



California ISO


Demand and Distributed Energy Market Integration Working Group

April 7th, 2025

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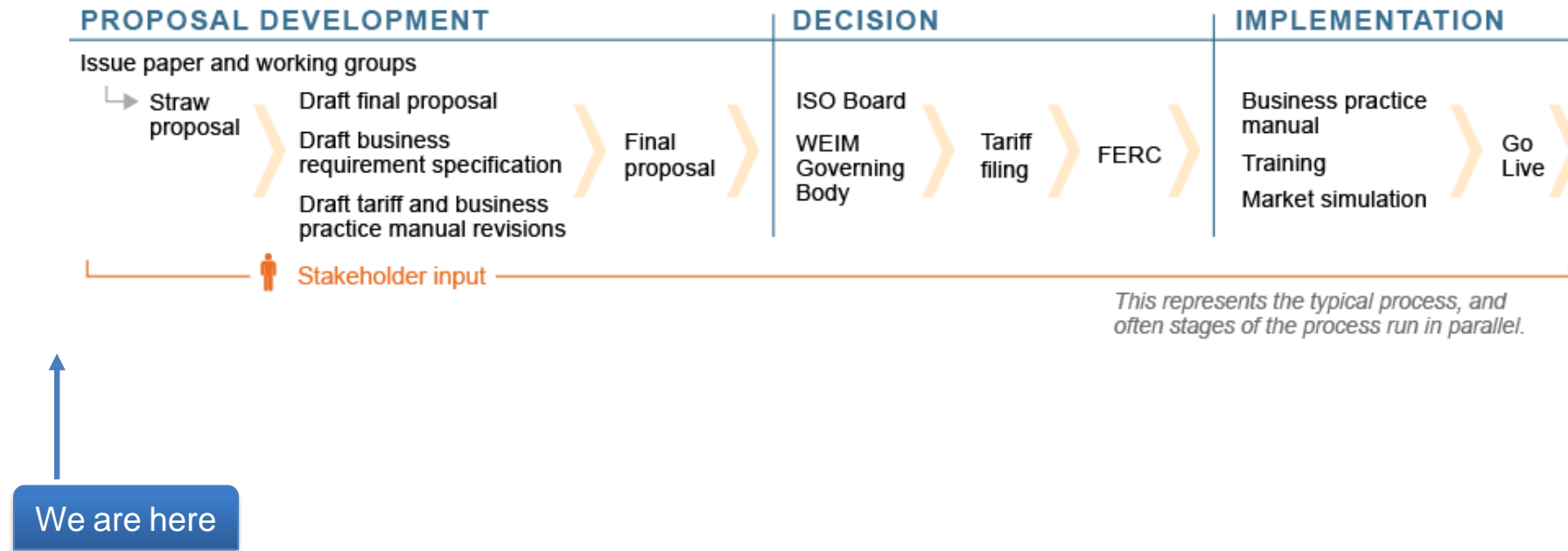
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Today's agenda

Time	Topic	Presenter
1:00 – 1:05	Welcome, Today's Agenda	Yelena Kopylov-Alford
1:05 – 1:35	Reviewing Key Issues: Current DR Performance Evaluation Methodology (PEM) Methodologies	Ansel Lundberg
1:35 – 2:05	Stakeholder Discussion: Draft Problem Statement Formulation	Jimmy Bishara & Juan Buitrago
2:05 – 2:15	Reviewing Key Issues: Standards	Ansel Lundberg
2:15 – 2:35	Stakeholder Presentation	Luke Tougas (CEDMC)
2:35 – 3:00	Stakeholder Discussion: Draft Problem Statement Formulation	Jimmy Bishara & Juan Buitrago
3:00 – 3:10	Reviewing Key Issues: How we got here	Ansel Lundberg
3:10 – 3:25	Stakeholder Discussion: Draft Problem Statement Formulation	Juan Buitrago
3:25 – 3:35	Reviewing Key Issues: MGO vs. PEM	Ansel Lundberg
3:35 – 3:55	Stakeholder Discussion: Draft Problem Statement Formulation	Jimmy Bishara
3:55 – 4:00	Next Steps	Yelena Kopylov-Alford

CAISO Policy Initiative Stakeholder Process



Working Group progress to date

- ✓ Identify/confirm Principles (complete)
- Confirming Problem Statement(s) (here)
- Proposal Development (based on WG progress/discussions)

Goals of Today's Working Meeting

The Working Group structure is meant to embrace flexibility to allow organic and robust conversation on the topics at hand – it is key for us to drive towards solutions collaboratively

- **PEM Overview Continued**

- During the previous working group (March 3rd), CAISO provided a high level overview of telemetry, metering, and Performance Evaluation Methodologies (PEMs) for Demand Response (DR). Today, we will clarify key elements of these same topics and aim to confirm stakeholder feedback from working group participants

- **Stake Holder Discussions - Problem Statement Formulation**

- Leverage today's discussion to inform draft problem statements and scope issues moving forward

- **SH Presentations**

- CEDMC

Demand and Distributed Energy

DR PERFORMANCE EVALUATION METHODOLOGIES: REVIEWING KEY ISSUES

Overview: DR market participation models

Design*	Services	Market dispatch	Description
Proxy Demand Resource (PDR)	Energy, A/S spinning & non-spinning reserves, and residual unit commitment (RUC)	Economic day-ahead and real-time	Bids into ISO markets as supply
Reliability Demand Response Resource (RDRR)	Energy	Economic day-ahead Reliability real-time	Bids into ISO markets as supply Used for reliability purposes

*Please see CAISO participation matrix for further reference: <https://www.caiso.com/documents/participationcomparison-proxydemand-distributedenergy-storage-forecastadjustment.pdf>

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		Reliability real-time	Used for reliability purposes
Heterogeneous DER Aggregation (HDERA)	Energy, A/S spinning & non-spinning reserves	Economic day-ahead and real-time	“Distributed curtailment resource” within HDERA uses PEMs for determining performance
<i>WEIM non-participant demand response</i>	<i>Contributes to passing RSE</i>	<i>Submitted manually to CAISO Forecasting Team</i>	<i>Does not rely on PEMs to directly determine performance in WEIM</i>

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PEMs are used in performance measurement of these participation models

*Please see CAISO participation matrix for further reference: <https://www.caiso.com/documents/participationcomparison-proxydemand-distributedenergy-storage-forecastadjustment.pdf>

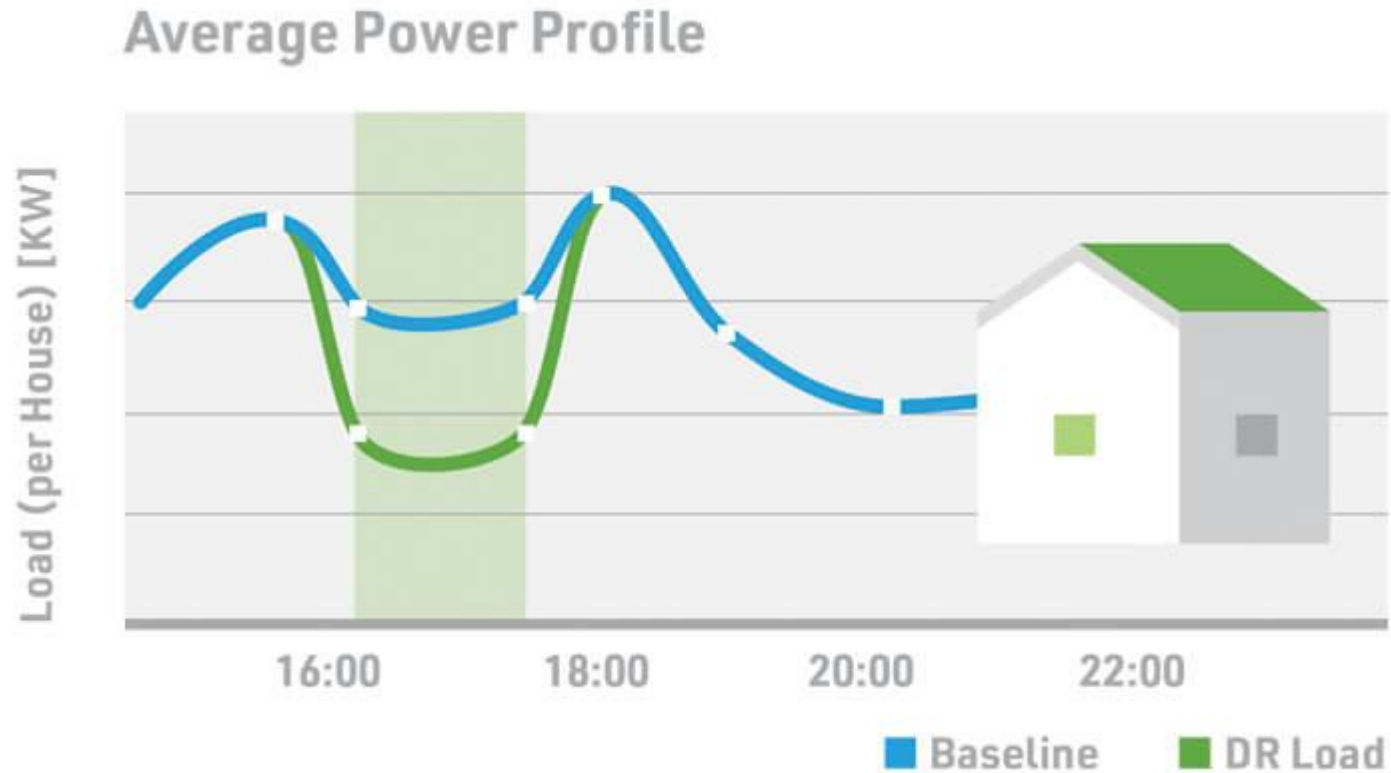
Demand and Distributed Energy

STAKEHOLDER DISCUSSION: DRAFT PROBLEM STATEMENT FORMATION

Draft problem statement formation: DR Baseline Performance Evaluation Methodology (PEM)

- Full suite of currently offered methodologies is underutilized, with heavy centralization in a single baseline methodology type (Day Matching Combined = 99%), which raises concerns on efficiency and accuracy in performance evaluation (DMM)
- Existing PEMs, such as the commonly used 5-in-10 and 10-in-10 approaches, are not well-suited for emerging DERs like behind-the-meter batteries and EVs, whose frequent dispatching distorts baseline calculations (LEAP, PAC, Joint DR Parties, Nostromo, PG&E, Tesla, Voltus)
 - While alternative approaches, such as control group baselines, could improve accuracy, they require better access to non-participant data (LEAP)
- Seeking stakeholder input to further refine

Load baseline methodologies: how do they work?



Three baseline types are supported for PDR and RDRR supply side performance measurement (PEMs)

Control Group

- Establishes baseline of load patterns during curtailment event using **non-dispatched customers with similar profiles**

Day Matching

- Estimates what electricity use would have been in absence of DR dispatch, using **electricity use data on non-event but similar days**

Weather Matching

- Estimates what electricity use would have been in absence of dispatch during **non-event days with most similar weather**

North American Energy Standards Board (NAESB) - Wholesale Electric Quadrant

- **Business Practice Standard WEQ-015:** Measurement & Verification of Wholesale Electricity Demand Response
- 015-1.3.1: Rules for Performance Evaluation
- Includes:
 - Baseline Type I (interval metered)
 - Baseline Type II (non-interval metered)
 - Metering Generator Output

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STAKEHOLDER PRESENTATION



Device Level Measurement

April 7, 2025

Smart meters enabled CAISO market-integrated DR but the DR market has outgrown them

- Key benefits of smart meters for demand response (DR) included:
 - Enable customers to see their historical or real-time hourly (or sub-hourly) electric usage
 - Allow sharing of customer meter data with DR providers through Electric Rule 24/32
 - Enable CAISO market integration by providing meter data for SQMD
- DR performance in CAISO market is measured at the customer meter level
- However, as market-integrated DR becomes more widespread among more actors (e.g., IOU, DR provider, technology provider), several problems with measuring performance at the customer meter level have arisen
 - “Click-Through” Process associated with IOU Share My Data platforms is problematic due to high drop-out rates; this suppresses the number of DR participants which reduces available DR capacity
 - Complete customer meter data are sometimes difficult to get on a timely basis
 - CAISO has limited visibility of BTM devices; this reduces the accuracy of its short-term load forecasting (See CAISO presentation at [5/16/24 CEC workshop](#))
 - It limits customer enrollment a single DR provider; this can be problematic because some DR providers are technology-specific
 - The performance of BTM devices can be “drowned out” by other factors within a premise; this can result in less accurate performance measurement

Device-Level Measurement (DLM) can address these problems but some work is needed

- **Proposal:** Leverage the internal telemetry contained within smart devices, energy storage inverter, EVSE, etc. by utilizing their respective device-level data for performance evaluation and market settlement for Proxy Demand Resources (PDR)
- Key elements:
 - Modify the Demand Response Registration System (DRRS) to accommodate device type and telemetry data
 - Create a customer authorization process by which customers' devices can be added to the DRRS outside of any Share My Data processes
- Key barriers:
 - Device accuracy standards: Metering BPM, Attachment G sets DER device accuracy standard at 0.2% in the absence of LRA standards; CPUC adopted a 2% accuracy requirement for EVSE in D.22-08-024; recommend CAISO adopt the same for other devices
- Other elements can remain the same
 - Device-level data would be VEE'd consistent with the Metering BPM, Attachment H
 - Existing PEMs described in Section 4.13.4 of the CAISO tariff and the Demand Response BPM would continue to apply

DLM can have widespread benefits to all actors

- Potential to dramatically increase DR participation in CAISO market
- Faster and more accurate measurement of load curtailment
- Improved situational awareness for CAISO operators with visibility into the quantity and types of devices responding to market signals
- Allow multiple providers to serve devices across a premise, increasing customer choice of DR providers
- Dual participation by a device can be prevented b/c each device will be registered to a single provider

How this proposal fits into the DDEMI WG scope

- Working Group Topic: Expansion of current performance evaluation methodologies, including recognition of registration and metering alternatives
- Discussion Topic: Performance Evaluation Methodology – Explore the utilization of device-level measurement and creation of alternative baseline methodologies
- Adherence to Working Group Principles
 - **Efficiency:** Additional capacity from new resources would result in more efficient market outcomes
 - **Competition:** Additional DR providers will improve competition to the benefit of customers
 - **Feasibility:** Utilize existing assets (i.e., smart devices) while requiring modest changes to the DRRS, tariff, and the Metering BPM
 - **Simplicity:** Only changes the data used to measure performance without creating a new market product; it would also simplify the process by which DR customers share their data to settle wholesale market transactions
 - **Reliability/Compliance:** Increasing available DR capacity would support overall grid reliability; potential data accuracy implications can be accounted for
 - **Facilitate state public policies:** Supports Senate Bill 100 which targets 60 percent renewable energy by 2030 and 100 percent clean energy by 2045, and CEC's 7 GW Load Shift Goal

Discussion and Q&A

Thank You!

Please contact us if you have any questions.

Luke Tougas – l.tougas@cleanenergyresearch.com

Joe Desmond – jdesmond@cedmc.org

Draft problem statement formation: DR Baseline Performance Evaluation Methodology (PEM)

- Better PEMs are needed for device-level visibility, in order to more accurately participate (CAISO)
 - Improved sub-metering can help augment current baselines (Voltus)
 - Additionally, a review of NAESB standards and CAISO compliance requirements is needed to determine how to onboard DR programs, such as irrigation-based demand response, to better reflect their capabilities (PAC)
- Seeking stakeholder input to further refine

Draft problem statement formation (cont'd): DR Baseline Performance Evaluation Methodology (PEM)

- Technology-specific problem statement needed (vs. broader / generic application)?
 - Thermal storage use of non-energy-metered baselines for temp-sensitive units (Nostromo)
- Seeking stakeholder input to further refine

Demand and Distributed Energy

DR PERFORMANCE EVALUATION METHODOLOGIES: REVIEWING KEY ISSUES

PEMs: tariff or BPM?

“In establishing its customer baseline calculation methodology, the CAISO has conducted many hours of stakeholder proceedings, learned from the experiences of other ISOs and RTOs, and relied on expert consultants to determine the most appropriate customer baseline calculations. However, the CAISO's proposal to include the customer baseline calculations in the Business Practice Manuals and not in the tariff is not acceptable. If rules, standards, and practices significantly affect the rates, terms, and conditions of jurisdictional service, such provisions must be filed pursuant to section 205 of the Federal Power Act, accepted by the Commission, and included in the Participating Transmission Owner's tariff.

We conclude that the customer baseline methodologies significantly affect the rates, terms, and conditions of jurisdictional service, and, accordingly, these methodologies must be filed as part of the CAISO Tariff.”

- FERC Ruling on CAISO's Proxy Demand Resource model, 2010

Draft problem statement formation: PEMs—tariff or BPM?

- FERC has shown reluctance to move baseline methodologies into the BPMs, limiting CAISO's ability to frequently adapt its framework to meet evolving market needs (CAISO)
 - Alternative baselines (PAC, Joint DR Parties, Nostromo, PG&E, Tesla, Voltus)
 - Via BPM and not tariff (PAC, Nostromo)
- Seeking stakeholder input for proposed problem statement

Demand and Distributed Energy

DR PERFORMANCE EVALUATION METHODOLOGIES: REVIEWING KEY ISSUES

MGO performance evaluation methodology

What is “metering generator output?”

Demand response at a given “location” (utility customer account) can be separated into:

- an overall load (**customer**) response
- a behind-the-meter generation (**device**) response



Then, that device response is compared to a baseline of the device’s behavior to determine **incremental** response of the sub-metered device

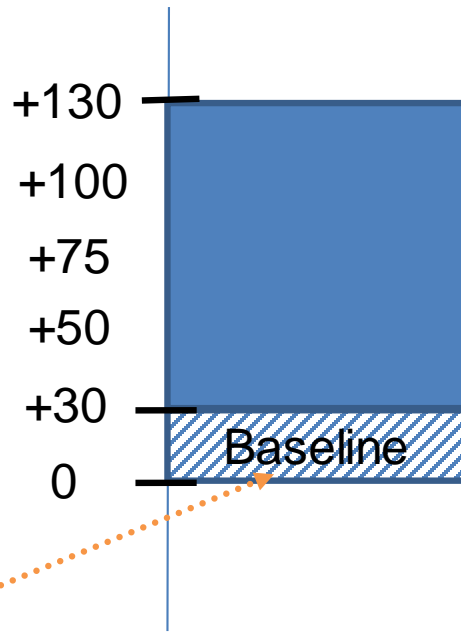


This baseline is calculated by looking back up to 45 days to create a baseline of “usual behavior” based on “non-event” hours

MGO performance evaluation methodology: how does it work?

- Leap March 3 WG presentation: proposal would “allow DERs to dispatch more frequently, moving from ‘emergency’ to ‘baseload’ resources”
- Stakeholders: what about “frequent dispatch”?
 - If a resource is dispatched by the ISO in most/all of the past 45 days and there are **no** available “non-event” hours, baseline is set to zero
- Exports
 - MGO methodology formula *could* be amended to accommodate exports
 - Note: would involve implications beyond PEMs (e.g., transmission system deliverability, local regulatory authority processes)

MGO performance evaluation methodology: how does it work?



Example:

Dispatch = 100 kWh (discharge)

Metered Output = 130 kWh

Baseline = 30 kWh*

Performance Measurement = $130 - 30 = 100$ kWh

*A 10-in-10 non-event hour selection method is used to calculate typical energy delivered by the device:

Like, 10 non-event hours in look back days	1	2	3	4	5	6	7	n/a	8	n/a	9	10
Metered quantity (kWh)	+75	+25	+25	+75	+25	+25	+25	-25	+25	-25	0	0

If the minimum number of hours is not reached, then baseline = 0

Control Group methodology

- ISO Tariff and Business Practice Manual require registration of Control Group customers, even if they are not enrolled in a DR program
- Stakeholder idea: remove registration requirements for “Matched” control groups
 - ISO Challenge: verifying that the control group customers haven't also been registered in another DR program
 - ISO Challenge: verifying the existence of the control group customers

Demand and Distributed Energy

STAKEHOLDER DISCUSSION: DRAFT PROBLEM STATEMENT FORMATION

Draft problem statement: DR Baseline Performance Evaluation Methodology (PEM)

- DR registration is too complex, which limits DR participation or inaccurately reflects DR program capabilities (CEDMC)
 - DR participation in CAISO markets is constrained by reliance on utility meter data, cumbersome registration processes, and strict metering accuracy requirements that exclude many DERs
 - While CAISO has PEM options for device-level performance measurement, current requirements—such as the IOU “click-through” registration process and ANSI C12 accuracy standards—undermine their accessibility and effectiveness
- Seeking stakeholder input to further refine

For reference

- All meeting material and notices are available on the Demand and Distributed Energy Market Integration working group webpage:
<https://stakeholdercenter.caiso.com/StakeholderInitiatives/Demand-DistributedEnergy-Market-Integration>
- If you have any questions, please contact Yelena Kopylov-Alford
ykopylovalford@caiso.com, or ISOStakeholderAffairs@caiso.com

This Week at the ISO – 04/07/25

Stakeholder Meetings

All public stakeholder meetings are also listed on the [ISO calendar](#):

- Monday, April 7 - [Demand and Distributed Energy Market Integration Initiative Working Group](#)
 - 1:00pm - 4:00pm PDT ([link](#))
- Tuesday, April 8 - [WEM Governing Body General Session](#)
 - 10:00am - 12:00pm PDT ([link](#))
- Tuesday, April 8 - [Technical User Group](#)
 - 10:00am - 11:00am PDT ([link](#)) – required Developer Account)
- Tuesday, April 8 - [FERC Order No. 881](#)
 - 1:00pm - 3:00pm PDT ([link](#))
- Wednesday, April 9 - [WEM Regional Issues Forum](#)
 - 9:00am - 1:00pm PDT ([link](#))
- Wednesday, April 9 - [WECC Interchange Tool Working Group \(WITWG\) Meeting](#)
 - 9:30am - 12:30pm PDT ([link](#))
- Wednesday, April 9 - [Settlement User Group](#)
 - 10:00am - 11:00pm PDT ([link](#))
- Wednesday, April 9 - [Transmission Development Forum](#)
 - 1:00pm - 4:00pm PDT ([link](#))
- Wednesday, April 9 - [Interconnection Process Enhancements Track 3 Draft Tariff Language](#)
 - 4:00pm - 5:00pm PDT ([link](#))
- Thursday, April 10 - [2025 California ISO Legal Forum](#)
 - All Day PDT ([registration link](#))
- Thursday, April 10 - [2026 Local Capacity Requirements Technical Study Final Results](#)
 - 9:00am - 12:00pm PDT ([link](#))

This Week at the ISO continued

Comment Submission Deadlines

- Monday, April 7 - [EDAM Congestion Revenue Allocation](#)
- Monday, April 7 - [Interconnection Process Enhancements Track 3 Draft Tariff Language](#)

Trainings

The ISO encourages market participants to review the new training page on the [Market Participant Portal](#). In addition to the [Learning Center](#), this new training page provides Scheduling Coordinators with a centralized location for accessing computer-based training videos (to learn more, please view the [High-Level Overview](#) video).

Market Simulations

Please refer to our [Release Schedule](#) for the most recent updates of initiatives scheduled for MAP- and Production-stage market sims.

- Thursday, April 10 - [Market Simulation Forum](#)
 - 2:00pm - 3:00pm PT ([link](#))

Business Practice Manual (BPM)

The status of all Proposed Revision Requests (PRRs) and updated BPMs in the [BPM Library](#) are published on the [BPM Change Management Website](#).

ENERGY matters

The California ISO's blog highlights its most recent news releases, and includes information about ISO issues, reports, and initiatives.



Energy Matters blog provides timely insights into ISO grid and market operations as well as other industry-related news.

<https://www.caiso.com/about/news/energy-matters-blog>



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