



Summer 2022 4420 Procedure Walkthrough/Tabletop

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Agenda

- CAISO Operating Procedure 4420 overview
 - D+7 through D+2 processes
 - D+1 processes
 - Day of processes
 - Load Restoration
- Scenario Overviews

Market Sensitive Information

- Due to the diversity of the meeting participant roles and responsibilities, it is extremely important that market sensitive information is not shared.
- If you have any concerns about what information may or may not be safely shared, please consult your organization's legal counsel for advice.

AWE to NERC EEA

- The ISO used AWE notifications (Alerts, Warnings, and Emergencies) to signal activation of system emergency procedures
 - AWE notifications have been in place since 1998
- On **May 1, 2022**, the ISO has changed its emergency notifications to align with **NERC's EEA** (Energy Emergency Alert) designations



CAISO BA Emergency Notifications

1998 to Present Day Emergency Levels***	Emergency Levels as of 5/1/22
Flex Alert	Flex Alert
Restricted Maintenance Operations	Restricted Maintenance Operations
Transmission Emergency	Transmission Emergency
Alert	EEA Watch
Warning	EEA 1
	EEA 2
	EEA 3
Stage 1	
Stage 2	
Stage 3	

*** AWE history will continue to be maintained on www.caiso.com

Energy Emergency Alert (EEA) Levels (EOP-011-1)

- Per EOP-011-1, EEA may only be initiated by an RC
 - 1) the RCs own request, or
 - 2) upon the request of an energy deficient BA
- EEA 1 - All available generation resources in use or committed
- EEA 2 - Load management procedures in effect
- EEA 3 - Firm load interruption imminent or in progress
 - Also under an EEA 3, BAL-002-WECC-3 R1.2 - Allows a BA to count firm load as Contingency Reserves
- Alert 0 - Termination
- RC will issue an Operating Instruction without delay if the actions being taken by the BA are not adequate or will not resolve the condition in a timely manner.



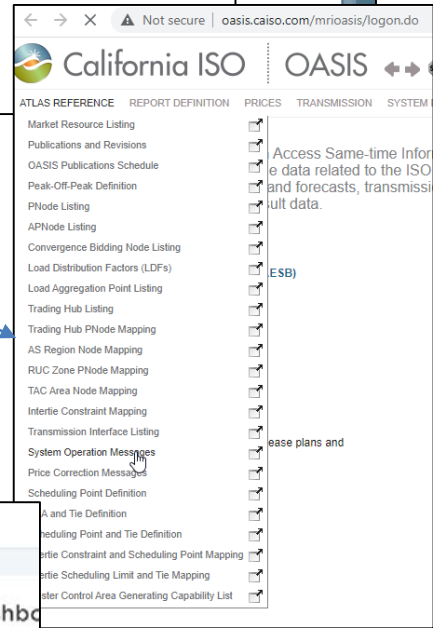
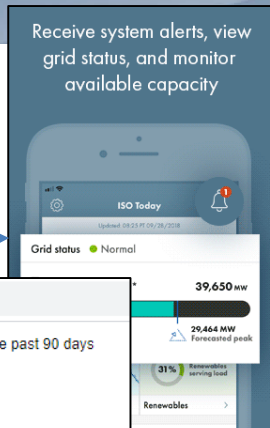
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- RC can declare an EEA for a system-wide or a local issue
- Includes steps for Transmission Emergencies

Emergency Notifications

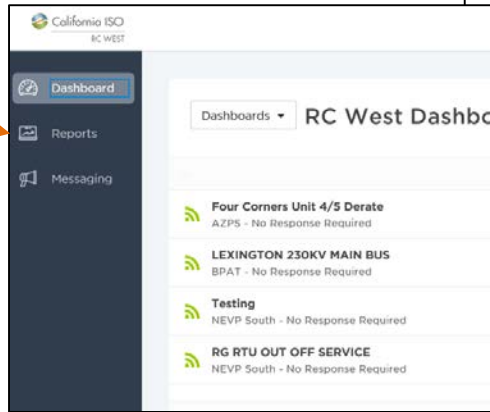
AWE Tool
(CAISO BA only)

- ISO Today App
- www.caiso.com
- MDS/MNS
- OASIS
- Email (AWE DL)



GMS Tool

- GMS Dashboard
- SPP R-COMM
- Email (Markets audience by subscription)



4420 Procedure - Non-EEAs Levels

AWE Levels	NERC EEA Levels	BA What is happening?	What's Needed?	By When?
Flex Alert	N/A	Potential energy shortages or gas curtailments, ongoing grid issue (fire, natural disaster), variable or uncertain temperature forecast, cloud cover, etc.	Public awareness to reduce the demand for energy by voluntary means	Ideally issued in advance – day ahead
Restricted Maintenance Operations	N/A	Actual or potential impacts to balancing and/or transmission operations	Reschedule planned work to keep equipment and resources in service if outages could threaten grid reliability	Give advanced notice (1 day+) if possible
Transmission Emergency	N/A	Could be system wide or could be local transmission limitation DR/interruptible/non-firm load dispatched-off	Load management procedures may be in effect in impacted area Additional bids, incremental dispatch, emergency assistance, evaluate transmission limitations	Issued in real time – current/ next hour(s)

4420 Procedure – EEA Watch, EEA 1 and EEA 2

EEA Levels	BA What is happening?	RC Confirm/ Translate	What's Needed?	By When?
EEA Watch (Alert)	<u>Day ahead</u> analysis is forecasting one or more hours energy deficient OR Sudden onset event after day ahead run or on operating day	All available generation projected to be in use	Additional bids, incremental dispatch	Issued in advance – day ahead by 1500
EEA 1 (Warning)	<u>Real Time</u> analysis is forecasting one or more hours energy deficient	All available generation in or committed to be in use for specific hours	Be prepared for dispatch of DR resources	Issued in real time, ideally hours ahead
EEA 2 (Warning/ Stage 1)	DR/ interruptible/ non-firm load dispatched-off All available UDC/MSS energy	Load management procedures in effect, able to maintain Contingency Reserves	Additional bids, incremental dispatch, emergency assistance, evaluate transmission limitations (TTC/ SOL)	Issued in real time – current/ next hour(s)

4420 Procedure

NERC EEA Levels	BA What is happening?	RC Confirm/ Translate	What's Needed?	By When?
EEA 3 (Stage 2)	Counting armed firm load as NS Contingency Reserves	BA unable to maintain CR, firm load interruption is imminent	Emergency assistance, evaluate transmission limitations (outages/ TTC/ SOL)	Issued in real time - current/ next hour(s)
EEA 3 – Firm Load Interruption (Stage 3)	Unable to maintain CR, manual load shedding is starting/ in progress	Unable to maintain CR, firm load interruption is in progress	Remove firm load to be able to respond to contingencies	Issued in real time – “w/ in 10 minutes” current/ next hour(s)

System Emergency Notifications



Flex Alerts

A Flex Alert is a call to consumers to voluntarily conserve electricity when the ISO anticipates using nearly all available resources to meet demand. Reducing energy use during a Flex Alert can prevent more dire measures, such as moving into EEA notifications, emergency procedures, and even rotating power outages.



Restricted Maintenance Operations

High loads are anticipated. ISO participants are cautioned to avoid taking grid assets offline for routine maintenance to assure that all generators and transmission lines are available.



Transmission Emergency

Declared for any event threatening or limiting transmission grid capability, including line or transformer overloads or loss.



EEA Watch

Analysis shows all available resources are committed or forecasted to be in use, and energy deficiencies are expected. Market participants are encouraged to offer supplemental energy. This notice can be issued the day before the projected shortfall or if a sudden event occurs.

EEA 1

Energy Emergency Alert 1

Real-time analysis shows all resources are in use or committed for use, and energy deficiencies are expected. Market participants are encouraged to offer supplemental energy and ancillary service bids. Consumers are encouraged to conserve energy.

EEA 2

Energy Emergency Alert 2

ISO requests emergency energy from all resources and has activated its emergency demand response program. Consumers are urged to conserve energy to help preserve grid reliability.

EEA 3

Energy Emergency Alert 3

ISO is unable to meet minimum Contingency Reserve requirements and controlled power curtailments are imminent or in progress according to each utility's emergency plan. Maximum conservation by consumers requested.

SCENARIO OVERVIEWS

- HEAT WAVE EVENT
- SUDDEN ONSET EVENT

Heat Event Scenario overview

- 7 day outlook indicating record high temperatures across the Western U.S.
- CAISO BA peak load forecast is 50,000 MW
- CAISO RA capacity is below forecast load
- Rest of WECC reporting potential record high loads
- No major transmission or generation outages

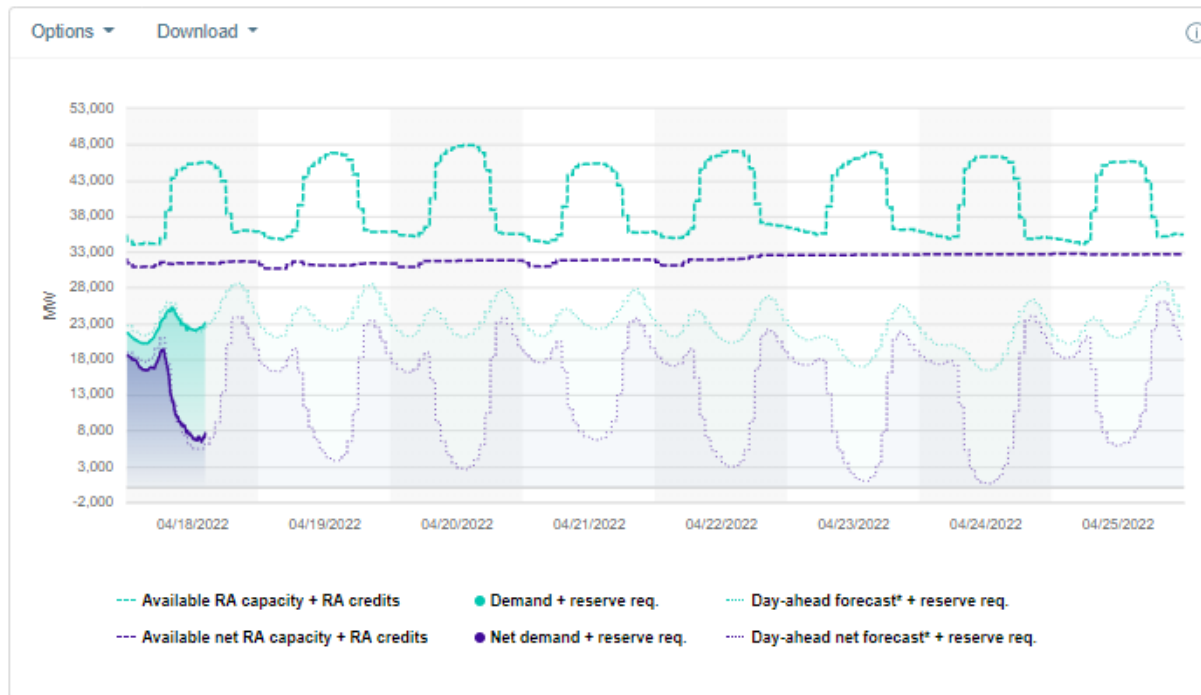
D+7 through D+2 processes

- CAISO Communications will . . .
 - Issue a “Heatwave Bulletin” news release and related social media
- CAISO Ops will . . .
 - Issue a **Restricted Maintenance Operations (RMO)** notice
 - Coordinate with other BAs to verify their anticipated system conditions
 - Consider what may occur in CAISO day ahead or real time markets, EIM, out of market
 - Reach out to CA water agencies to consider pump load schedule reductions during peak hours
 - Reach out to CAISO Contracts, Government Affairs and Legal teams for potential help with Governor’s office, DOE 202(c), outreach to generators and PTOs to consider MW increase options
- What you’ll see . . .
 - www.caiso.com 7 day outlook graph with load forecast & RA capacity trends
 - RMO notification
 - News releases and social media

Increased Transparency of Resource Adequacy

7-day resource adequacy capacity trend

Resource adequacy capacity forecast for today plus the next 7 days, in megawatts, compared to demand forecast plus reserve requirements.



*Note: Values for the 7th day of the day-ahead forecasts will complete by 9:30 PT.

D +1 Actions

- Day Ahead Market
 - DAM Residual Unit Commitment (RUC) uses high confidence forecast
 - Market results published by 13:00
- For this scenario – assume the Market unable to meet DA forecasted load for specific hours
 - By 1500
 - **Flex Alert and EEA Watch** notifications will be issued by 15:00 based on market results
 - **RMO** issued if not already sent
 - **EEA Watch** issued by RC West for next day
- Additional Ops-type communications/ coordination
 - Send System Status Update email
 - Send message regarding infeasibilities and possible export & wheel curtailments
 - Receive info re: activation of ELRP

Day of Process

- No change in conditions, CAISO BA forecasting potential resource deficiencies for later in the day
- ~10:00 CAISO BA sends out System Status Update email
 - Maintain periodic updates throughout the day
- When system conditions indicate all resources in use and/or committed for future hours, CAISO BA issues **EEA 1** notice
 - RC West will issue **EEA 1** for CAISO BA
- Continuous communication with CAISO LSEs, neighboring BAs and the RC of conditions including forecasted deficiencies
 - If there is potential for counting firm load as Contingency Reserves or firm load removal, System Status Update emails will include prorata share estimates by hour.

EEA 2

- When system conditions indicate emergency Load Management Programs will be needed, CAISO BA issues **EEA 2** notice
 - RC West will issue **EEA 2** for CAISO BA
- Enable RDRR in market, but will Force if needed
- Dispatch all unloaded generation above RA designation
- Call upon all available remaining Interruptible Load and any pump load that can be reduced
- State Power Augmentation Program resources start up (uninstructed) for EEA 2 effective time period
- Dispatch any excess Contingency Reserves while still maintaining Contingency Reserve Obligation
- (Note: Previously Stage 1) CAISO BA will request all available energy from load following MSS.
- Start making arrangements for emergency assistance

Potential Export/Wheel Curtailments

- If HASP (Hour Ahead Scheduling Process) cannot meet power balance and goes infeasible.
- HASP will award export and wheel schedule awards based on priority.
- Operator will evaluate export and wheel award curtailments and determine whether to implement or not.
- Evaluate load forecast, available internal generation capacity, ability to meet contingency reserve obligation.

- CAISO operators will make in-hour evaluations to provide emergency assistance to neighbor BAs if system conditions allow.

EEA 3

- When system conditions indicate CAISO will be unable to maintain Contingency Reserves, CAISO BA issues EEA 3 notice
 - RC West will issue EEA 3 for CAISO BA
- Allows requesting additional emergency assistance
- CAISO BA will begin dispatching Contingency Reserves as needed to meet demand.
 - Amount of contingency reserves dispatched will be replaced with load available to be shed within 10 minutes to meet Disturbance Criteria Standard should contingency occur and remaining available resources are inadequate to recover in 15 minutes.
- CAISO BA will establish conference call with UDC/MSS (Utility Distribution Company/Metered Sub Systems) via blast call to discuss use of firm load as contingency reserve and pro-rata allocations.

EEA 3 – Counting firm load as Contingency Reserves

- Operators will monitor RTCA, DSA, and VSA to ensure system security maintained for loss of MSSC, or any other contingency that may show as non-converged or place CAISO BA in an insecure state.
- May require pre-contingent load shed
- Any Contingencies may require load shed – locally or system-wide
- Any SOL exceedances may require load shed

EEA 3 – Firm Load Interruptions

- CAISO BA is no longer able to meet demand and will initiate firm load shed operating instructions via blast call – pro-rata whenever possible
- CAISO BA will issue an **EEA 3 – Firm Load Interruption** notice
- All available resources dispatched including Contingency Reserves
- Will still require load armed as contingency reserve to be available for contingency.
- Operators will continue to evaluate MSSC using available tools to ensure no insecure state for loss of MSSC
- Continue hourly updates to RC and UDC/MSS entities
- UDC/MSS entities rotate load blocks in accordance w/your emergency plans

Restoration

- If firm load shed was required CAISO BA will restore firm load as soon as system conditions allow.
- MW restoration values will be determined by Shift Manager prorata.
- Continue hourly updates until event over and CISO BA returned to EEA 0 with all Emergency notices cancelled.

SCENARIO OVERVIEWS

- SUDDEN ONSET EVENTS

Example - July 9, 2021

Time	CAISO BA (AWE notices)	RC West (EEA notices)	Actions
7/8 16:22	Flex Alert		Effective for the period 7/9 16:00 – 21:00
7/9 13:38		EEA Watch	Requested due to potential loss of 3- 500 kV lines and reduction TTC on COI
14:05	Warning		Forecast above Day Ahead, in preparation for potential loss of remaining COI lines
15:15		EEA 1	Effective at 17:00 – 22:00
15:44			3- 500kV lines relayed, further reducing TTC
16:30			ELRP estimated MW provided
17:44		EEA 2	Effective at 17:44 - RDRR enabled, 18:05 RDRR forced dispatch
18:32	Stage 2	EEA 3	Effective at 18:32 - firm load counted as Contingency Reserves

EEA 3 – Contingency Event Occurs

- Contingency event loss of Diablo Canyon or PDCI
 - CAISO BA will declare EEA 3 – Firm Load Interruptions
 - Load armed for contingency reserve obligation will be called upon to shed.
- If additional load can be armed in next 60 minutes, additional load can be used to meet our contingency reserve obligation.
- If no additional load is available to arm for contingency reserve obligation CAISO BA will declare EEA 3 – Firm Load Interruptions,, and will shed firm load to recover contingency reserve obligation within 60 minutes.

WRAP UP