



California ISO

Storage Design and Modeling

Stakeholder Meeting on Default Energy Bids and Outage Management

September 22nd, 2026

PUBLIC

Engagement Best Practices



This call is being recorded for informational and convenience purposes only and will be available on the CAISO website. Any related transcriptions should not be reprinted without ISO's permission.

The meeting is structured to stimulate open dialogue and engage different perspectives.



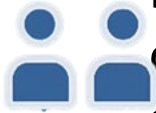
The facilitator will provide guidance for comments and questions to ensure a productive flow. Please keep remarks succinct and avoid revisiting points that have already been covered, allowing space for all voices.



Closed Captioning and the Transparency Viewer are available at the bottom of the Webex screen.



Instructions for Raising Your Hand to Ask a Question



Please remember to state your name and affiliation before making your comment. After unmuting, please pause for about two seconds before speaking to ensure your audio connects clearly.



If you are connected to audio through your computer or used the 'call me' option, select the raise hand icon located on the bottom of your screen.



If you are connected on the phone line only and not the Webex, dial *3 to be added to the raise hand queue.

You may send questions via chat to all panelists.



If you need technical assistance during the meeting, please send a chat to the event producer at Intellor Events.



CAISO Policy Initiative Stakeholder Process



[Learn more in the Stakeholder Process Guide.](#)

Agenda

Time	Topic	Presenter
9:00 – 9:05	Welcome and today's agenda	Brenda Marquez
9:05 – 9:10	Meeting goals and initiative timeline	Sergio Dueñas Meléndez
9:10 – 10:00	Revised straw proposal on storage default energy bids enhancements	Dinesh Das Gupta Sergio Dueñas Meléndez Miheer Shah
10:00 – 10:45	Revised straw proposal on hybrid default energy bids	Dinesh Das Gupta
10:45 – 11:00	Open discussion	
11:00 – 11:15	Break	
11:15 – 11:45	Check-in: Outage management topic group implementation	Dinesh Das Gupta
11:45 – 12:00	Open discussion	

MEETING GOALS AND INITIATIVE TIMELINE

Meeting Goals

- Discuss revised straw proposal on default energy bids for:
 - Storage resources
 - Hybrid resources
- Check-in on implementation of items discussed in the 2nd Revised Straw Proposal on Outage Management

Overview of potential proposal timeline *

Date		Item
September	17	Revised straw proposal on default energy bids posted
	22	Hybrid meeting
October	9	Comments due
Mid-November		Draft final proposal on default energy bids

**All dates are tentative until confirmed through a notice in the ISO's Daily Briefing.*

REVISED STRAW PROPOSAL ON STORAGE DEFAULT ENERGY BIDS

Background – Market power mitigation and default energy bids

- Today, the ISO may replace a resource's bid with a previously agreed upon default energy bid
- This process seeks to limit the ability of market power to affect market outcomes
- The default energy bid is meant to reflect the resource's marginal costs
 - The cost of producing one additional unit of electricity

Background – The current storage default energy bid

$$\text{Discharge Default Energy Bid} = \text{Max} \{ [\text{Max} (En_{\delta/\eta}, 0) + \rho], PB_OC_{\gamma} \} * \text{Multiplier}$$

$$\text{Charge Default Energy Bid} = \text{Max} \{ [\text{Max} (En_{\delta/\eta}, 0)], PB_OC_{\gamma} \} * \text{Multiplier}$$

Where:

- En : Energy Cost
- η : Round-trip efficiency
- δ : Energy charging duration
- γ : Energy discharge duration
- ρ : Variable operations cost
- PB_OC : Price-based opportunity cost
- *Multiplier*: 110% multiplier

Background – Problem statements and guiding principles

Current storage default energy bid relies on day-ahead market runs:

Day-ahead values may be stale when used in real-time

Regional resources that are not part of the day-ahead market cannot use

Single real-time storage default energy bid may over- or under-estimate opportunity costs at different times of the day



New storage default energy bid should:

Consider scaling that reflects differences between day-ahead and real-time

Be usable across WEIM

Reflect changing real-time opportunity costs, ensure correct placement in the bid stack under mitigation, and minimize risks posed by charging side mitigation

Background – The July straw proposal

- The ISO presented two approaches: time-of-day and static
- Most stakeholders favored the time-of-day approach
 - **Further develop time-of-day:** ACP-CA, CalCCA, CESA, DMM, PacifiCorp, Cal Advocates, SDG&E, SCE, and Terra-Gen
 - **Further develop static:** Vistra and NV Energy
- The revised straw proposal focuses on refining the time-of-day approach, incorporating feedback

Background – Time-of-day approach (July)

- The time-of-day straw proposal:
 1. Introduces a >1 multiplier for hours before peak hours
 - Reflects changing opportunity costs and supports state-of-charge management efforts
 2. Increases price-based opportunity cost component multiplier from 1.1 to 1.4 in day-ahead calculations to align with the hydro default energy bid
 - Previous analysis found that a 1.4 multiplier limits hydro operations to 4 hours or less on $>90\%$ of days, similar to the assumptions of the current storage default energy bid
 3. Adds a gas floor
 - Approximates the cost of serving load with a marginal gas-fired resource when stored energy is discharged
 - Aligns with hydro default energy bid
 4. Redefines the charge default energy bid as discharge default energy bid minus variable operating costs

Background – Time-of-day approach (July)

$$DA \text{ Discharge DEB} = \text{Max}(\text{Variable Operations Cost} * 1.1, PB_OC * 1.4, \text{Gas Floor} * 1.1)$$

$$DA \text{ Charge DEB} = (DA \text{ Discharge DEB} - \text{Variable Operations Cost})$$

$$RT \text{ Discharge DEB} = \text{Max}(\text{Variable Operations Cost} * 1.1, PB_OC * 1.4, \text{Gas Floor} * 1.1) * TOD \text{ Multiplier}$$

$$RT \text{ Charge DEB} = (RT \text{ Discharge DEB} - \text{Variable Operations Cost})$$

Where:

Variable Operations Cost: Represents cycling and other operational costs

PB_OC: Price-based Opportunity Cost

- In DA for EDAM, calculated by scaling the MPM outputs based on differences relative to DA LMPs
- In RT for EDAM, calculated by scaling DA LMPs based on differences relative to RT LMPs
- In RT for WEIM, calculated by scaling DGAP based on differences relative to RT LMPs

TOD Multiplier: A value of 1.4 before the hour that sets the price-based opportunity cost and 1 after the hour that sets the price-based opportunity cost (only in real-time)

Gas Floor: 11,068 MMBtu/MWh * Fuel region gas price

The revised straw proposal modifies the time-of-day approach in two important ways

$$DA \text{ Discharge DEB} = \text{Max}(\text{Variable Operations Cost} * 1.1, \mathbf{PB_OC} * \mathbf{1.1}, \text{Gas Floor} * 1.1)$$

$$DA \text{ Charge DEB} = (DA \text{ Discharge DEB} - \text{Variable Operations Cost})$$

$$RT \text{ Discharge DEB} = \text{Max}(\text{Variable Operations Cost} * 1.1, \mathbf{PB_OC} * \mathbf{1.1}, \text{Gas Floor} * 1.1) * TOD \text{ Multiplier}$$

$$RT \text{ Charge DEB} = (RT \text{ Discharge DEB} - \text{Variable Operations Cost})$$

Where:

Variable Operations Cost: Represents cycling and other operational costs

PB_OC: Price-based Opportunity Cost

- In DA for EDAM, calculated by scaling the MPM outputs based on differences relative to DA LMPs
- In RT for EDAM, calculated by scaling DA LMPs based on differences relative to RT LMPs
- In RT for WEIM, calculated by scaling DGAP based on differences relative to RT LMPs

TOD Multiplier: A value of 1.4 before the hour that sets the price-based opportunity cost and 1 **after the later of either (1) the earliest of the Nth highest priced day-ahead LMPs, or (2) hour ending 18 (only in real-time)**

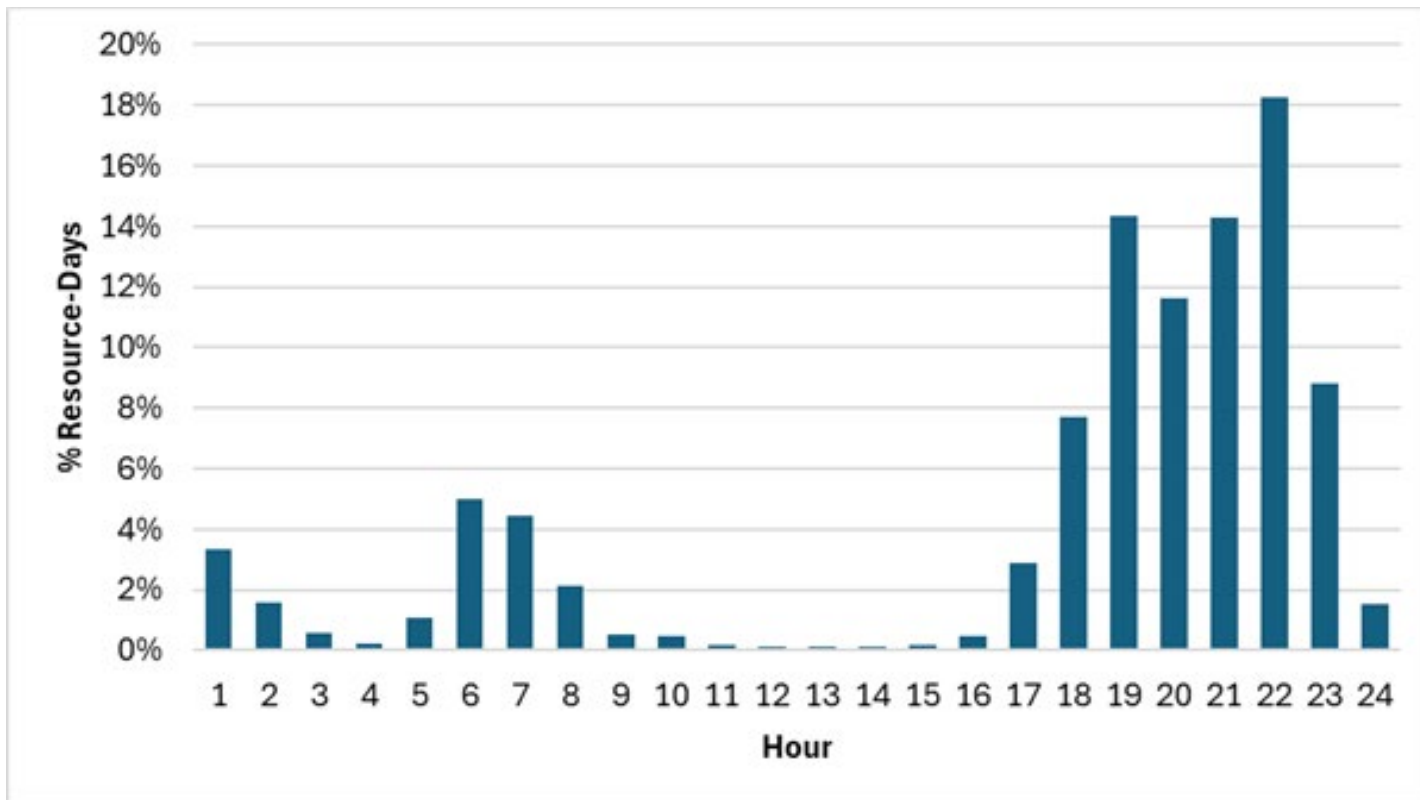
Gas Floor: 11,068 MMBtu/MWh * Fuel region gas price

Most stakeholders support using a time-of-day multiplier to reflect changing storage opportunity costs

- Stakeholders disagree over the lower value for time-of-day multipliers
 - Most stakeholders favor a value of 1.0 for the time-of-day multiplier during peak and after peak hours
 - Cal Advocates and DMM support multipliers below 1.0 during peak and post-peak hours
- DMM argued that the time-of-day multiplier should not decrease before the evening peak, suggesting adding a “floor” for this change
- In the revised straw proposal, the ISO incorporates DMM’s proposal to delay the multiplier step-down until at least hour ending 18
 - Does not support reducing the multiplier below 1.0 because storage value extends beyond the current trading day

Most stakeholders support using a time-of-day multiplier to reflect changing storage opportunity costs

Frequency of hour when the time-of-day multiplier would decrease under the straw proposal



Several stakeholders commented on the value of the multiplier applied to the price-based opportunity cost component

- The July 2026 straw proposal included an increase to the multiplier, from 1.1 to 1.4
 - Intended to promote alignment with the hydro default energy bid
 - The analyses that informed the 1.4 multiplier sought to limit dispatch to no more than four hours in 90% of days
- While several stakeholders supported leveraging this value, DMM and Cal Advocates argued against it
 - The existing opportunity cost framework already captures the highest-value discharge opportunities by using the Nth-highest hourly price
 - Applying a 1.4 multiplier across all hours, combined with other upward adjustments, could result in default energy bids far exceeding actual opportunity costs, particularly during peak periods when storage opportunity costs are declining and market power concerns are acute

Several stakeholders commented on the value of the multiplier applied to the price-based opportunity cost component

- In the revised straw proposal, the ISO acknowledges that, while the 1.4 value would align the storage default energy bid with its hydro counterpart, the proposed time-of-day storage default energy bid also includes additional upward adjustments
- Given the inclusion of additional upward adjustments in the time-of-day framework, the revised straw proposal reverts to the current 1.1 multiplier for the price-based opportunity cost component

Stakeholders offered differing perspectives regarding the inclusion of the gas floor

- CESA, NV Energy, and SDG&E supported including a gas floor in the storage default energy bid, arguing that:
 - It improves alignment between storage and hydro default energy bids
 - It helps ensure mitigated storage resources are appropriately positioned in the bid stack
 - The proposal limits the gas floor's influence by using the greater of opportunity cost or gas floor value
- DMM opposed including the gas floor, noting that gas prices are not directly related to battery storage marginal costs and that any gas-price influence is already reflected in electricity prices and therefore captured in the opportunity cost calculation

The Revised Straw Proposal retains the gas floor provision to better evaluate how often it would determine the storage default energy bid

- The gas floor is only one component in a maximizing function and is unlikely to be the binding factor in most cases because gas-price impacts are often already reflected in LMP-based opportunity costs
- The gas floor would mainly affect situations where it is material for both hydro and storage resources, helping ensure consistent treatment of energy-limited resources when mitigated
- The ISO seeks stakeholder feedback on whether maintaining the gas floor provides sufficient value despite its expected limited impact

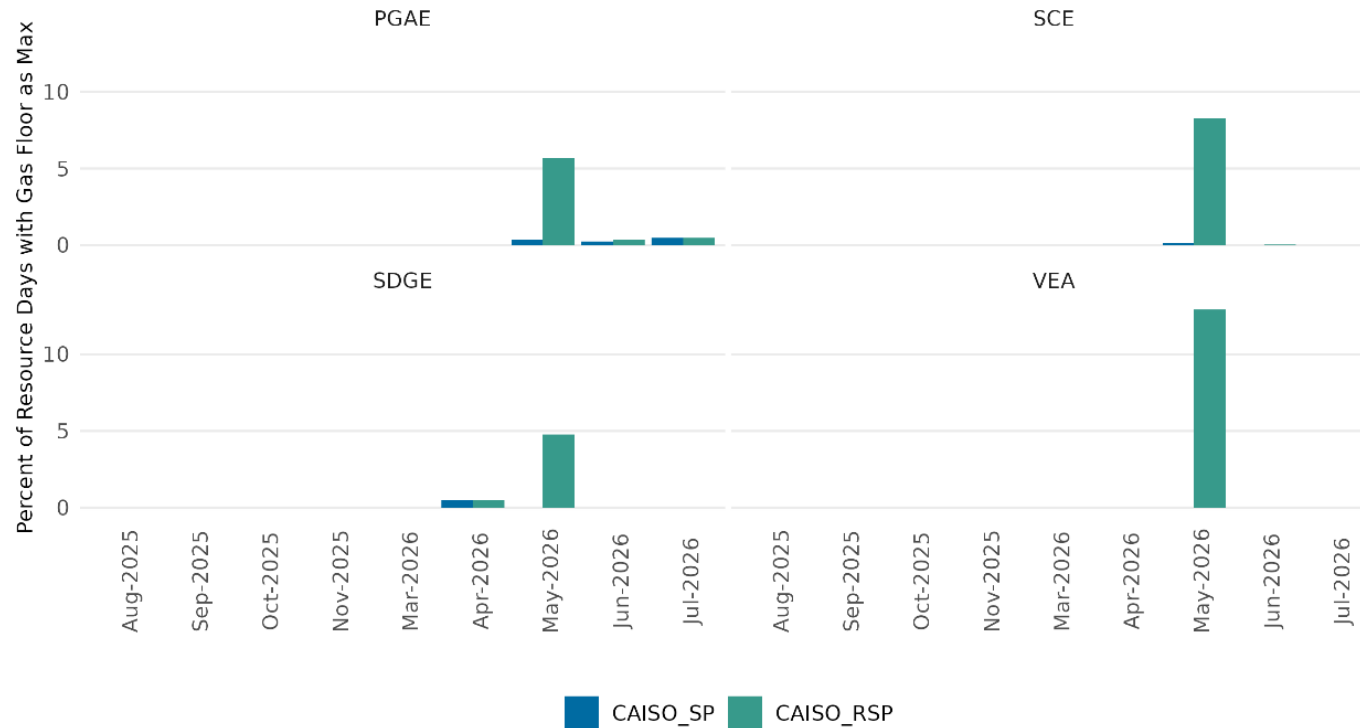
The ISO conducted analysis to assess the differences between the TOD alternatives

- Analyses looked at battery storage assets from August 1, 2025, through July 31, 2026
 - Approximately 75% had a four-hour duration; 23% had a duration under four hours, and 2% had a duration greater than four hours
- All assets considered are storage resources within the CAISO balancing authority area
 - The analysis seeks to offer a comparison between different variants of the time-of-day approach and the current real-time default energy bid
 - Because today there is no standardized default energy bid methodology for WEIM-only resources and the analysis period only covered two months of EDAM operations, the comparisons produced in these analyses focus only on storage resources within the CAISO balancing authority area

The following analyses share a common set of assumptions

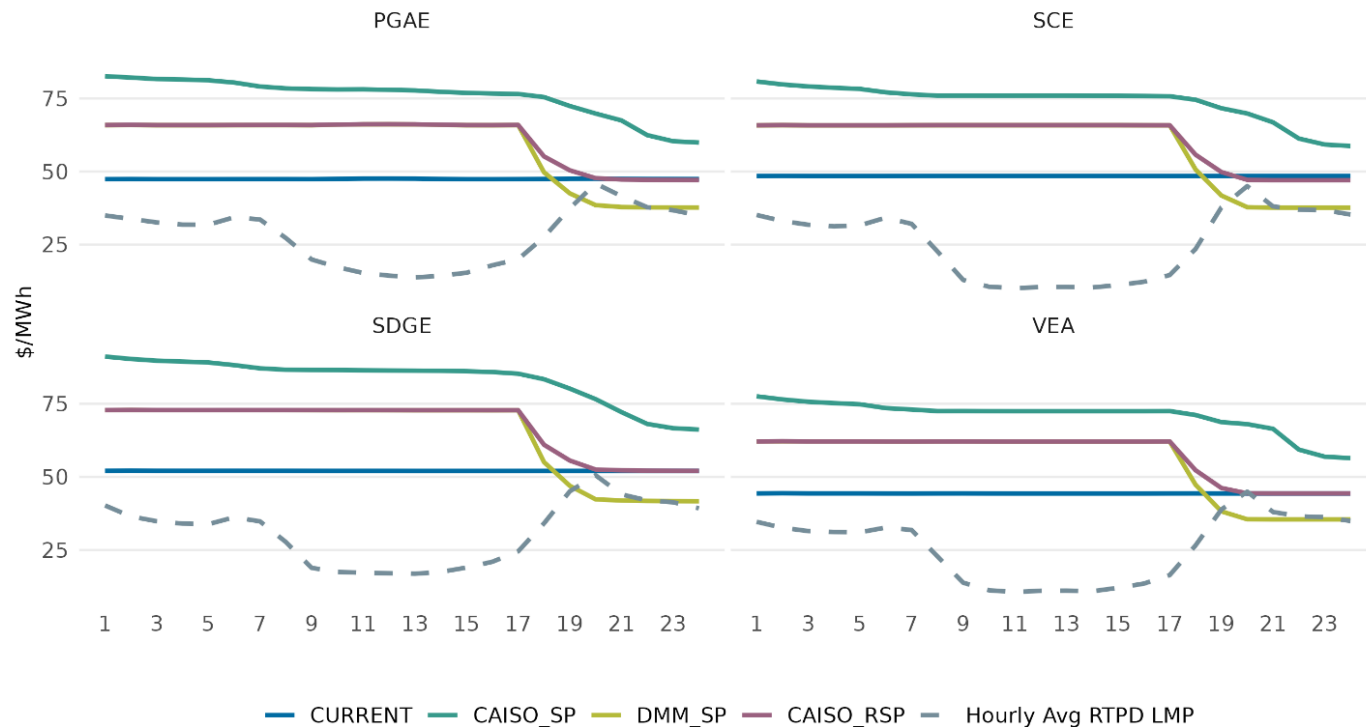
- LMPs were derived from market results and therefore represent outcomes that may have been impacted by market power mitigation
- The analyses provided assumed 100% mitigation such that resources were mitigated in every interval when the default energy bid value was below the LMP
 - This is intended to provide a conservative bookend estimate of the impacts of the different variants and the status quo
- The effects of the scaling step are not considered in these analyses
- Bids submitted by the assets were not considered to determine the optimal dispatch assumed for the revenue efficiency metric

The gas floor would have had limited impact on the DEBs



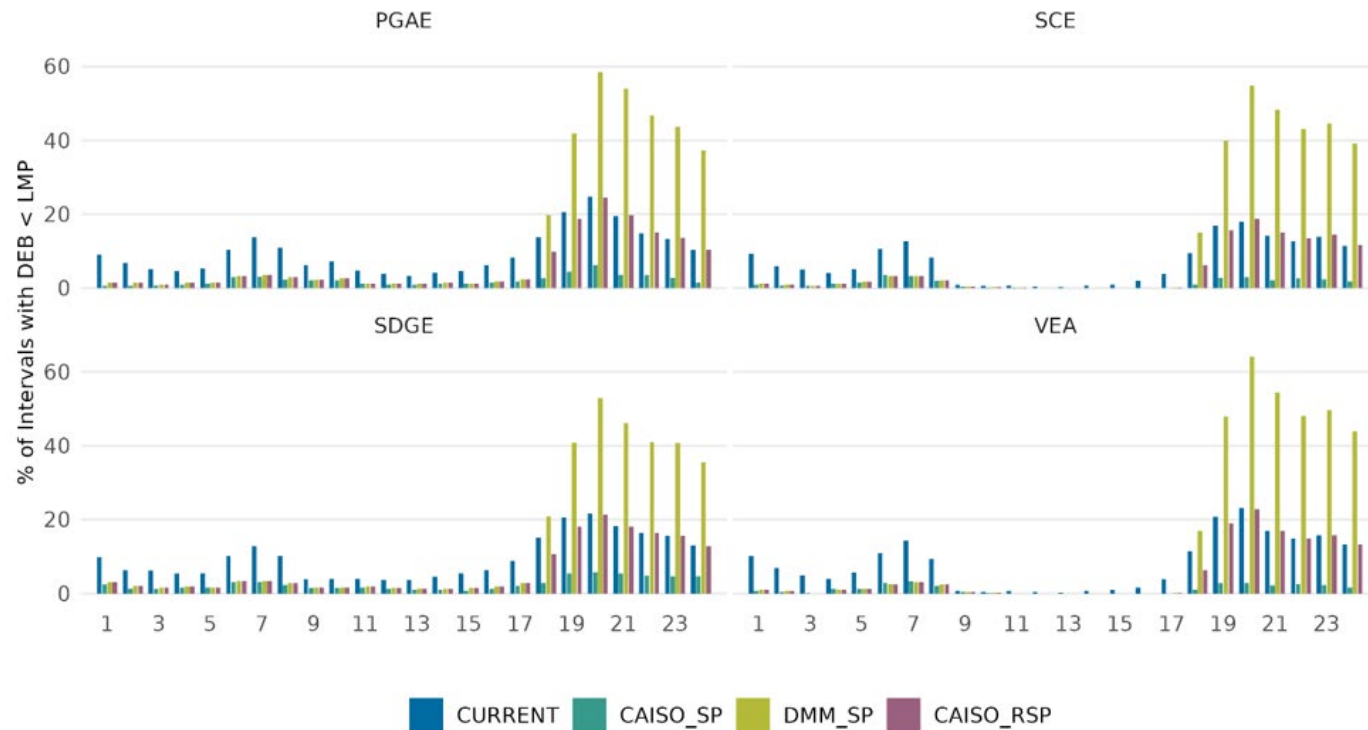
- Gas floor is relatively higher than other components in Revised Straw Proposal as price-based opportunity cost multiplier is lowered to 1.1
- Price-based opportunity cost component appropriately places battery fleet appropriately in the bid stack relative to gas fleet

The Revised Straw Proposal strikes a balance between the Straw Proposal and the DMM proposal



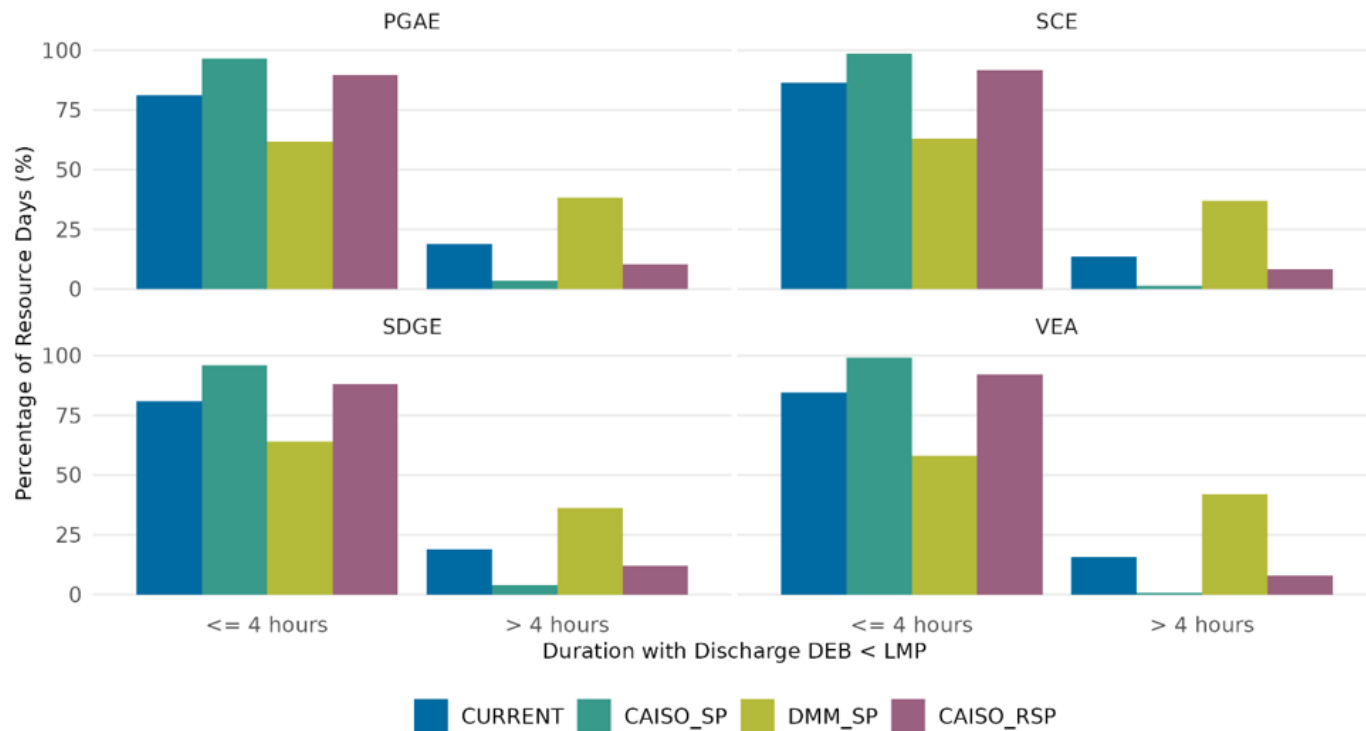
- Compared to the DMM proposal, the Revised Straw Proposal recognizes the value of stored energy at the end of the day by ensuring the real-time default energy bid is not lower than the day-ahead default energy bid

The Revised Straw Proposal would lower the potential for dispatch in midday hours relative to the current storage default energy bid



- Highest potential for mitigation during midday hours is in current storage default energy bid, but still low frequency of mitigation impact

The Revised Straw Proposal will rarely be material for a period that is longer than the duration of the battery



- With the Revised Straw Proposal, resources maintain the ability to be economically dispatched consistent with competitive market outcomes
- Straw Proposal may be an overestimation of the true opportunity cost of the batteries

The Revised Straw Proposal does not adversely impact battery resources' revenue efficiency

UDC	CURRENT	CAISO_SP	DMM_SP	CAISO_RSP
PGAE	97.4	99.6	97.9	99.1
SCE	98.7	99.84	98.35	99.6
SDGE	96.2	99.0	96.6	98.2
VEA	99.0	99.9	98.5	99.7

- Revenue efficiency for batteries under the current storage default energy bid is lowest, but still above 96%
- Straw Proposal has the narrowest impact to revenue efficiency

The revised straw proposal includes a modified version of the time-of-day approach that takes elements from the alternative offered by DMM

- Relative to the July 2026 time-of-day approach, the revised straw proposal includes two modifications:
 - The multiplier applicable to the price-based opportunity cost component is 1.1, as opposed to 1.4
 - The time-of-day multiplier changes to a lower value in the later of either (1) the earliest of the Nth highest priced day-ahead LMPs, or (2) hour ending 18; as opposed to during the hour that set the price-based opportunity cost component
- The revised straw proposal offers a better balance of accurately estimating opportunity costs, protecting against the potential exercise of market power, and preserving storage assets' ability to manage their state-of-charge relative to the July straw proposal

REVISED STRAW PROPOSAL ON HYBRID DEFAULT ENERGY BIDS

Background – Topic developments

- In the 2020 Hybrid Resources initiative, the ISO noted a hybrid default energy bid would be developed in a future initiative
- Wellhead presented a “greater-of” methodology during scoping
- The ISO presented 3 approaches in straw proposal
 - Greater-of with minimum share (ISO-preferred)
 - Largest component
 - Weighted average
- Almost all commenters expressed support for continued development of the greater-of approach with minimum share

Background – Straw proposal, greater-of methodology

- A hybrid resource's default energy bid would be equal to the greater-of the default energy bid values applicable to each of the components that make up that hybrid resource
 - Ensures hybrid resources are similarly positioned in the bid stack to resources with similar costs
- A component must represent at least ___% of the hybrid resource's installed capacity for its default energy bid value to be considered as part of the greater-of approach
 - Ensures hybrid resource default energy bids reflect the marginal cost characteristics of a significant portion of the resource

Almost all commenters expressed support for continued development of the greater-of approach

- Support: ACP-California, AES, CalCCA, CESA, DMM, Cal Advocates, PG&E, PacifiCorp, SDG&E, SCE, Vistra, and WPTF
- Opposition: Terra-Gen
 - Premature to apply any default energy bid to hybrid resources without clearer tools for managing hybrid resource state-of-charge
 - The ISO reiterates that scheduling coordinators already have tools to manage their hybrid resources through economic bidding and the use of dynamic limits, as specified by the tariff and business practice manual

Most commenters requested analysis on hybrid fleet composition for developing a minimum share threshold

- Support: AES, CESA, CalCCA, DMM, Cal Advocates, PG&E, PacifiCorp, SDG&E, and SCE
- Oppose: Terra-Gen and Vistra
 - Monitor until there is a clear need to establish a minimum share

Requests for continued development:

- Tie minimum share to ability to meaningfully shift generation rather than capacity: PG&E, SDG&E
- Develop analysis on fleet composition: ACP-California, AES, DMM, CalCCA, CESA, Cal Advocates, PacifiCorp, SCE, Terra-Gen, and WPTF

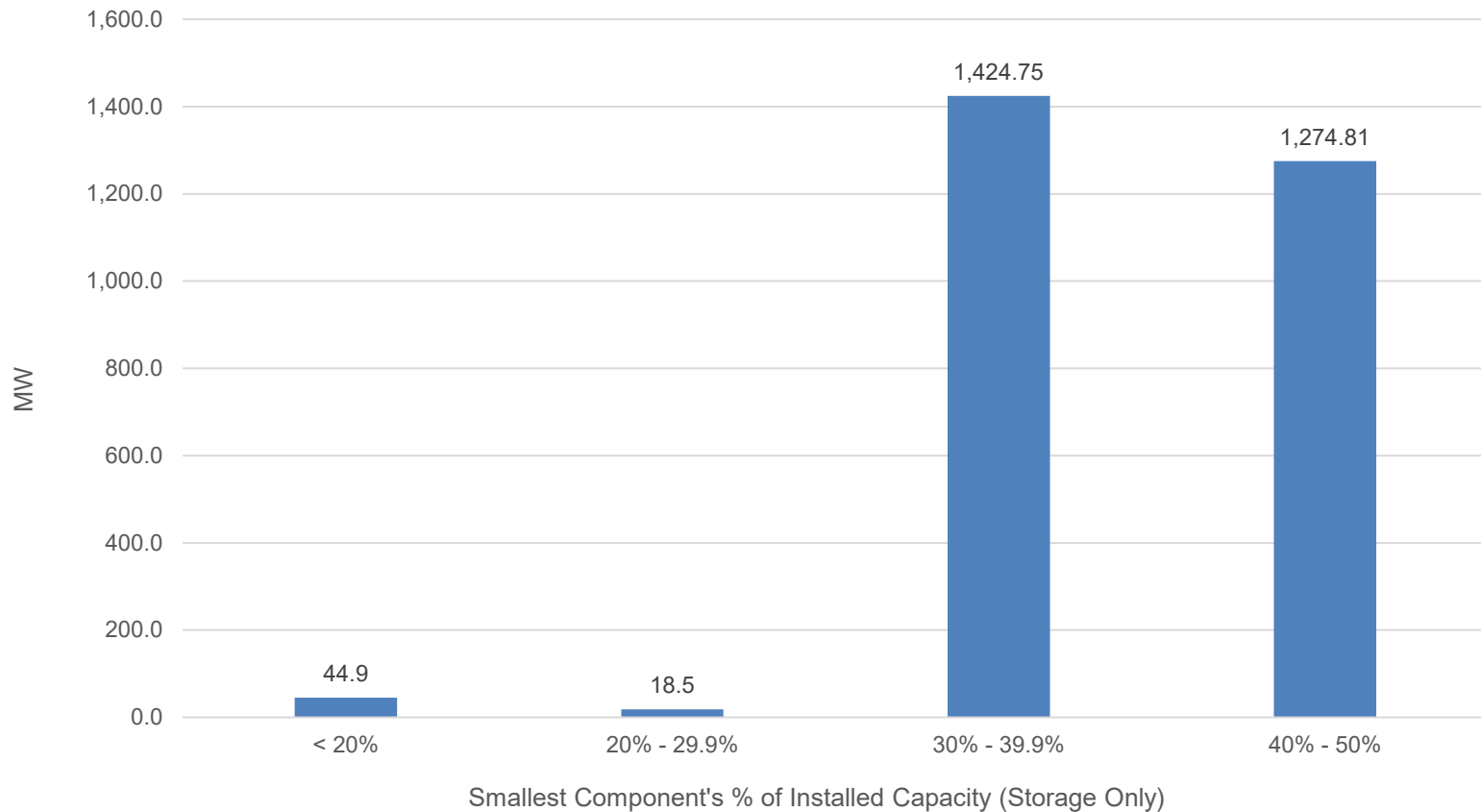
A minimum share based on ability to meaningfully shift generation would be a complex implementation effort

- The ISO understood this idea as incorporating hourly component characteristics into the hybrid default energy bid
 - E.g., evaluating changing hourly real-time opportunity costs given storage characteristics or assessing solar capabilities through the day
- As discussed in the December 2025 issue paper on the storage default energy bid, this idea would require sourcing relevant price estimates for energy and opportunity costs within the real-time market
 - Currently, the longest look-ahead in real-time is 4 hours (short-term unit commitment process)
 - May be too short to capture the opportunity cost for the rest of the day's hours for a 4-hour battery resource

The ISO analyzed the current hybrid fleet to inform setting a minimum share requirement

- As of August 4, 2026:
 - All 42 hybrid resources contained a storage component
 - 40 of 42 resources had storage as the smaller component
 - 7 hybrids had storage components that accounted for less than 30% of the resource's installed capacity
 - 17% by count
 - 63 MW (< 3%) of total hybrid storage capacity

Storage MWs by smallest component % of installed capacity, excluding resources with non-storage smallest component



Considering hybrid fleet data, the ISO proposes a 30% minimum share threshold

- A hybrid component must represent at least 30% of the hybrid resource's total installed capacity for its default energy bid value to be considered under the greater-of approach
 - Ensures hybrid resource default energy bids reflect the marginal cost characteristics of a significant portion of the resource
 - Consistent with 83% of hybrid configurations today
- If none of the components were to meet the greater-of approach's minimum share requirement, the largest component's default energy bid value would be leveraged for the hybrid resource

The proposal offers a durable solution for all hybrid configurations but would be complex to implement

- Implementation of any hybrid default energy bid based on component characteristics will be complex
 - Increased data collection for hybrid resources and their underlying components
 - All three approaches suggested in the straw proposal would face this implementation challenge
- Greater-of approach requires development of new data pipelines to allow for the calculation of component-level default energy bids and their comparison

BREAK

CHECK-IN: OUTAGE MANAGEMENT TOPIC GROUP IMPLEMENTATION

The ISO remains on track with implementation

- The 2nd Revised Straw Proposal finalized the policy process of the following items
 - Two Outage Management System (OMS) enhancements were prioritized for implementation this year
 - Implementing a representation of nonlinearity no earlier than spring 2027

In the 2nd revised straw proposal on outage management, the ISO moved items to implementation

Topic	Status
-------	--------

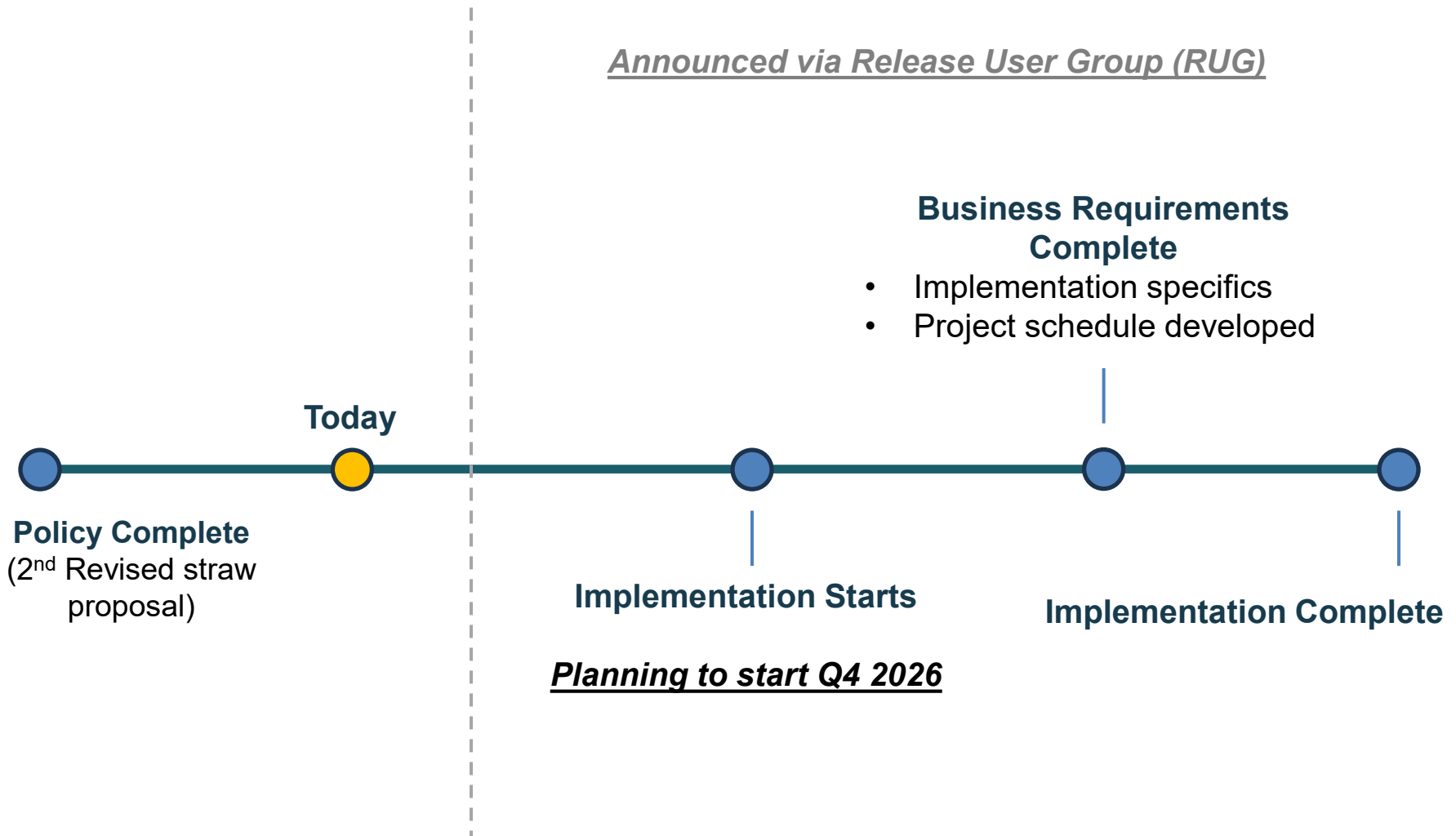
For implementation target 2026:

Automatically accept requests to update existing outage cards	☒
Allow new resources to test their ability to charge during the new resource implementation process	Slated for starting implementation Q4 2026

For starting implementation no sooner than 2027:

Improve functionality of the out-of-service checkboxes	No update
Allow non-null values for non-generation outages (ancillary services)	No update

The ISO is on-track for implementing representation of nonlinearity no earlier than Spring 2027



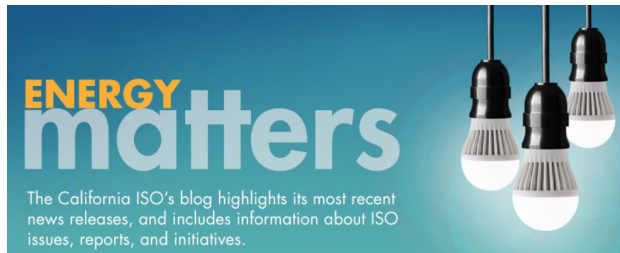
NEXT STEPS

Next Steps and Key Dates

- **October 9th:** Comments due
- Contact us at Stakeholder Affairs at ISOStakeholderaffairs@caiso.com or bmarquez@caiso.com

Please note that the dates above are tentative until the CAISO publishes a notice formally confirming them

Energy Matters blog provides timely insights into ISO grid and market operations as well as other industry-related news and a new energy podcast from CAISO



Listen and subscribe:   



News Release | Western Energy Markets

NV Energy signs agreement to join Extended Day-Ahead Market

09/17/2026



News Release | Western Energy Markets

BHE Montana becomes eighth utility to commit to the Extended Day-Ahead Market

08/10/2026



News Release | Western Energy Markets

Western Energy Markets Quarterly Benefits Report debuts with first Extended Day-Ahead Market results

07/30/2026

[Subscribe](#) to the Energy Matters blog and Frequency Band podcast

REGISTRATION CLOSSES ON SEPT. 30

2026 STAKEHOLDER SYMPOSIUM

Welcome reception - Oct. 5 at Kimpton Sawyer Hotel, Sacramento, CA

Symposium program - Oct. 6 at SAFE Credit Union Convention Center, Sacramento, CA

7:30-9:00 a.m. Registration and networking breakfast

9:00-9:15 a.m. Welcome and opening remarks

9:15-9:45 a.m. Opening Keynote

9:45-10:30 a.m. The EDAM experience: Perspectives from the first movers

Break

11:00-11:45 a.m. The Road to ROWE: Navigating the 2027 transition

1:30-2:15 p.m.

2:15-3:00 p.m.

Break

3:30-4:30 p.m.

4:30-4:45 p.m.

5:00-7:00 p.m.

Power Shifts: Short talks on big change

Success through partnership: Building the future together

CAISO's strategy for the next 5 years

Closing remarks

Networking reception

