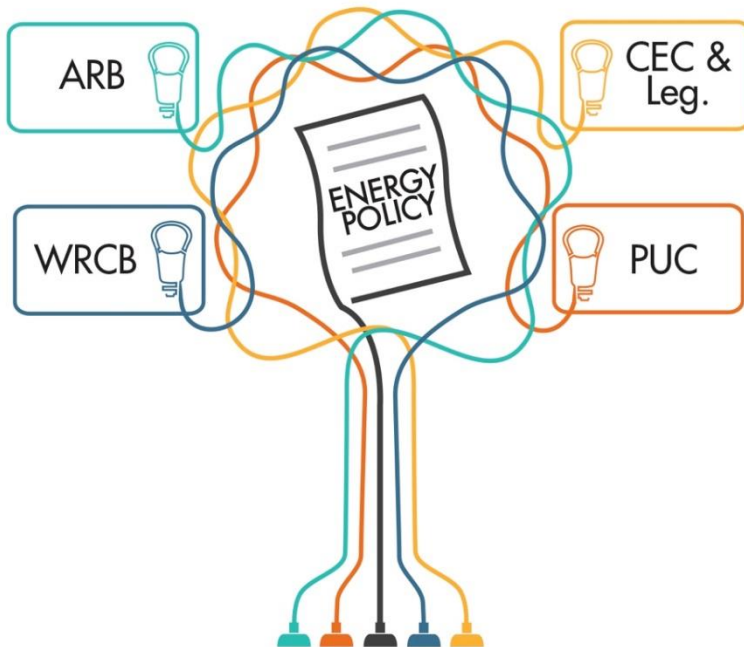
- Coordinates bulk electric system reliability in the geographic area known as the Western Interconnection

North American energy regions share the goal of maintaining reliability and market efficiency



For more information visit the [ISO/RTO Council website](#)

ISO coordinates with state agencies



Air Resources Board

- Greenhouse gas regulations



Energy Commission and Legislature

- Renewable Portfolio Standard
- Energy Policies (Senate & Assembly bills)



Water Resources Control Board

- Once-through cooling



Public Utilities Commission

- Resource Adequacy
- Generation Procurement
- Integrated Resource Plan

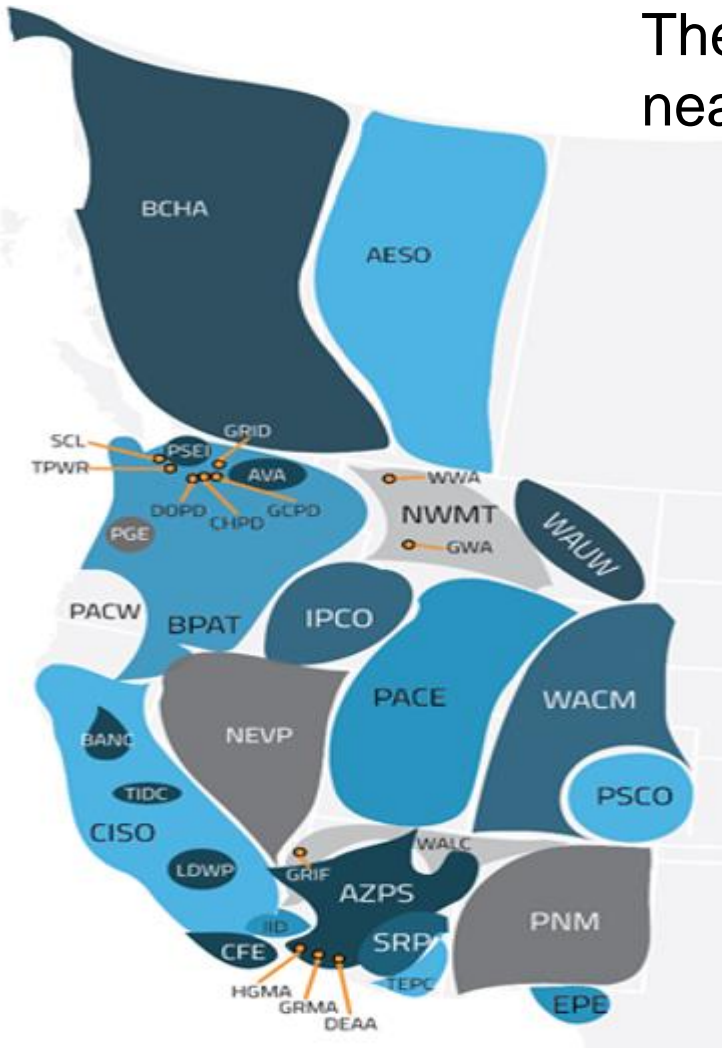
The ISO is also a Balancing Authority (BA)

The Western Interconnection is made up of nearly 40 Balancing Authority Areas (BAAs)

For more information about other BAAs, visit the WECC website

Each BA is responsible for:

- reliably planning and operating an area of the high voltage grid
- instantaneously matching generation with load inside its borders
- meeting import and export obligations



California ISO facts

As a federally regulated nonprofit organization, the ISO manages the high-voltage electric grid California and a portion of Nevada.

52,061 MW record peak demand
(September 6, 2022)

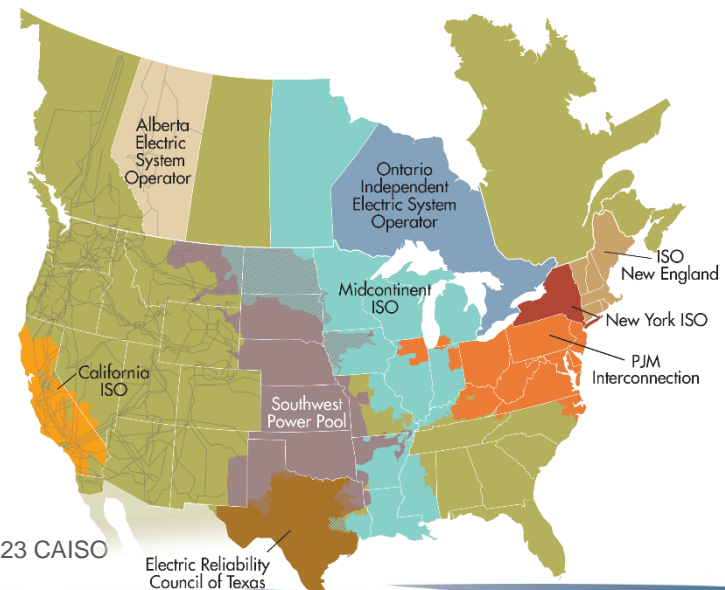
234.2 million megawatt-hours of electricity delivered
(2021)

75,747 MW power plant capacity
Source: California Energy Commission

1,119 power plants
Source: California Energy Commission

32 million people served

One of **9** ISO/RTOs in
North America



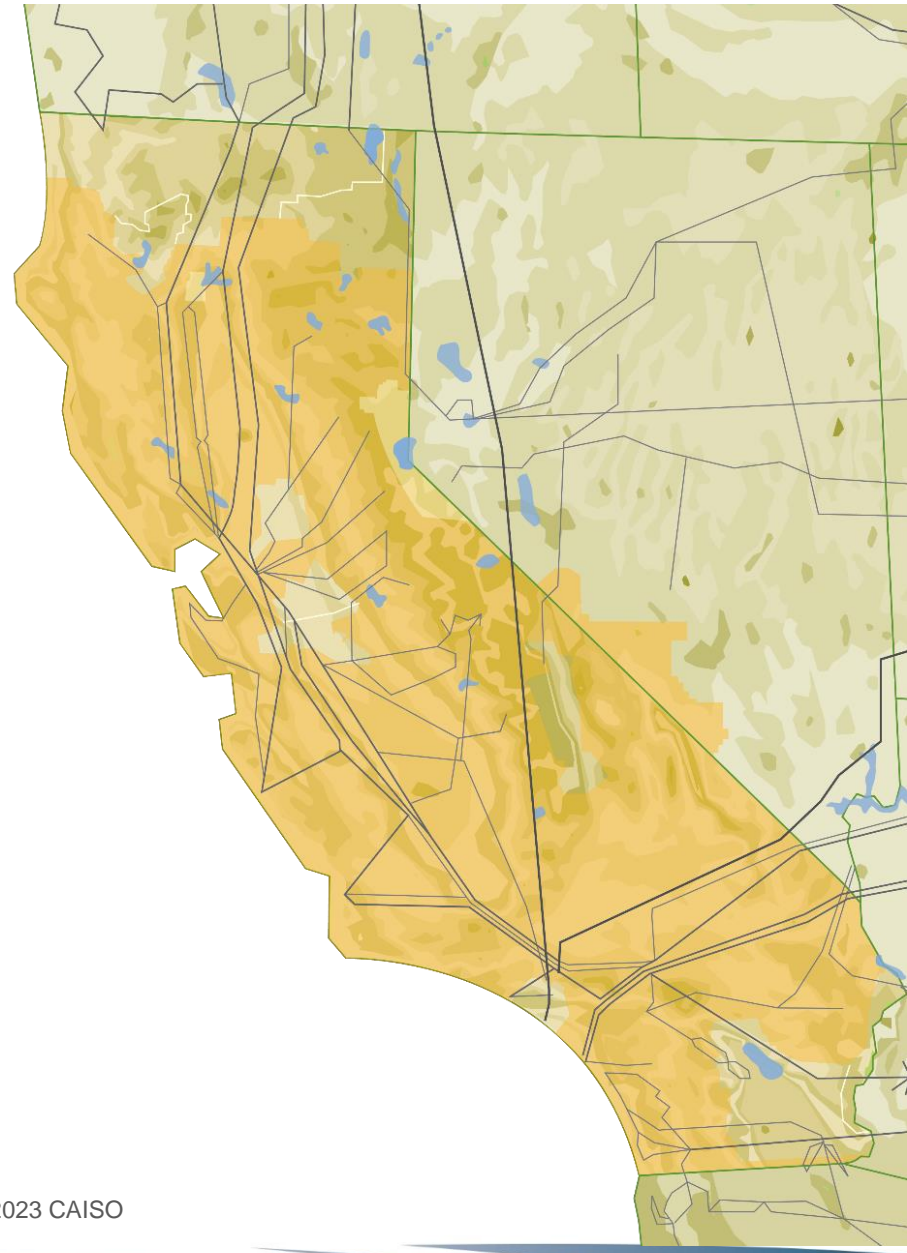
California ISO facts

26,000 circuit-miles of transmission lines

\$739 billion annual market (2022)

4,515 MW added installed storage capacity (2023)

70,037 market transactions per day (2021)



Historical statistics and records (as of 1/31/2023)

 **Solar peak**
14,352 MW

June 7, 2022 at 12:16 p.m.

Previous record:
14,136 MW, May 16, 2022

 **Wind peak**
6,465 MW

May 28, 2022 at 5:39 p.m.

Previous record:
6,265 MW, March 4, 2022

 **Peak percentage of renewables compared to demand**
103.5%

May 8, 2022 at 3:39 p.m.

Previous record:
99.87%, April 30, 2022

 **Peak net imports**
11,894 MW

Sept. 21, 2019 at 6:53 p.m.

 **Peak demand**
52,061 MW

Sept. 6 at 4:57 p.m.

Second highest:
50,270 MW, July 24, 2006

 **Steepest ramp over 3-hour period**
17,660 MW

March 11, 2022 starting at 2:59 p.m.

Second highest:
17,298 MW, April 24, 2022

How is an ISO different than a vertically integrated public utility?

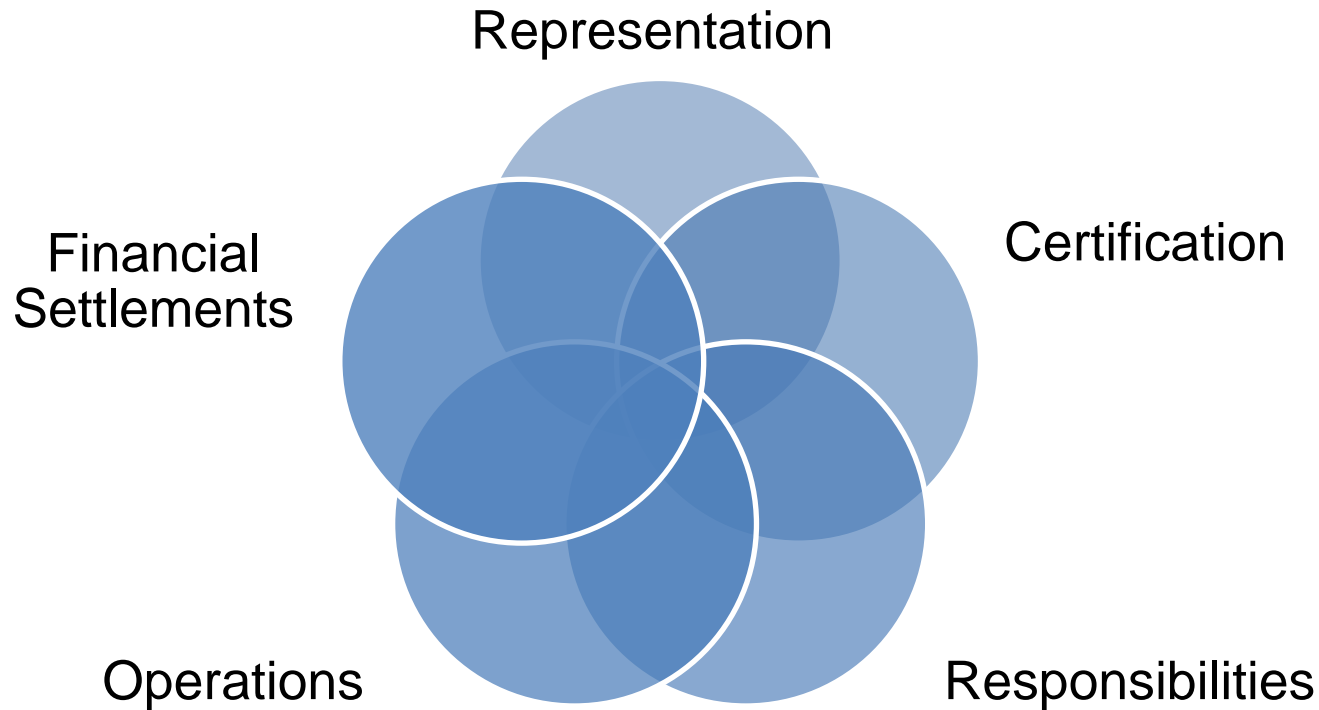
Vertically Integrated Utility

- Serve end-use customers
- Owns and purchases generation
- Owns and operates transmission and distribution lines
- Provides open access through an OATT

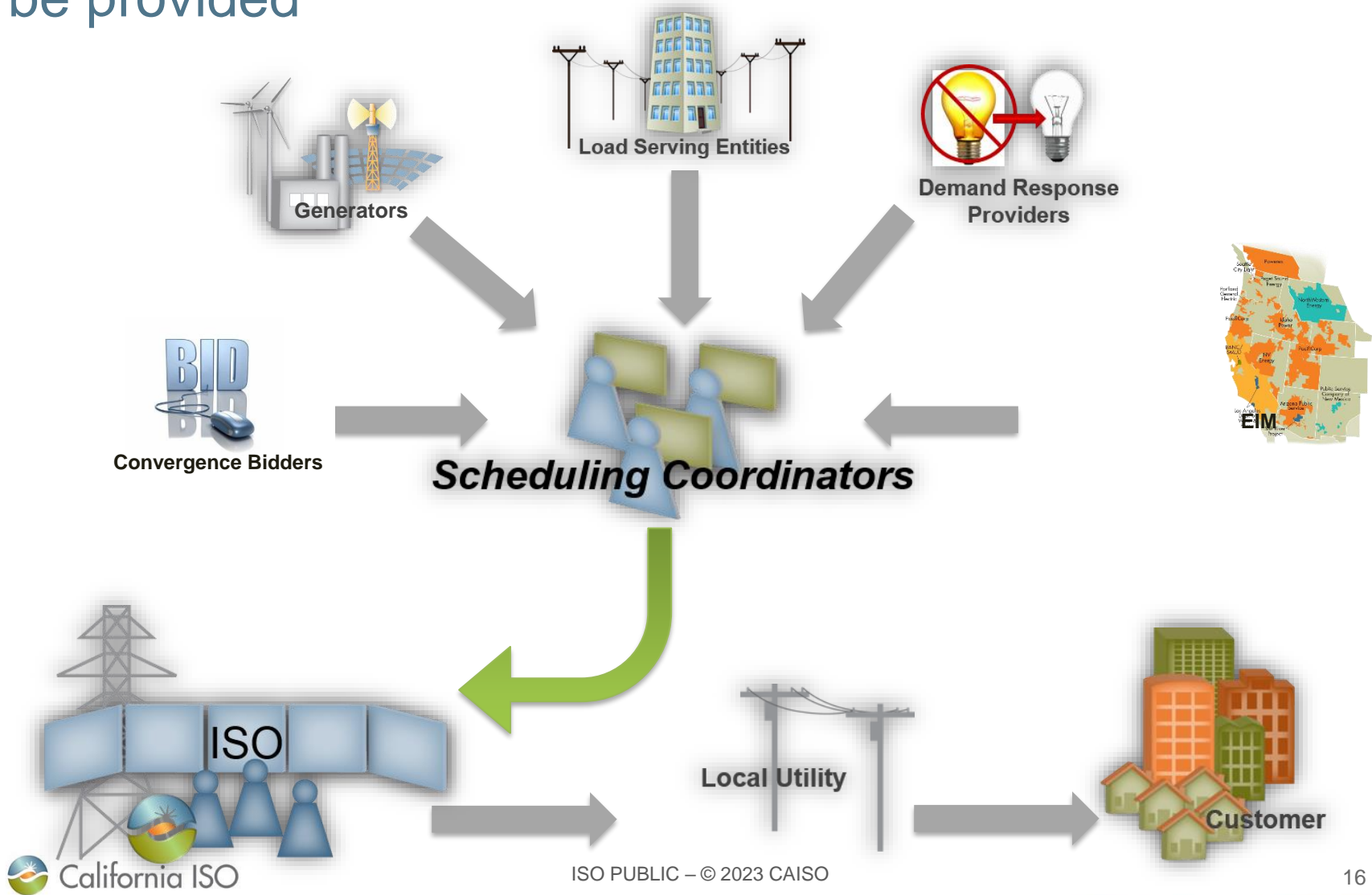
ISO/RTO

- Operates transmission system owned by others
- Manages markets for wholesale energy and energy services
- Provides open access to utilities, independent power producers and marketers through ISO tariff

Scheduling Coordinators are entities that are authorized to transact business with the ISO



Participation with the ISO depends on the service to be provided



The ISO provides two markets to optimize for reliability and economics

Day-Ahead Energy Market

Commits the most cost-effective and reliable mix of generation for the region

Enables parties to schedule contracted supply/demand

Enables suppliers to offer excess supply in the form of energy or reserves

Enables Load Serving Entities to secure pricing to meet their demand for energy

Real-time Energy Market

Economically dispatches resources to balance real-time supply and demand, while ensuring system reliability

Extends beyond California to other western states

Hour-ahead scheduling for inertie resources

Optimization every 15-min for intra-hour variability and every 5-min to meet instantaneous demand

WEIM

Grid operators need a plan for operating the next day to ensure reliability

- The California ISO uses its **day-ahead market** to create a reliability plan. As a result, resources are committed to provide:
 - Supply to meet the demand that cleared in the market
 - Supply to meet the ISO demand forecast
 - Ancillary services to meet the reliability requirements



System Operations supports grid reliability

Control room personnel

- Highly skilled, cross-trained System Operators with specific responsibilities

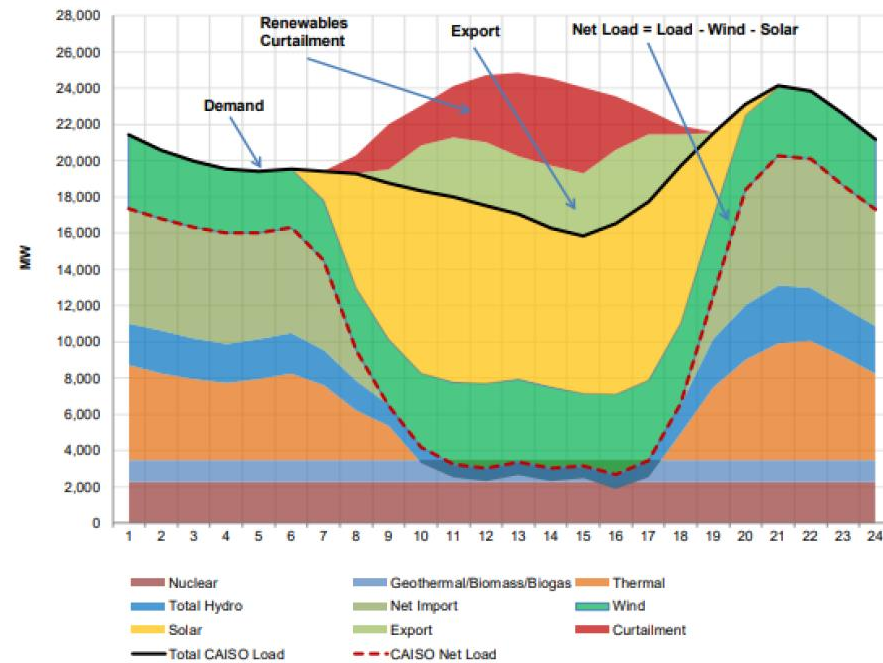
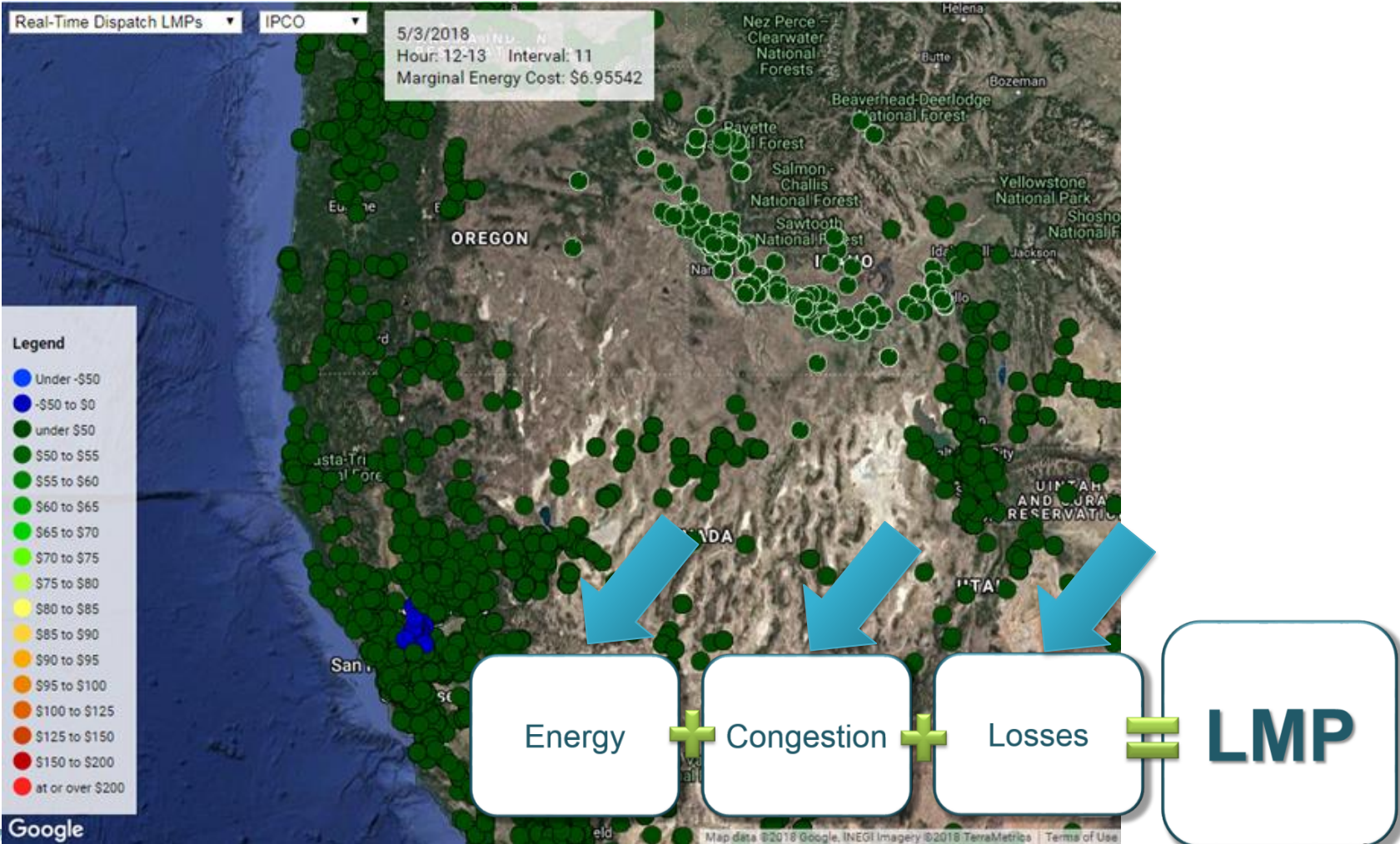


Figure 4. Using exports to reduce renewable energy curtailment

Source: CAISO, data for May 8, 2022

Locational marginal pricing components



* LMP for EIM entities also contains a GHG component

The ISO extended its markets to other BAAs through the Western Energy Imbalance Market (WEIM)

Launched in 2014 to:

- enhance grid reliability,
 - generate financial benefits for participants
 - improve the integration of renewable energy resources.
-
- Gross benefits exceeding \$3.4 billion
 - Reduced over 792 thousand metric tons
 - Avoided curtailments of 1,850,797 MWh



The ISO is a Reliability Coordinator

RC West serves over 40 balancing authorities and transmission operators:

- monitors the interconnected power grids in the West for compliance with federal and regional standards
- determines measures to prevent or mitigate system emergencies in day-ahead or real-time operations
- leads system restoration following major incidents



Out of state wind resources play a growing role in state agency resource planning

Out of state wind resources in different resource plans:

- The current “Preferred System Plan” calls for 1500 MW in 2032
- The High Transportation Electrification portfolio calls for 4828 MW by 2035
- The “starting point” scenario provided by the CEC and CPUC for the 20 Year Outlook calls for 10 GW by 2040
- These projections also call for roughly matching levels of offshore wind, as well as California wind resources





Questions

