

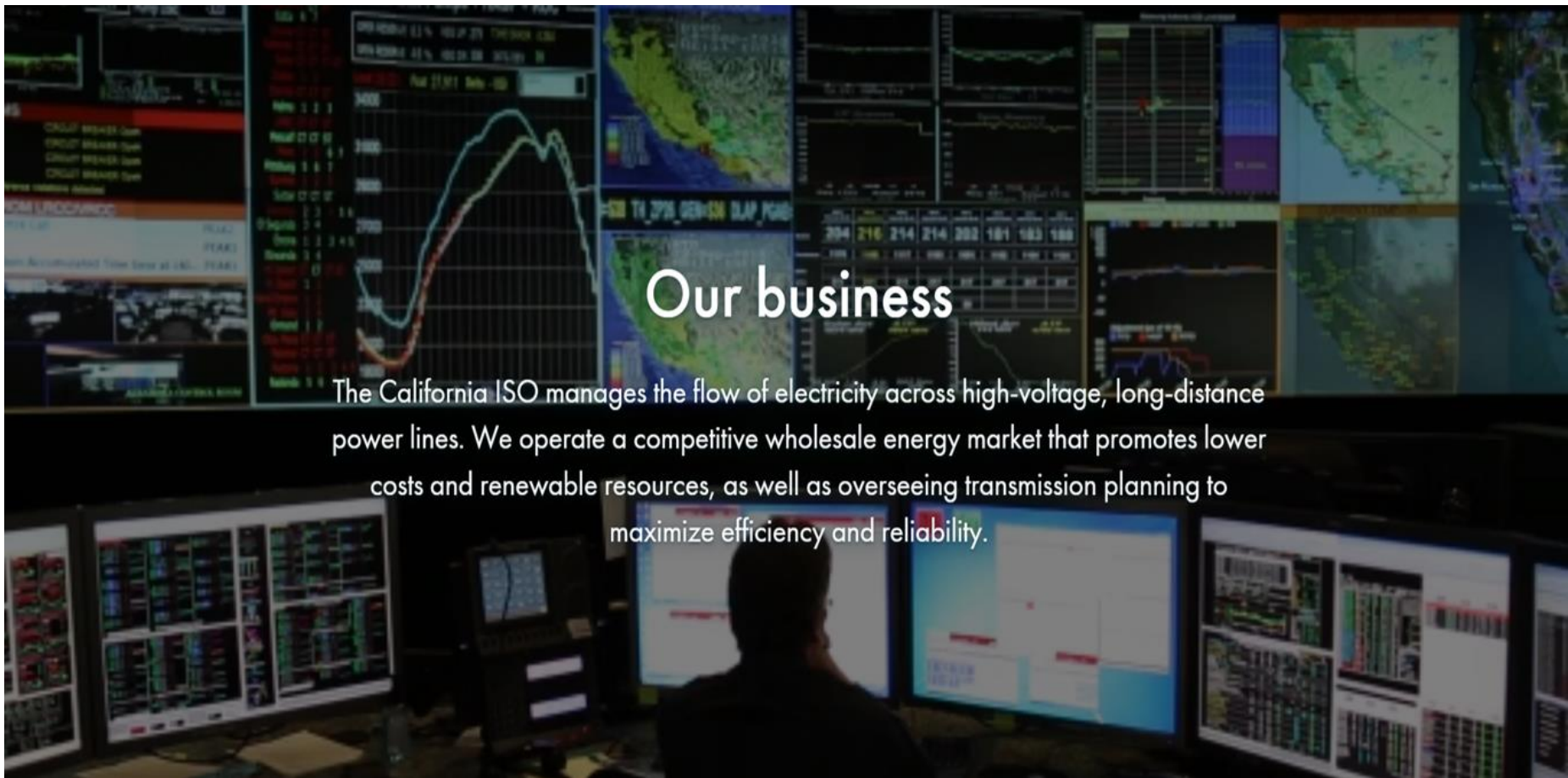


California ISO

# Coordinating the Transmission and Distribution Systems in Support of Increasing Utilization of Demand Response and Distributed Energy Resources

Case Study for CAISO Legal Forum

April 10, 2025



## Our business

The California ISO manages the flow of electricity across high-voltage, long-distance power lines. We operate a competitive wholesale energy market that promotes lower costs and renewable resources, as well as overseeing transmission planning to maximize efficiency and reliability.

# California ISO has been operating as a Balancing Authority since 1998

- As the largest of about 38 balancing authorities in the western interconnection, the ISO serves an estimated 35% of the electric load in the western states
- **Market services** extended beyond the CAISO Balancing Area in 2014 – presently includes 21 WEIM Balancing Areas across 11 western states
- Since 2019, CAISO has been providing **Reliability Coordinator** services - currently serving 25 balancing authorities and 39 transmission operators in the western states

# Operational coordination & communication considerations

- NERC functions
  - Reliability Coordinator vs Balancing Authority vs Transmission Operator vs Distribution Provider
  - TOPs with Coordinated Functional Registration agreements
- Contractual relationships as well as defined jurisdictional boundaries
  - ISO – TSO
  - TSO - DSO
  - ISO – Merchant
  - Merchant – DSO
  - CCAs

## RC West Operations coordinating across wide area

Emergency Notifications	2024	2023	2022	2021	2020
EEA - Watch	38*	9	9	4	NA
EEA - 1	12**	14	19	7	26
EEA - 2	0	0	7	3	9
EEA - 3	11	6	7	3	12
Total	61	29	42	17	47
Transmission Emergency	13***	1	3		

Peak Load	2024	Historical
WECC	167,988 MW (07/10/2024)	167,988 MW (07/10/2024)
RC West	128,470 MW (07/10/2024)	130,986 MW (9/6/2022)

*\*31 one BA, \*\* 7 due to winter storm MLK weekend 2024, \*\*\* 7 northern CA local TOP area*

# CAISO BA Operations – Emergency DR History

## EEA 2

Dispatch Order clarification from CPUC regarding “BIP” Big Industrial Programs in 2013

Note:  
Emergency DR can also be utilized locally during Transmission Emergencies, load reduction is not always mitigation action

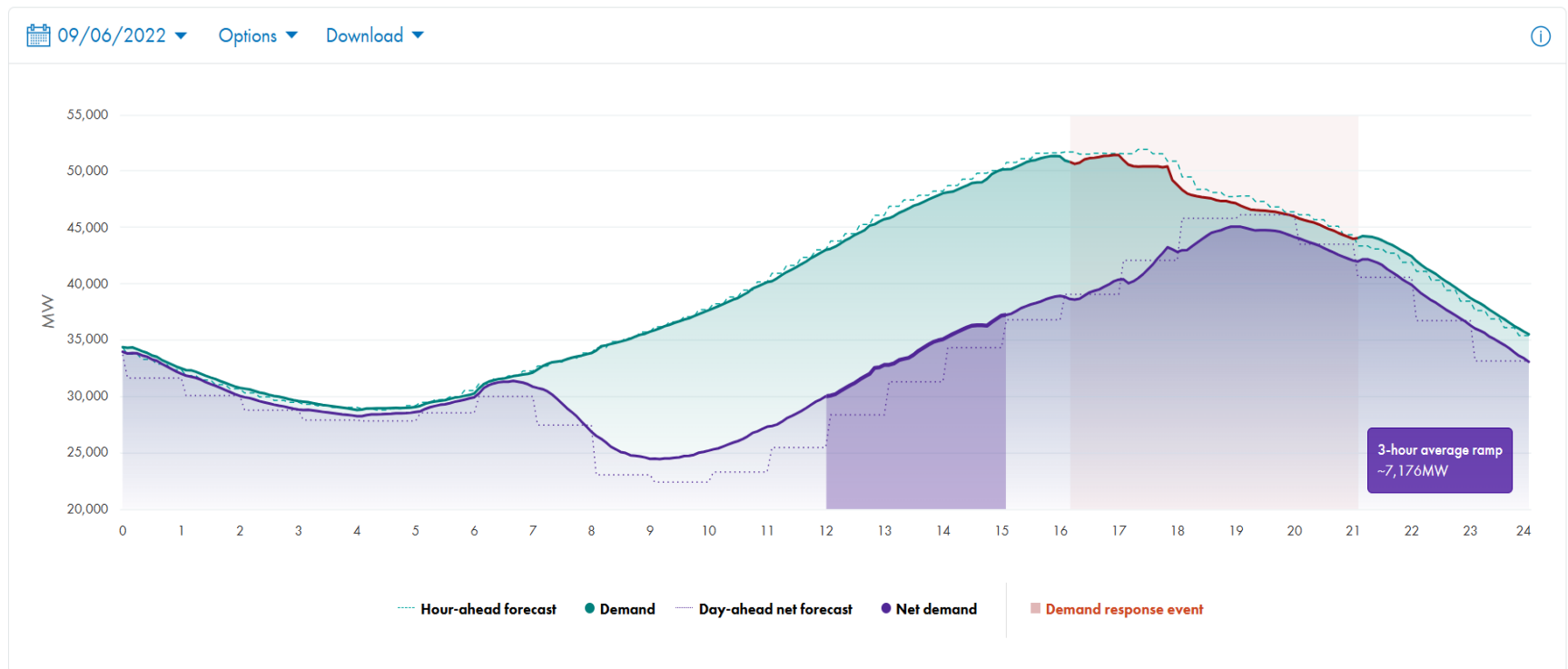
	Flex Alert	Restricted Maintenance Operations	Transmission Emergency	Alert	Warning	Stage 1 Emergency	Stage 2 Emergency	Stage 3 Emergency	1-Hour Probable Load Interruptions	Voluntary Load Reduction Program
1998	N/A	8	N/A	7	8	7	5	0	N/A	N/A
1999	N/A	12	N/A	2	6	4	1	0	N/A	N/A
2000	20	77	N/A	34	85	55	36	1	N/A	N/A
2001	26	168	N/A	180	181	70	65	38	N/A	N/A
2002	1	18	N/A	3	4	2	1	0	N/A	N/A
2003	0	10	N/A	0	0	1	0	0	N/A	N/A
2004	6	16	6	1	2	1	0	0	N/A	N/A
2005	7	13	5	0	2	1	2	0	N/A	N/A
2006	18	16	0	1	5	3	1	0	N/A	3
2007	6	18	4	1	3	1	0	0	N/A	N/A
2008	3	10	0	0	1	0	0	0	N/A	N/A
2009	0	6	6	0	2	0	0	0	N/A	N/A
2010	0	8	1	0	1	0	0	0	N/A	N/A
2011	2	17	2	0	1	0	0	0	N/A	N/A
2012	2	134	0	0	0	0	0	0	N/A	N/A
2013	3	11	0	0	0	0	0	0	N/A	N/A
2014	1	8	1	0	1	0	0	0	N/A	N/A
2015	2	10	0	1	2	0	0	0	N/A	N/A
2016	3	11	0	0	0	0	0	0	0	N/A
2017	4	18	9	0	0	1	0	0	0	N/A
2018	2	22	2	0	0	0	0	0	0	N/A
2019	1	2	3	0	1	0	0	0	0	N/A
2020	10	20	2	9	7	0	6	2	1	N/A
2021	8	24	0	0	4	0	1	0	0	N/A
2022	0	0	0	0	0	0	0	0	0	N/A
TOTALS	125	657	41	239	316	146	118	41	1	3

	Flex Alert	Restricted Maintenance Operations	Transmission Emergency	EEA Watch	EEA1	EEA2	EEA3
2022	11	16	10	9	6	5	1
2023	0	6	2	2	1	0	0
2024	0	18	23	1	0	0	0
2025	0	2	0	0	0	0	0
TOTALS	11	42	35	12	7	5	1

# Case Study: Demand Reduction for Emergencies

CAISO BA Extreme Weather Event Playbook initiated on Monday 08/29/2022

See CAISO <https://www.caiso.com/documents/extreme-weather-event-process-and-communications.pdf>



## DR program considerations through an extended event like Labor Day Week Sept 2022

- Program rules & limitations
- Advance notice requirements
- Number of parties to coordinate
- Customer fatigue
- Expected response over weekends & holidays

Economic in-market/other utility programs

Emergency programs

Trade Date	RMO	Flex Alert	EEA Watch	EEA 1	EEA 2	EEA 3
8/31	Yes	Yes	Yes	Yes		
9/1	Yes	Yes	Yes			
9/2	Yes	Yes				
9/3	Yes	Yes	Yes			
9/4	Yes	Yes	Yes			
9/5	Yes	Yes	Yes	Yes	Yes	
9/6	Yes	Yes	Yes	Yes	Yes	Yes
9/7	Yes	Yes	Yes	Yes	Yes	
9/8	Yes	Yes	Yes	Yes	Yes	
9/9	Yes	Yes	Yes	Yes		



# BACKGROUND

# Managing the Flow of Electrons Across the High-Voltage Transmission System

Since 2019, CAISO has been providing Reliability Coordinator Services. Today, the CAISO:

- Serves as the NERC-registered Reliability Coordinator for 25 balancing authorities and 39 transmission operators in the western United States;
- Has a wide area view of the bulk electric system with authority to prevent or mitigate emergency operations in day-ahead and real-time; and
- Provides leadership in system restoration following a major event.

*See CAISO Tariff §19, the Business Practice Manual for Reliability Coordinator Services, and the Reliability Coordinator Services Agreement.*

# Oversight Committee Provides Insight and Guidance to Management

Chair: Chris Sanford, BPA

Vice Chair: Ashley Kelly, APS

Oversight Committee provides customers an avenue for “input and oversight with respect to the CAISO’s ongoing performance of the RC function” through:

- oversight of each of the RC working groups;
- input and guidance to RC West management on operational issues;
- input and concurrence with respect to overarching Reliability Coordinator policies and procedures
- review and input on new tools or staffing decisions that may substantially affect the budget for and cost of RC service, and
- an annual review of composition and structure of the working groups.

Regulatory Liaison provides input and feedback from state regulators to the Oversight Committee and RC West management.

*See CAISO Tariff § 19.11 and Reliability Committee Oversight Charter*

(<https://www.caiso.com/documents/reliabilitycoordinatoroversightcommitteecharter.pdf>)

## CAISO Relies on the Customer Partnership to Fulfill RC West Function

An RC Customer will perform its obligations, insofar as they relate to interactions with the Reliability Coordinator, which include:

- exchanging data, operating plans, operating procedures, studies, and reports with the CAISO;
- following CAISO operating instructions as the Reliability Coordinator with respect to monitored transmission facilities; and
- promptly providing such information as the CAISO may reasonably request in relation to major incidents consistent with the NERC event analysis program.

*See CAISO Tariff § 19.5(b) and Appendix B.22 (pro forma RCSA).*

# Operating Competitive Wholesale Energy Markets

CAISO's "full network model" analyzes active transmission and generation resources and find the least cost energy to serve demand.

- The Day-Ahead Market is made up of three market processes that run sequentially.
  - Opens for bids and schedules seven days before and closes the day prior to the trade date, with results published at 1:00 p.m.
  - *Extended beyond the CAISO Balancing Area and into EDAM Balancing Areas (go-live 2026).*
- The Real-Time Market is a spot market to meet the last increments of demand not covered by day-ahead schedules and is also the market that secures energy reserves and ancillary services.
  - Opens at 1:00 p.m. prior to the trading day and closes 75 minutes before the start of the trading hour, with results published approx. 45 minutes prior to start of trading hour.
  - *Extended beyond the CAISO Balancing Area in 2014; presently, 21 WEIM Balancing Areas across 11 Western states.*

*See CAISO Tariff §§ 27-34 and Business Practice Manuals for Market Operations and the Energy Imbalance Market*

# Proactively Adapting Our Operational Capabilities

In California and other states, distribution utilities already face many of the same planning and operational challenges the transmission system has long experienced.

Reliable operation of the overall grid will depend on effective coordinated planning and seamless interaction between the Transmission and Distribution operators.

Through 2026, CAISO is increasing coordination with Distribution operators to begin developing a framework and functional model for operational coordination to enable reliable and responsive Distributed Energy Resource utilization