



California ISO

Storage Design and Modeling

*Outage Management Working Group & SOC
Management & Capacity Awards Topic*

Stakeholder Meeting


May 9, 2025

9 am – 12 pm

Reminders

- This call is being recorded for informational and convenience purposes only. Any related transcriptions should not be reprinted without ISO's permission.
- The meeting is structured to stimulate dialogue and engage different perspectives.
- Please keep comments professional and respectful.
- Please try to be brief and refrain from repeating what has already been said so that we can manage this time efficiently.

Instructions for raising your hand to ask a question

- Open the Participant and Chat panels from the bottom right.
- 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.
 - **Note:** *3 only works if you dialed into the meeting.
- Please remember to state your name and affiliation before making your comment.
- You may also send your question via chat to either **Yelena Kopylov-Alford** or to all panelists.
- If you need technical assistance during the meeting, please send a chat to the event producer.

Agenda

Time	Topic	Presenter
9:00 – 9:05	Welcome and today's agenda	Yelena Kopylov-Alford
9:05 – 9:10	Overview of recent Issue Paper & Straw Proposal and the SDM Initiative	Sergio Dueñas Melendez
9:10 – 9:45	Outage Management Enhancements	Sergio Dueñas Melendez
9:45 – 10:20	Representation of Nonlinearity	Sergio Dueñas Melendez
10:20 – 10:45	SOC Clarification	Sergio Dueñas Melendez
10:45 – 11:00	Open discussion	
11:00 – 11:05	Break	
11:05 – 11:45	SOC Management & Capacity Awards topic	Dinesh Das Gupta
11:45 – 12:00	Open discussion	

Overview of Issue Paper & Straw Proposal and the SDM Initiative

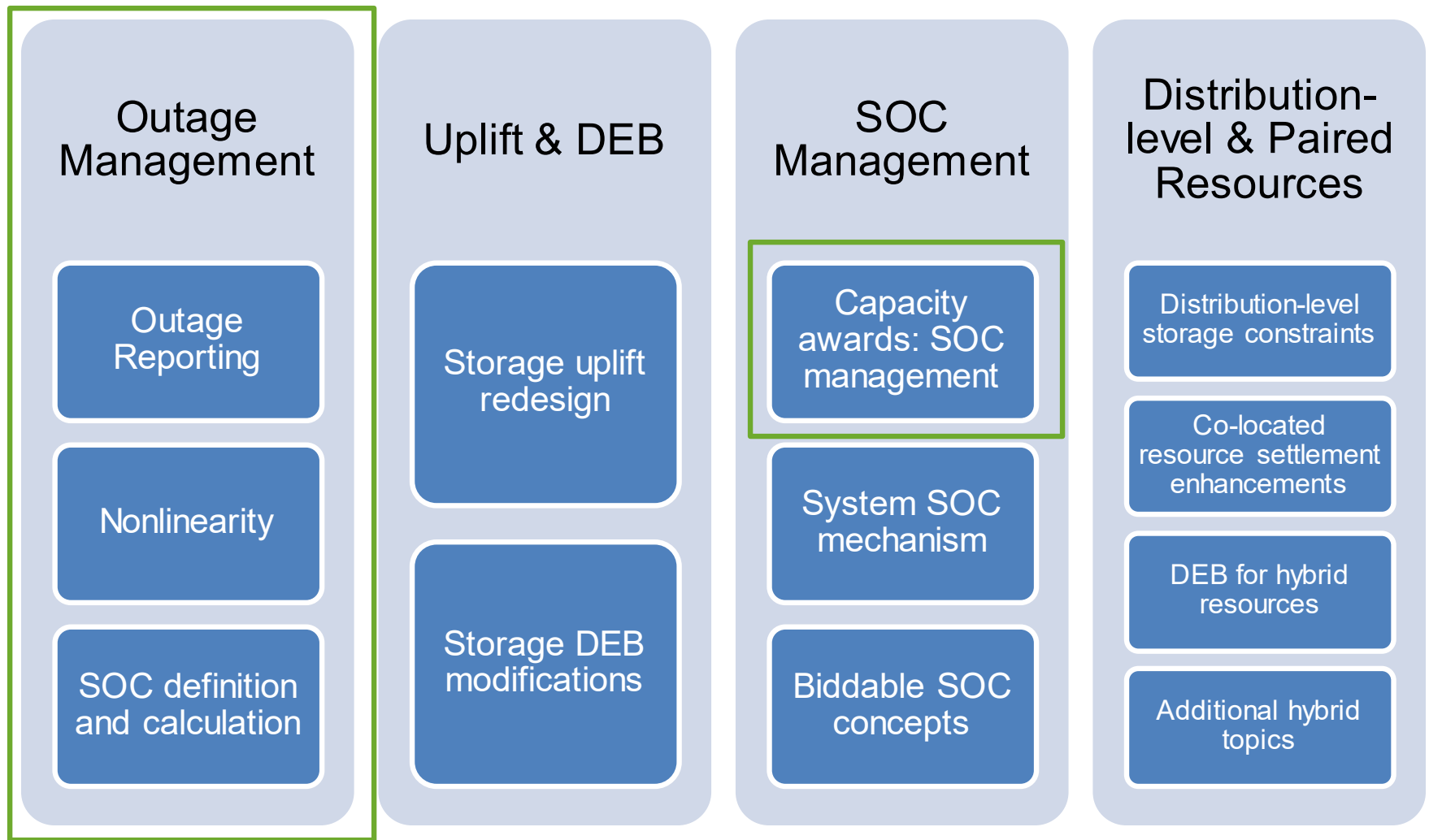
Overview of the Issue Paper & Straw Proposal

- This paper addresses three main topics:
 - Outage management enhancements.
 - Representation of nonlinearity.
 - SOC clarification.
- Stakeholder feedback from Working Group meetings and written comments showed consensus on urgently addressing storage outage management and nonlinearity issues.
 - While some stakeholders advocated for prioritizing bid cost recovery (BCR) reform, there was a strong overall desire to first focus on known and urgent operational challenges and to continue leveraging the Working Group format to set a shared common understanding of the current state of storage design before discussing more complex and interrelated issues such as BCR and default energy bid (DEB) issues.

SDM Initiative: Updated Topic Groups and Timeline

- The ISO categorized topics within the SDM initiative to facilitate parallel development and efficient stakeholder engagement.
- This structure allows for organized discussions, holistic consideration of interrelated issues, and the potential for phased resolution.
- Topic Groups and timeline have been updated herein to reflect changes following the publication of the Issue Paper & Straw Proposal

Revised Topic Groups



Updated timeline

Date	Milestone
05/09/25	Stakeholder meeting on Outage Management and SOC Management & Capacity Awards Topic
<u>05/13/25</u>	<u>Comments due on SOC Management & Capacity Awards Topic</u>
<u>05/23/25</u>	Comments due on Outage Management Issue Paper & Straw Proposal
<u>05/26/25</u>	<u>Discussion Paper on Distribution-level & Paired Resources Posting</u>
05/28/25	Stakeholder meeting on Uplift & DEB and SOC Management
06/11/25	Comments due on Uplift & DEB and SOC Management
06/30/25	Meeting on Outage Management and Distribution-level & Paired Resources Discussion Paper
07/16/25	Comments due on Outage Management and Distribution-level & Paired Resources Discussion Paper

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

Outage Management Enhancements

Outage Management Enhancements

- The integration of energy storage assets into the ISO's markets has revealed the need to evolve certain aspects of the Outage Management Business Practice Manual (BPM) and Outage Management System (OMS) to accurately represent and accommodate the unique operational characteristics of storage resources.
- While the current OMS has served conventional resources effectively, storage resources necessitate the ability to rerate negative PMin values and communicate SOC limitations, which are not easily conveyed by the current system.

Stakeholder Input: Outage Management

- There is broad support for the ISO to work on these matters expeditiously:
 - **Department of Market Monitoring (DMM):** Storage resources face limitations and outage types not currently covered in OMS that are unique to storage resources, such as negative PMin and SOC limitations.
 - **Pacific Gas & Electric (PG&E):** Outage management, availability, and nonlinearity constraints should be the highest priority in Topic Group 1 because, while the changes to OMS functionality are not trivial, the changes should not directly affect other software development to the degree that DEB and BCR changes would be certain to do.
 - **Terra-Gen:** Allow for overlapping Load Max, Max Energy, and Min Energy derates, which are necessary to properly model BESS (battery energy storage system) availability.

Stakeholder Input: Outage Management

- Vistra Corp. (Vistra) advocated for a phased approach to enhancing storage integration, prioritizing immediate operational improvements through a track focused on BPM and operating procedure clarifications.
- First, Vistra recommended a BPM clarification to outage reporting for all capability attributes, including PMax, PMin, and Minimum and Maximum Energy, and to add clarifications specifying reporting thresholds for state of charge, mirroring the tariff threshold for maximum capacity output.
 - For this purpose, Vistra recommended reporting requirements for changes exceeding ten (10) MW or forty (40) MWh, or five percent (5%) of registered values lasting fifteen (15) minutes or longer, within sixty (60) minutes of discovery.

Stakeholder Input: Outage Management

- Second, Vistra recommended adding the cause descriptions in the nature of work (NOW) table for storage outages.
 - These additions would describe the different types of outages and note which NOW should be used.
 - In particular, Vistra proposed to note that inverter outages, rack outages, safety management outages, control system failures, and electrical component or transformer failures should fall under the Plant Trouble NOW.
 - In addition, Vistra requested the ISO allow use of the technical limitations not in Market Model NOW to be used to convey the impacts of nonlinearity, a topic that is further discussed in subsequent slides.

Stakeholder Input: Outage Management

- Third, Vistra, like other stakeholders, called for a non-policy related IT project to enhance OMS by:
 - Allowing automatic acceptance of updates to forced outage cards
 - Supporting overlapping outage cards that can adjust Availability, Load Max, Max Energy, and Min Energy values on one card
 - Allowing non-NULL values in addition to NULL for other cards (as related to ancillary services)
 - Creating a single Out-of-Service checkbox for Non-Generator Resources (NGRs)
 - Allowing for Load Max (Pmin) rerates on Test Energy cards during New Resource Implementation
 - Retaining outage card values during extensions

Straw Proposal and Next Steps: Outage Management

- The ISO agrees with the need to align OMS with storage-specific outage types and characteristics, and proposes to focus on four critical components that would address the concerns and issues shared by stakeholders:
 - Support overlapping outage cards that can adjust Availability, Load Max, Max Energy, and Min Energy values on one card.
 - Allow non-NULL values in addition to NULL for other cards as related to ancillary services (AS)
 - Creating a single Out-of-Service checkbox for Non-Generator Resources (NGRs)
 - Allowing for Load Max (Pmin) rerates on Test Energy cards during New Resource Implementation

Straw Proposal and Next Steps: Outage Management

- The ISO agrees with Vistra that a BPM clarification to outage reporting for all capability attributes would enhance operational clarity, including clarifications specifying reporting thresholds for state of charge
- Section 4.1 of the Outage Management BPM could be revised for this purpose, a modification that could be addressed through a dedicated BPM process.

Straw Proposal and Next Steps: Outage Management

- Regarding the inclusion of outage types as reasons for applicable NOWs, the ISO agrees most of the outage types related to the Plant Trouble NOW could be included for clarity within Section 3.4 of the Outage Management BPM.
- The one exception where more discussion may be helpful relates to rack outages, which could be the result of voltage imbalance.
- Discussion on whether the ISO should allow the use of the technical limitations not in Market Model NOW as a means to represent foldback is included in subsequent slides.

Representation of Nonlinearity

The Nature of Nonlinearity

- Lithium-ion batteries exhibit nonlinearity (foldback) near SOC limits.
 - This is due to increased internal resistance at very low and very high SOC levels.
- Consequences:
 - Reduced responsiveness.
 - Limited dispatch capability.
 - Example: A 100MW resource might only provide 50MW at SOC extremes.
- Stakeholders agree on the need for a solution to represent this in the market.

Alternatives Discussed to Represent Nonlinearity

- Four Alternatives Discussed:
 - Outage Cards: Use outage cards to signal foldback effects.
 - **Stakeholder concern:** Which NOW to use
 - **CESA/PG&E:** Support using OMS in the near-term.
 - **Vistra:** Suggests Technical Limitations NOW (but RAAIM exemption concern).
 - Master File Integration: Incorporate foldback characteristics into Master File fields (e.g., "current rate").
 - **Portland/SCE/DMM:** Support adding more storage capability information to the Master File.

Alternatives Discussed to Represent Nonlinearity

- Four Alternatives Discussed:
 - Dynamic Limit Tool Extension: Allow storage to submit real-time MW limits, like hybrid resources.
 - **Terra-Gen/CESA/Vistra**: Support for its consideration.
 - **DMM**: Concerns about opacity and gaming potential.
 - Biddable SOC: Allow bidding in terms of SOC instead of capacity.
 - **DMM**: Supports this for more accurate reflection of storage constraints.

Near-Term Solution: Outage Cards

- A near-term solution is to use outage cards within OMS.
 - These cards would signal the effects of foldback on ramp rates, P_{min} , and/or P_{max} as a function of SOC.
- Stakeholder concerns exist about which Nature of Work (NOW) code to use.
- CESA and PG&E support using OMS as a workable interim solution.
- Vistra suggests using the "Technical Limitations not in Market Model" NOW.
 - This NOW is exempt from the Resource Adequacy Availability Incentive Mechanism (RAAIM).

ISO's Position on RAAIM

- Currently, the ISO does not believe there should be a blanket RAAIM exemptions for foldback.
- Foldback is a known technological limitation that cannot be fully eliminated but can be minimized through asset design or considered in Resource Adequacy (RA) contracting.
- A RAAIM exemption would remove incentives to:
 - Develop assets that minimize foldback.
 - Contract for adequate capacity.

Next Steps and Long-Term Vision

- ISO's preferred near-term solution: Use the "Plant Trouble" nature of work (NOW).
 - Include a comment that the outage is related to nonlinearity/foldback.
 - This allows:
 - RAIM evaluation of resources.
 - Identification of nonlinearity instances.
- Longer term solutions:
 - Integrate "current rates" as resource-specific values in the Master File.
 - Develop a bidding pathway using SOC.
- The relationship between nonlinearity outages, generic RA, or effective flexible capacity (EFC) will be discussed in the RA Modeling and Program Design (RAMPD) initiative.

SOC Clarification

Background – SOC Estimates and SOC Definition

- SOC is not an observable value, but rather a calculation or estimate that varies as a function of voltage
- There are many ways to estimate SOC, and different assets may employ different methods to calculate the value that is conveyed to the ISO through telemetry
 - Regardless of the method used, the estimates should reflect a good faith judgement of the unit's capability
- Today, the definition of SOC within the ISO's Tariff can be found in Appendix A, which reads:
 - “State of Charge: The Energy available to CAISO Markets from a Non-Generator Resource or storage device.”
 - The current definition does not further define the term “available”, which may lead to operational ambiguity regarding whether all stored energy is accessible to the market

Inaccessible Energy – Voltage Imbalance

- Voltage imbalance occurs when the voltages across the cells (or strings of cells) of a battery resource are no longer balanced
- When the voltage of the cells are no longer balanced, the lowest voltage cell will limit the discharge capability of the battery, limiting the available energy the resource is able to provide to the CAISO system
 - Voltage imbalance also affects the charging capability of the battery (the cell with the highest voltage limits the charging capability)
- The energy stored in the other cells in the battery will be represented in total the telemetered SOC for the resource, but this energy is inaccessible due to cell imbalance
- Imbalances can occur due to manufacturing impurity, cycling through the assets operational lifetime, and augmentation choices

Inaccessible Energy – Low SOC

- The ISO has identified instances where storage resources submit outages which significantly derate their P_{max} in periods where the resources have a low but non-zero state of charge and have received a dispatch operating target (DOT) greater than 0 MW
- Generally, the ISO has identified two drivers for energy inaccessibility at low SOC:
 - Non-linearity in rates of charging and discharging at low SOC (foldback)
 - Significant opportunity costs associated with fully discharging

Inaccessible Energy – Low SOC

- Significant opportunity costs associated with fully discharging
 - Resources that face such constraints may have the capacity to be fully discharged, but doing so may impose significant costs on the resource due to the opportunity costs associated with the resulting outage and the costs of bringing the resource back online
 - Lithium based batteries may suffer irreversible damage not only when discharging near/at P_{max} as they approach the SOC min, but also vice versa
 - These factors may lead resources to be effectively operated as if their minimum stored energy limit is greater than zero even though their master file characteristics indicate that the resource's minimum stored energy limit is equal to zero

Inaccessible Energy – Low SOC

- Significant opportunity costs associated with fully discharging
 - The implicit higher minimum stored energy limit typically appears to be enforced through the use of outages that derate the storage resource's P_{max} to prevent discharge instructions that would deplete the resource's SOC beyond that level
 - The minimum SOC constraints that some resources face are known by the resource operators and could be represented to the market through various means including the minimum stored energy limit master file characteristic and outages that up-rate the minimum state of charge parameter
 - If such constraints are not accurately communicated, infeasible energy schedules may be awarded in the real-time market because the actual lower limit of a resource's SOC may exceed the stored energy required to satisfy the energy award

Stakeholder Perspectives on SOC

- Stakeholders support more robust language on availability related to telemetered SOC.
- DMM recommendations:
 - Consistent SOC calculation methodology.
 - Telemetry should reflect energy accessible at dispatch.
 - Enhance definitions for DA-ISOC.
- CPUC ED staff: Refine SOC to reflect voltage imbalances.
- CESA: "Inaccessible energy" may be inaccurate; further discussion needed.

SOC Straw Proposal and Next Steps

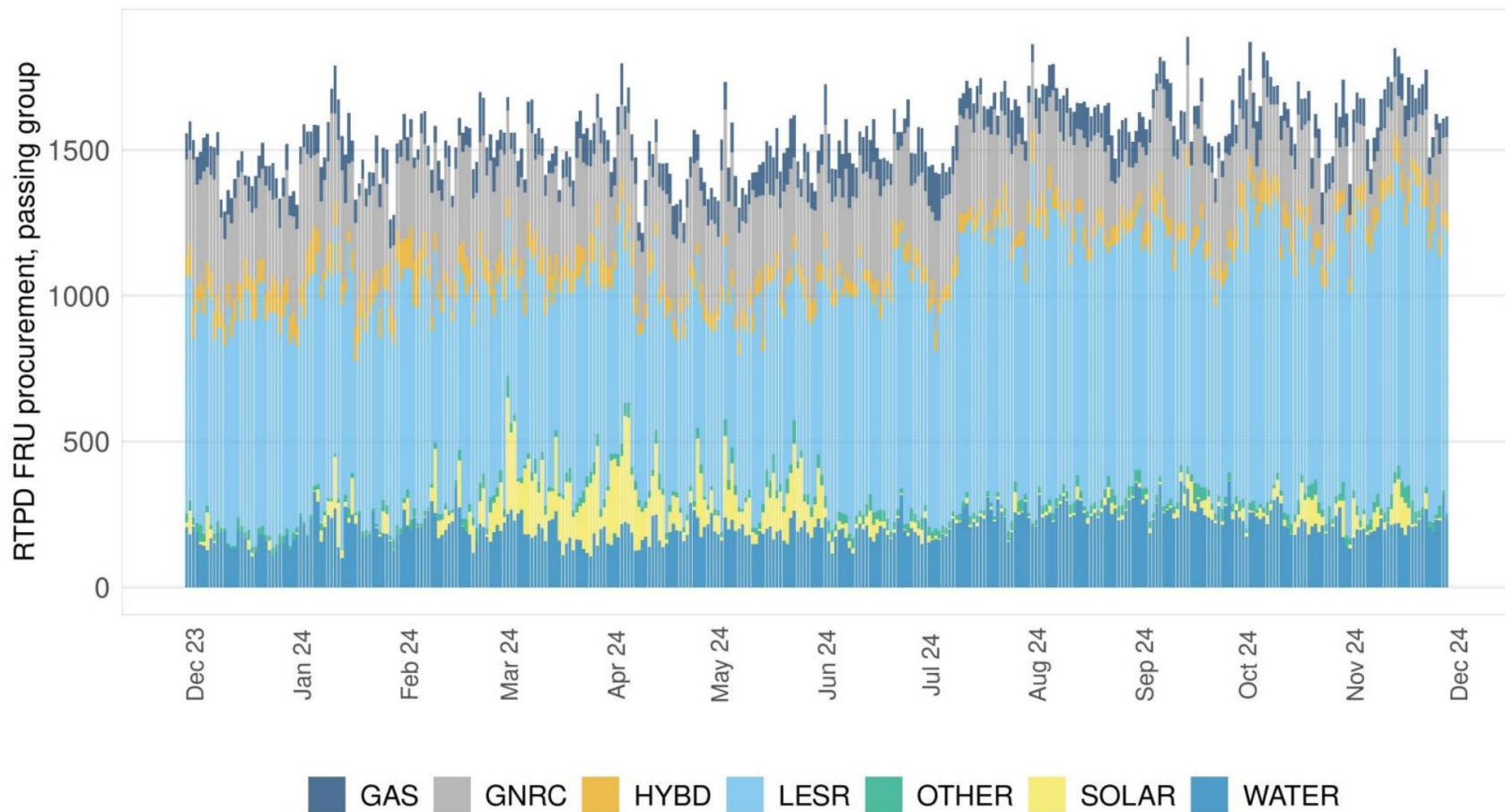
- Telemetry should accurately represent operational capability.
- ISO plans to expand Section 14.5 of the Direct Telemetry BPM.
- Clarify that the values conveyed for instantaneous SOC and maximum continuous energy limit should reflect the energy accessible to the market at the time that they are communicated
 - Refine best practices for telemetry SOC calculation (e.g., consider voltage imbalance).
- Continue discussion in Working Groups.

Discussion

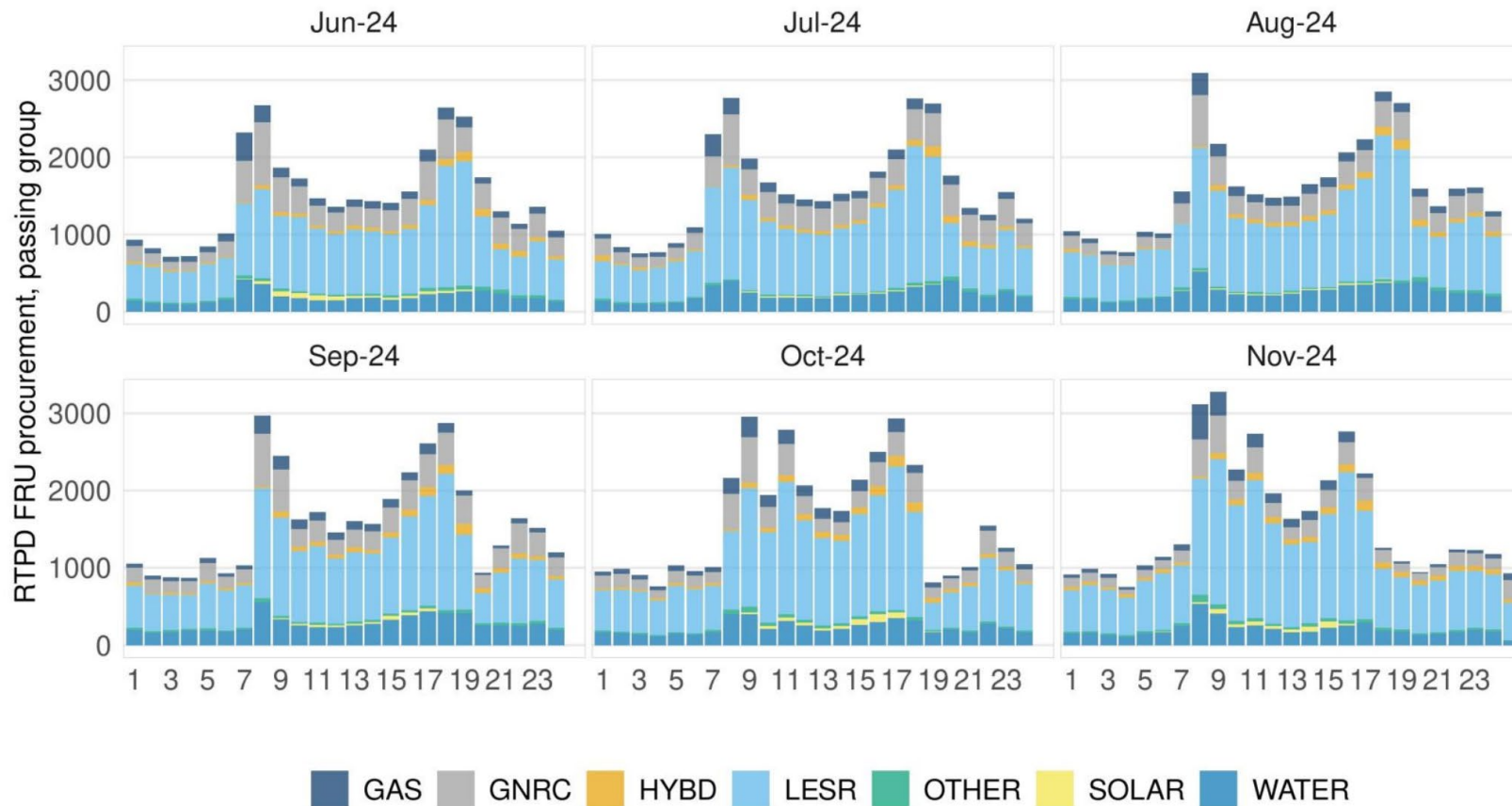
Break

SOC Management & Capacity Awards topic

Energy storage provides most flexible ramping up (FRU) procurement



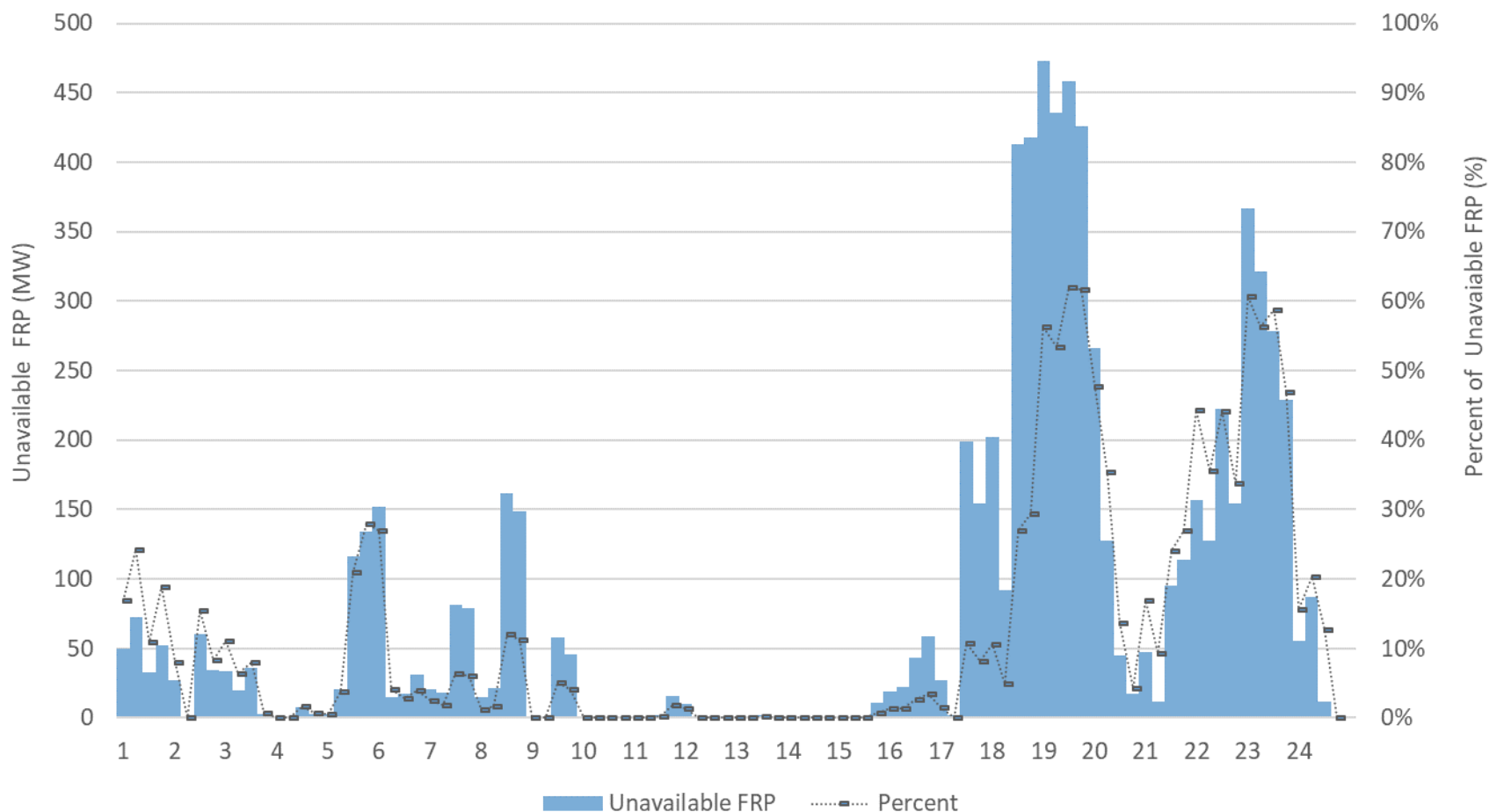
Storage resources tend to support FRU procurement across all hours of the day



The current SOC formulation does not consider the impact of FRU on SOC

- Storage FRU awards are not limited by their impact on SOC
 - These awards may be infeasible because the resource may not have enough SOC to deliver if dispatched
- Modeling FRU impacts on SOC will ensure FRU deliverability from storage resources
- Because a large share of FRU is currently procured from storage resources, this gap has significant implications

In typical summer conditions, this gap can result in up to 60 percent (450 MW) of awarded FRP to be unavailable during peak hours



This issue has price formation, market efficiency, and reliability implications

- FRU prices could be suppressed due to artificial oversupply
- The market may need to procure immediate additional energy from other resources to cover undelivered FRU awards, putting upward pressure on the bid stack and potentially increasing real-time energy prices
- Impels operations to use load conformance to ensure immediate ramping capability
- Therefore, the ISO proposes modifying the current SOC formulation to consider FRU impacts immediately, ensuring delivery by Summer 2025

Questions

Proposed modifications to the Market Operations BPM (PRR 1627)

7.8.2.5 Stored Energy Management for Non Generator Resources in Real-Time

For NGRs designated as Limited Energy Storage Resources (LESRs), state of charge (SOC) constraints are applied to both the binding and non-binding intervals in FMM and RTD based on their Master File parameters, Lower and Upper Charge Limit bids, End-of-Hour (EOH) SOC bids limits, and, if applicable, the reliability-induced Minimum SOC described in section 2.5.8 of this BPM.

Real-Time Interval State-of-Charge Management

To model state of charge for storage resources during each interval the real-time market uses telemetered values for state of charge from storage resources to calculate an initial value, similar to the way initial operating levels are calculated for traditional generation. From these initial conditions state of charge is updated from energy and regulation awards throughout the look-ahead periods considered by the real-time market. This is a similar process to how state of charge is modeled in the day-ahead market, outlined in section 6.6.2.3, with the exception that the real-time interval state of charge considers the impacts of Uncertainty Awards in the upward direction. ~~As a result,~~ the state of charge is calculated for each interval in real-time markets as follows:

$$SOC_{i,t} = SOC_{i,t-1} - (EN_{i,t}^{(+)} + \eta EN_{i,t}^{(-)}) \frac{\Delta T}{T_{60}}$$

$$SOC_{i,t}^{AT} = SOC_{i,t-1}^{AT} - (FRU_{i,t} + EN_{i,t}^{(+)} + \eta EN_{i,t}^{(-)} + ATRU_t RU_{i,t} - ATRD_t \eta RD_{i,t}) \frac{\Delta T}{T_{60}}$$

$$\underline{SOC}_{i,t} \leq SOC_{i,t} \leq \overline{SOC}_{i,t}$$

$$\underline{SOC}_{i,t} \leq SOC_{i,t}^{AT} \leq \overline{SOC}_{i,t}$$

[...]

Proposed modifications to the Market Operations BPM (clean-up edit)

6.6.2.3 Stored Energy Management

[...]

The state of charge for a storage resource is governed by the state of charge equation as follows:

$$SOC_{i,t} = SOC_{i,t-1} - (EN_{i,t}^{(+)} + \eta EN_{i,t}^{(-)}) \frac{\Delta T}{T_{60}}$$

$$\underline{SOC}_{i,t} \leq SOC_{i,t} \leq \overline{SOC}_{i,t}$$

$$SOC_{i,t}^{AT} = SOC_{i,t-1}^{AT} - (EN_{i,t}^{(+)} + \eta EN_{i,t}^{(-)} + ATRU_t RU_{i,t} - ATRD_t \eta_i RD_{i,t}) \frac{\Delta T}{T_{60}}$$

$$\underline{SOC_{i,t}^{AT}} \leq SOC_{i,t}^{AT} \leq \overline{SOC_{i,t}^{AT}}$$

[...]

Questions

Testing: Resource Level

RTPD 7/9/2024 18:15 (7 intervals)

- The resource had an SOC Min of 1.00 MWh. For simplicity, assuming this resource had no RU/RD
- The FRU award was undeliverable since no SOC to support it
- If the proposed modification was active, mindful of limited SOC, the FRU award would have been zero. The first two intervals, FRU is not optimizable
- $$SOC_{i,t}^{AT} = SOC_{i,t-1}^{AT} - \left(\text{FRU}_{i,t} + EN_{i,t}^{(+)} + \eta_i EN_{i,t}^{(-)} + ATRU_t RU_{i,t} - ATRD_t \eta_i RD_{i,t} \right) \frac{\Delta T}{T_{60}}$$

7/9/2024			Status Quo		With Proposed Modification	
Start Time	SOC	Energy	FRU	FRU LMP	FRU	FRU LMP
18:15	21.00	-0.083	80	0	80	0
18:30	21.00	0.000	80	0	80	0
18:45	21.00	0.000	80	16.58	0	17.58
19:00	21.00	0.000	80	0	0	3.47
19:15	21.00	0.000	80	11.13	0	11.81
19:30	1.03	79.900	0.1	11.78	0	12.51
19:45	1.00	0.100	0	0	0	0

Testing: System Level

RTPD 7/9/2024 18:15 (7 intervals)

- Case was re-executed. The last 5 intervals are reported below.
- In the counterfactual, the modification results in 16 extra fast start units being committed.

TIME_INTERVAL	Total FRU from Storage not consuming SOC	Total FRU from Storage consuming SOC	Diff
7/9/24 18:45	1,156	834	323
7/9/24 19:00	668	440	228
7/9/24 19:15	144	52	92
7/9/24 19:30	52	52	0
7/9/24 19:45	63	52	11

Testing Takeaways

- The proposed modification:
 - Mitigates infeasible FRU awards to storage resources, resolving the market efficiency and reliability concerns of the ISO
 - Bolsters FRU price formation, aiding the market in identifying additional resources to meet FRU needs
- Enhanced testing will continue before final deployment
 - If deployed, the ISO will monitor the modification's effects
 - If unintended consequences arise, the ISO can immediately disable the modification

Questions

Stakeholder Discussion

- One stakeholder suggested the proposed modification may unnecessarily constrain FRU
 - Proposal accumulates FRU procurement rather than reversing and re-procuring in each real-time interval
 - May not have significant adverse affects
 - Large amount of storage FRU capability
 - Re-initialization of SOC telemetry in each successive market
 - Should monitor to ensure needed flexibility is not overly constrained under stressed conditions
- The ISO emphasizes ensuring deliverability of flexibility is paramount and commits to suggested monitoring

Stakeholder Discussion

- Stakeholders suggested the proposal may mix upward and downward capacity products, where an additional downward award may make room for an upward award
 - Adding FRD to the formula would negate benefits because the awards may offset each other
 - Proposal does not materially impact FRD procurement and pricing
- To resolve, the ISO currently favors expanding envelope equations to real-time use
 - Requires implementation of DAME
 - Requires stakeholder process to discuss and design envelope equation enhancements
- Given resource constraints, the ISO believes the most prudent solution is to add FRU to the SOC AT formula
 - Beyond summer, the ISO agrees that reflecting the effects of both FRU and FRD on SOC would be a material improvement

Discussion

Next Steps

Next steps

- Upcoming milestones:
 - 5/13: Stakeholder comments due on SOC Management and Capacity Awards topic
 - 5/23: Comments due on Outage Management issue paper & straw proposal
 - Please submit your comments via commenting tool on the [initiative page](#)
 - 5/26: Discussion paper on Distribution-Level Paired Resources posting
 - 5/28: Stakeholder meeting on Uplift & DEB and SOC Management topic groups



For reference

- Visit initiative webpage for more information:
<https://stakeholdercenter.caiso.com/StakeholderInitiatives/Storage-design-modeling>
- If you have any questions, please contact
ISOStakeholderaffairs@caiso.com

This Week at the ISO – 05/05/25

Stakeholder Meetings

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

- Monday, May 5th – [Ancillary Services Focus Group #2](#)
 - 1:00pm - 3:00pm PT ([link](#))
- Tuesday, May 6th – [Technical User Group](#)
 - 10:00am - 11:00am PT ([link](#) – developer account required)
- Wednesday, May 7th - [Settlement User Group](#)
 - 10:00am - 11:00am PT ([link](#), meeting number: 961 854 046)
- Thursday, May 8th - [Participating Transmission Owner Per Unit Costs 2025 - Draft Cost Guides](#)
 - 10:00am - 12:00pm PT (link will be provided in future notice)
- Friday, May 9th - [Storage Design and Modeling](#)
 - 9:00am – 12:00pm ([link](#))

Comment Submission Deadlines

- Monday, May 5th - [Draft 2026 Flexible Capacity Needs and Availability Assessment Hours Technical Study](#)
- Monday, May 5th - [EDAM Congestion Revenue Allocation](#)

Trainings

- Tuesday, May 6th – Hybrid Resources Phase 2C Project - Live Demonstration
 - 1:00pm - 2:00pm PT ([link](#))

Market Simulations

None scheduled for the week

This Week at the ISO continued

Business Practice Manual (BPM) Updates

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

- The PRRs listed below have an open 10-business day comment or appeal period from April 29, 2025, through May 13, 2025.
- **New ISO PRR's**
 - *PRR 1622 and 1623 Not Used*
 - [PRR 1624](#) Scheduling Coordinator Certification and Termination BPM, updating affiliate information and how they are associated
 - [PRR 1625](#) Transmission Planning Process BPM, Emergency PRR, Competitive solicitation timeline for selection of approved project sponsor.
 - [PRR 1626](#) Market Operations BPM, Activation of contingency-based flowgates in fifteen-minute market.
 - [PRR 1627](#) **Market Operations BPM, Emergency PRR, Adding state of charge to flexible ramping awards determination. Please submit comments related to the policy conversation informing PRR 1627 through the commenting tool on the [Storage Design and Modeling initiative webpage](#) by May 13. These comments will inform future policy discussions.**
 - [PRR 1628](#) Generator Management BPM, Additional changes for 2023 interconnection process enhancements track 2.
 - [PRR 1629](#) Energy Imbalance Market BPM, Addition of seasonal opt-in for CAISO balancing authority.
- **ISO Recommendations**
 - [PRR 1620](#) Reliability Requirements BPM, Clarification regarding eligible generating units as new use import commitments.
 - [PRR 1621](#) Candidate CRR Holder Registration BPM, Emergency PRR, Updating application with new congestion revenue rights customer types.
- **ISO Final Decisions**
 - [PRR 1617](#) Not Used
 - [PRR 1618](#) Market Instruments BPM, Emergency PRR, Clarifications to the after-market cost recovery process.
 - [PRR 1619](#) Congestion Revenue Rights BPM, Changes related to implementation of the congestion revenue rights replacement project

ENERGY matters

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



Story | Operations

Taking steps to bend the cost curve while enhancing reliability

By Elliot Mainzer

04/24/2025



Story | Leadership

CEO Elliot Mainzer's recent Congressional testimony on grid reliability

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