Storage Bid Cost Recovery (BCR) and Default Energy Bid (DEB) Enhancements

Stakeholder Meeting

October 9, 2024

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- You may also send your question via chat to either **Brenda Marquez** or to all panelists.

California ISO

Today's Agenda

Time	Topic	Presenter
9:00 – 9:05	Welcome and today's agenda	Brenda Marquez
9:05 – 9:35	Background	Sergio Dueñas Melendez
9:35 – 11:05	Overview of Draft Final Proposal (DFP)	Sergio Dueñas Melendez
11:05 – 11:45	Issues regarding mitigation	Sergio Dueñas Melendez
11:45 – 11:55	Open stakeholder discussion	
11:55 – 12:00	Next steps	Brenda Marquez

California ISO

CAISO Policy Initiative Stakeholder Process
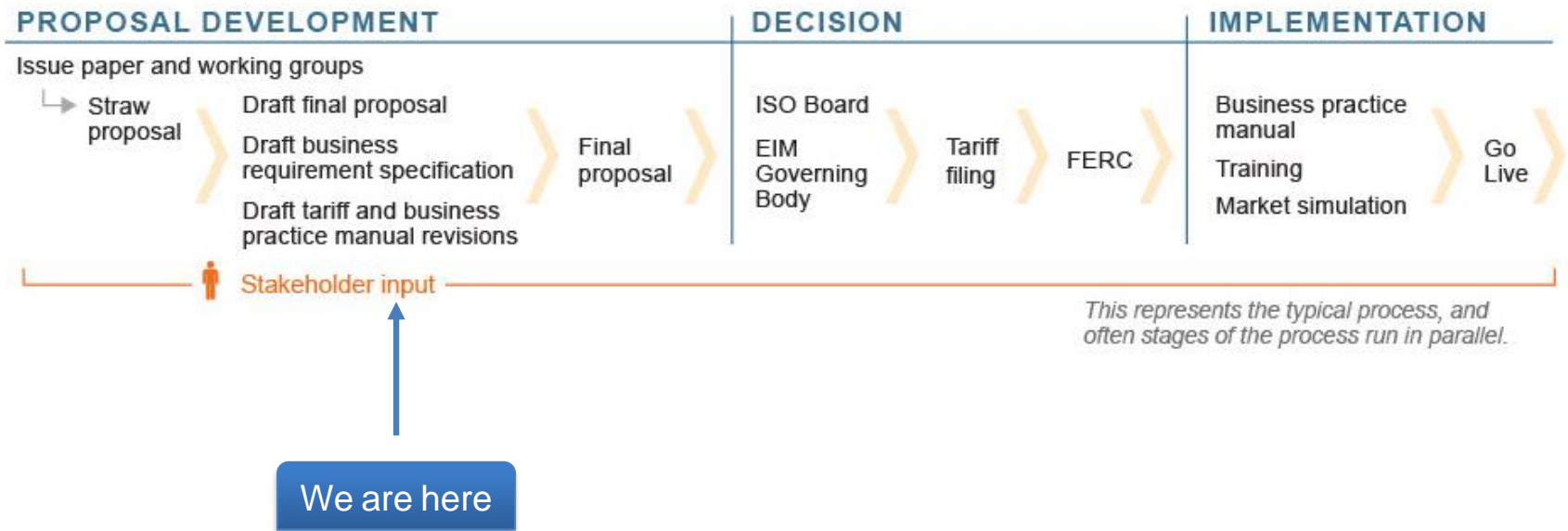
Track 1
Oct 04, 2024 Posting
Oct 09, 2024 Meeting
Oct 21, 2024 Comments due

Background

The ISO has identified that storage resources have received potentially unwarranted BCR

- This is because CAISO's BCR construct does not adequately consider state of charge, which is necessary for an energy storage resource to support awards and schedules

- Current rules result in materially different treatment between conventional generators and energy storage resources

- **Concern 1:** Storage assets are not exposed to real-time prices for deviating from day-ahead schedules

- **Concern 2:** Storage assets may have an incentive to bid strategically to maximize the combined BCR and market payment

Given the complexity of BCR and the consensus that a redesign of storage uplift is necessary, the ISO has decided to focus the present effort on closing Concern 2 (strategic bidding)

- The near-term solution would be interim and based on the recommendations from stakeholders to modify the cost proxy used in the BCR calculations
- The Draft Final Proposal builds upon the modified BCR calculation proposed by CESA
  - CESA's Latest Proposal:
    - For a buy-back:

    (RT dispatch – DA schedule) * (**[Max(RT Bid, Min(DA LMP, RT Discharge DEB, RT LMP))]** – RT LMP)
    - For a sell-back:

    (RT dispatch – DA schedule) * (**[Min(RT Bid, Max(DA LMP, RT DEB, RT Bid))]** – RT LMP)

Stakeholders have raised concerns regarding the need for a specific exception for instances of market power mitigation

- Analyses performed by the ISO and the Department of Market Monitoring (DMM) have found that the impact of mitigation on incremental dispatch has been generally small
  - DMM also analyzed a counterfactual scenario in which resources bid at $1,000/MWh in the hours preceding the net peak in order to assess the potential future effects of mitigation, the impact remained small in that case

- From these analyses the ISO believes that concerns related to mitigation should not delay or complicate the implementation of a near-term solution focused on closing the gap that would allow for strategic bidding behavior to unduly inflate BCR payments
  - This being said, consideration of a specific exception for mitigation may be warranted as part of a broader redesign of storage uplift

Overview of Draft Final Proposal

In comments submitted September 23, CESA offered modifications to the triggering conditions of its Alternative Solution

- Trigger avoids complexities introduced by reliance on SOC
  - In the case of a buy-back of a discharge schedule, the interval must have:
    - (1) a day-ahead schedule or base schedule to discharge, and
    - (2) a RT dispatch to discharge that is lower than the day-ahead or base schedule; and,
    - (3) a RT dispatch that does not charge the resource
  - In the case of a sell-back of a charge schedule, the interval must have:
    - (1) a day-ahead schedule or base schedule to charge, and
    - (2) a RT dispatch to charge that is lower than the day-ahead or base schedule; and,
    - (3) a RT dispatch that does not discharge the resource

In comments submitted September 23, CESA offered modifications the proxy energy cost in its Alternative Solution

- For the latest iteration, CESA has slightly altered the proposed modified BCR calculation to:
  - For a buy-back of a discharge schedule
    - (RT dispatch – DA schedule) * (**[Max(RT Bid, Min(DA LMP, Discharge Portion of RT DEB, RT LMP)]** – RT LMP)
  - For a sell-back of a charge schedule
    - (RT dispatch – DA schedule) * (**[Min(RT Bid, Max(DA LMP, Charge Portion of RT DEB, RT LMP)]** – RT LMP)
- CESA argues that this modification will ensure that, if the RT bid would have resulted in a surplus in an interval, the surplus is maintained; and if the RT bid would have resulted in a shortfall, the DA LMP or RT DEB could be used to minimize or eliminate that shortfall

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Several stakeholders offered support for the latest iteration of the CESA proposal

- Vistra, the Western Power Trading Forum (WPTF) and Pacific Gas & Electric (PG&E) submitted comments that broadly supported the latest CESA proposal
  - Vistra and WPTF noted that the modified calculation should be used only in the intervals that meet certain triggers
  - PG&E noted in comments that the modified calculations could be applied across all intervals provided the ISO can provide additional information on if it can integrate logic to use a different RT BCR equation for intervals with no DA schedules

CAISO Public

Several stakeholders continue to oppose the CESA proposal unless significant modifications are made

- The California Public Utilities Commission's Office of Ratepayer Advocates (Cal Advocates) opposed the use of a modified BCR calculation across all intervals and instead recommends adopting the DMM's recommendation to eliminate most RT BCR payments to storage as an interim solution with a sunset provision

- If the ISO moves forward with a modified BCR calculation as a means to resolve Concern 2, Cal Advocates urges the implementation of three key components:
  - CAISO should remove the RT Bid parameter in the modified bid formula and should apply the formula to all intervals
  - CAISO should not use the DEB in the modified BCR formula since it does not represent hourly storage opportunity costs and may misrepresent opportunity costs leading up to peak demand hours
  - CAISO should apply the minimum or maximum SOC trigger condition at the start of the binding interval

Several stakeholders continue to oppose the CESA proposal unless significant modifications are made

- DMM expressed that none of the alternative proposals presented by stakeholders would address the real-time bidding incentives created by the current BCR design, which can lead to inefficient dispatch based on bids below real-time marginal cost

- DMM also noted that the ISO should not rush to implement interim measures that only address strategic bidding concerns or other limited scenarios created by the actions of scheduling coordinators

Some stakeholders have noted a modified version of the CESA proposal could serve a middle ground alternative

- Southern California Edison (SCE) stated that, while some market participants felt very strongly that the CESA formula should only apply for hours of buyback or sellback, applying this modified formulation across all hours should be considered as a viable compromise that would incentivize market participants to bid accordingly, especially for hours that don't have a corresponding DA award

- SCE also noted that the current methodology could result in excess BCR, whereas completely removing RT BCR for storage assets would result in an opposite extreme outcome

- As such, SCE reasons that using the CESA modified formula for all hours would strike an implementable and a reasonable workaround to the complications related to MIO

CESA's latest proposal improves upon the current storage BCR calculation, but it must be applied across all intervals to eliminate the opportunity for bidding strategically to inflate BCR payments

- The triggers put forth by stakeholders do not recognize that the bulk of the BCR is being paid to resources that are uneconomically dispatched as part of SOC constraints which are binding in either in the binding interval or any of the advisory intervals, and would therefore apply the modified BCR calculation to a very limited share of intervals
  - This is because the triggers focus on the conditions of a specific interval, without consideration of advisory intervals
  - Applying the modified calculations across all intervals would result in a more equal treatment across resources since the ISO does not make whole other asset classes when they are unable to perform due to fuel limitations

Modifying BCR calculation to use other variables as the cost proxy is reasonable

- Stakeholders in this process have repeatedly indicated that energy bids for storage resources are used for other purposes than to reflect marginal costs

- FERC has found that the bids submitted by energy storage resources do not solely reflect marginal costs

- Using different cost proxies does not make any energy or interval ineligible for BCR, it merely changes the cost proxy used in calculating BCR surpluses and shortfalls in order to eliminate the opportunity for an asset to bid in a manner that would unduly inflate BCR payments

Applying a modified BCR calculation across all intervals to eliminate the opportunity for bidding strategically to inflate BCR payments ensures storage resources are made whole to a reasonable proxy of their costs as an interim solution

- In comments submitted September 23rd, several parties noted that they would not oppose the application of modified BCR calculations for storage assets across all intervals, but requested additional details on the financial and operational implications of this change

- The ISO has included several detailed 24-hour examples for different hypothetical units and conditions under all of the approaches detailed in the DFP

- These examples are simplified scenarios based on dispatch observed in the market by ISO staff, they do not represent actual settlement outcomes for any existing resources

Applying a modified BCR calculation across all intervals to eliminate the opportunity for bidding strategically to inflate BCR payments ensures storage resources are made whole to a reasonable proxy of their costs as an interim solution

- Given the focus of the DFP on closing design gaps related to strategic bidding concerns, these examples are constructed to focus on scenarios where resources may bid in a manner that would capture unduly high BCR payments

Examples included in the DFP

Resource	Status Quo	BCR using DA LMP - All Intervals	BCR using RT DEB - All Intervals	BCR using First Min/Max Methodology - All Intervals	BCR using Latest Min/Max Methodology - All Intervals	BCR using DA LMP - Subset of Intervals	BCR using RT DEB - Subset of Intervals	BCR using First Min/Max Methodlogy - Subset of Intervals	BCR using Latest Min/Max Methodlogy - Subset of Intervals
Unit A	($36,010.00)	($2,941.00)	($9,465.00)	($1,449.00)	(5,813.00)	(23,683.00)	(25,827.00)	(23,593.00)	(25,447.00)
Unit B	($90,909.00)	($1,223.00)	($16,466.00)	($2,736.00)	(14,330.00)	(39,253.00)	(48,121.00)	(40,452.00)	(48,670.00)
Unit C	($24,490.00)	($960.00)	($4,989.00)	($880.00)	(5,209.00)	(22,518.00)	(22,860.00)	(22,439.00)	(22,553.00)
TOTAL	($151,409.00)	($5,124.00)	($30,920.00)	($5,065.00)	($25,352.00)	($85,454.00)	($96,808.00)	($86,484.00)	($96,670.00)

Real time energy bid price to calculate Real-Time Energy Bid Cost.

Replaced real-time energy bid with DA LMP to calculate Real-Time Energy Bid Cost.

Replaced real-time energy bid with real-time Default Energy bid to calculate Real-Time Energy Bid Cost.

Replaced real-time energy bid with the first Min/Max proposal for both buy-back and sell back to calculate Real-Time Energy Bid Cost.

Replaced real-time energy bid with the latest Min/Max proposal for both buy-back and sell back to calculate Real-Time Energy Bid Cost

Replaced real-time energy bid with DA LMP to calculate Real-Time Energy Bid Cost only in intervals that meet CESA triggers

Replaced real-time energy bid with real-time Default Energy bid to calculate Real-Time Energy Bid Cost only in intervals that meet CESA triggers

Replaced real-time energy bid with the first Min/Max proposal for both buy-back and sell back to calculate Real-Time Energy Bid Cost only in intervals that meet CESA triggers

Replaced real-time energy bid with the latest Min/Max proposal for both buy-back and sell back to calculate Real-Time Energy Bid Cost only in intervals that meet CESA triggers

Min and Max calculations are applied to both FMM IIE and RTD IIE.   Checks for the CESA triggers are only applied for FMM for simplicty

Examples included in the DFP

Table 2. Frequency of intervals that meet all CESA trigger conditions for each example unit

Resource	Buy-Back Intervals	Buy-Back Intervals (%)	Sell-Back Intervals	Sell-Back Intervals (%)	Total	Total (%)
Unit A	0	0%	19	7%	19	7%
Unit B	6	2%	33	11%	39	14%
Unit C	0	0%	6	2%	6	2%

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Examples included in the DFP

Figure 1. All Assets, All Approaches
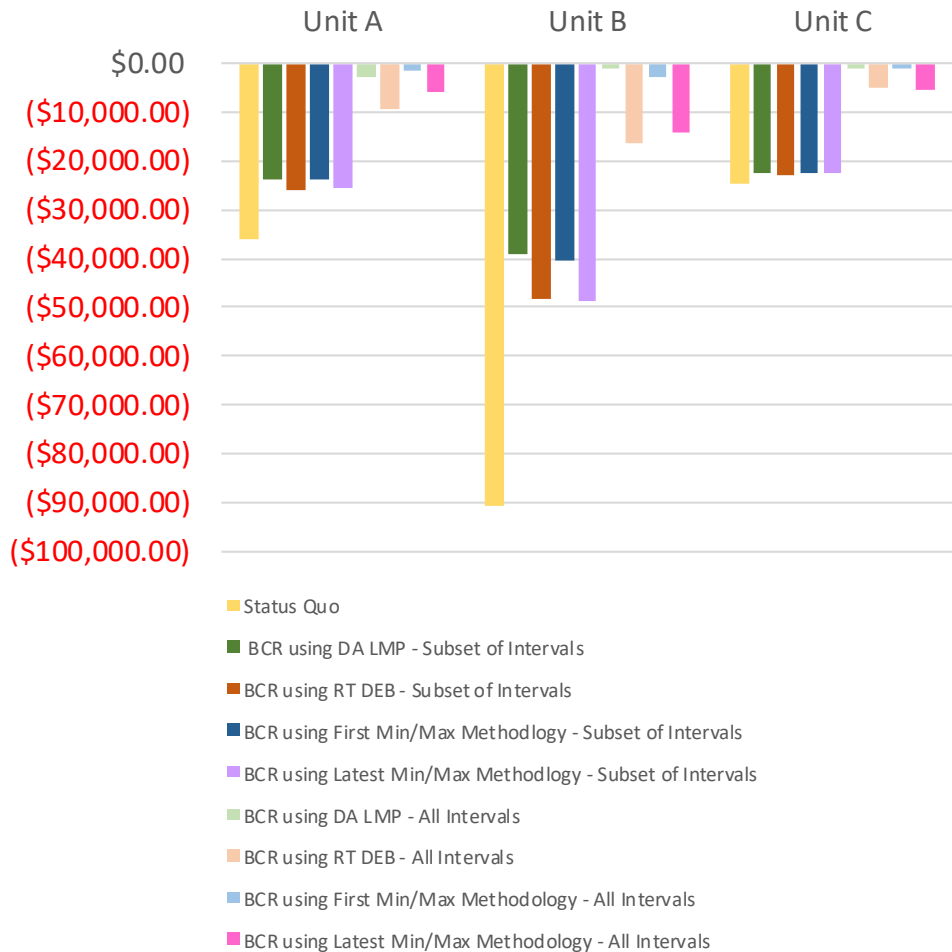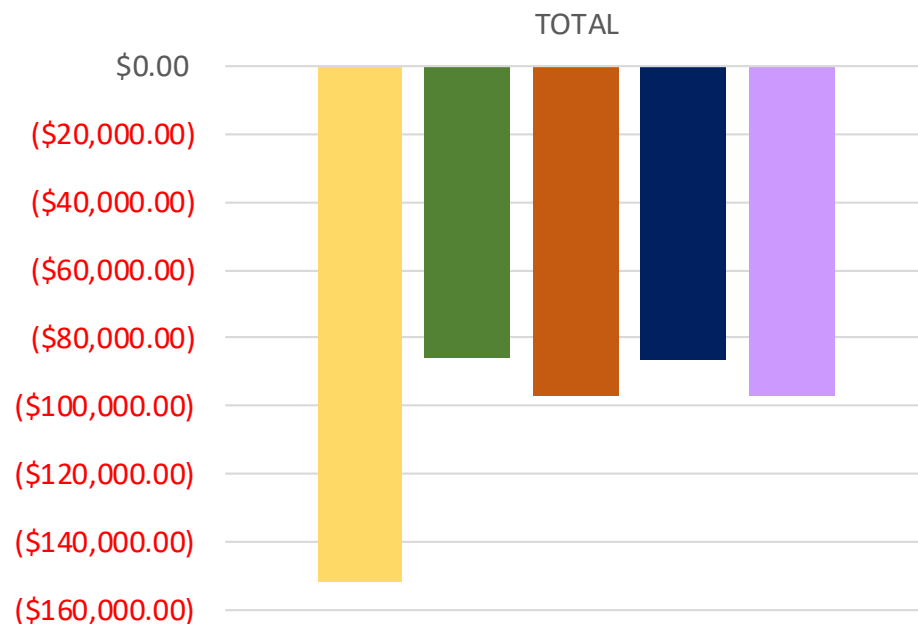

Figure 2. Total for all Assets, All Approaches

Legend:
- Status Quo
- BCR using DA LMP - Subset of Intervals
- BCR using RT DEB - Subset of Intervals
- BCR using First Min/Max Methodlogy - Subset of Intervals
- BCR using Latest Min/Max Methodlogy - Subset of Intervals
- BCR using DA LMP - All Intervals
- BCR using RT DEB - All Intervals
- BCR using First Min/Max Methodology - All Intervals
- BCR using Latest Min/Max Methodology - All Intervals
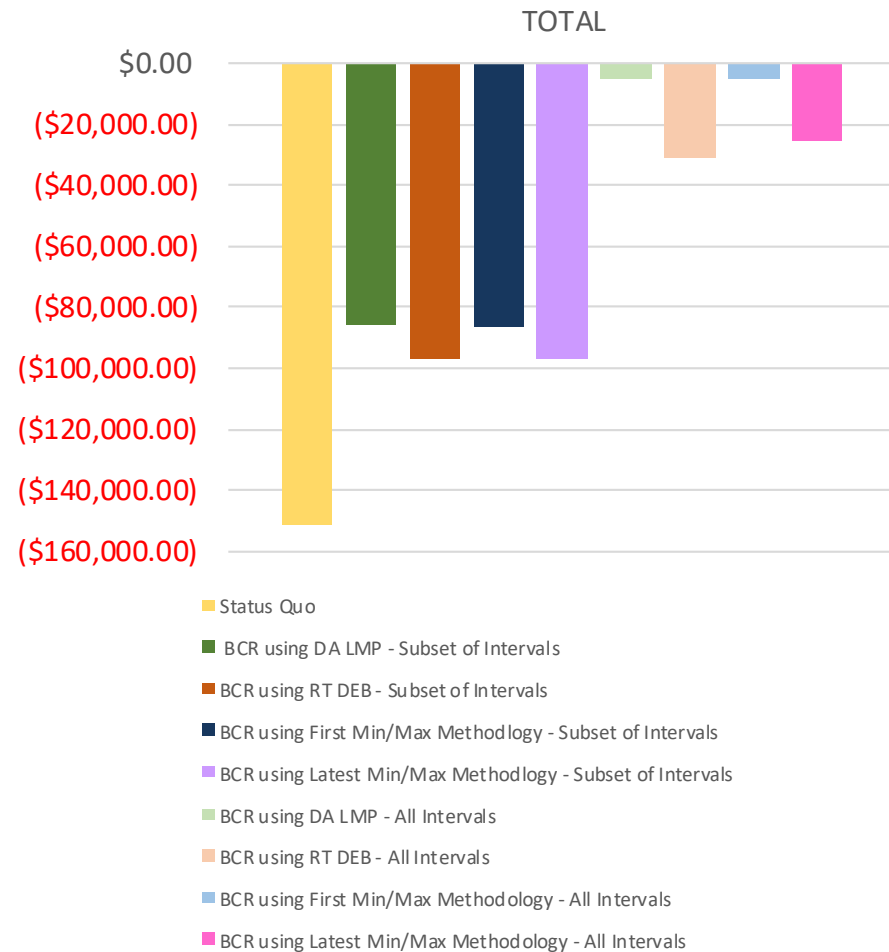
Examples included in the DFP

Figure 3. All Assets, Approaches Applied to Intervals that meet all CESA Triggers
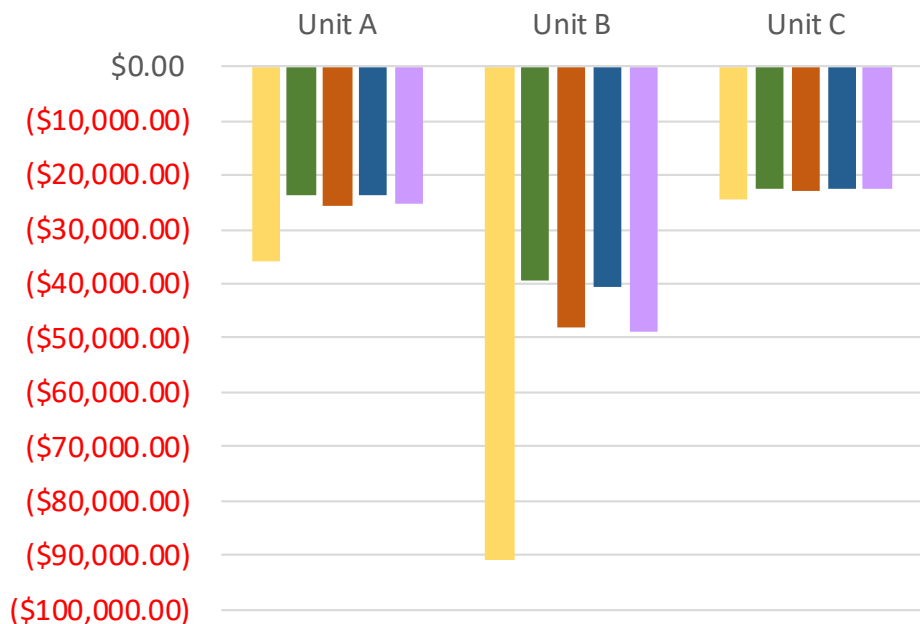
Figure 4. Total for all Assets, Approaches Applied to Intervals that meet all CESA Triggers

- 🟨 Status Quo
- 🟩 BCR using DA LMP - Subset of Intervals
- 🟧 BCR using RT DEB - Subset of Intervals
- 🟦 BCR using First Min/Max Methodlogy - Subset of Intervals
- 🟪 BCR using Latest Min/Max Methodlogy - Subset of Intervals

Examples included in the DFP

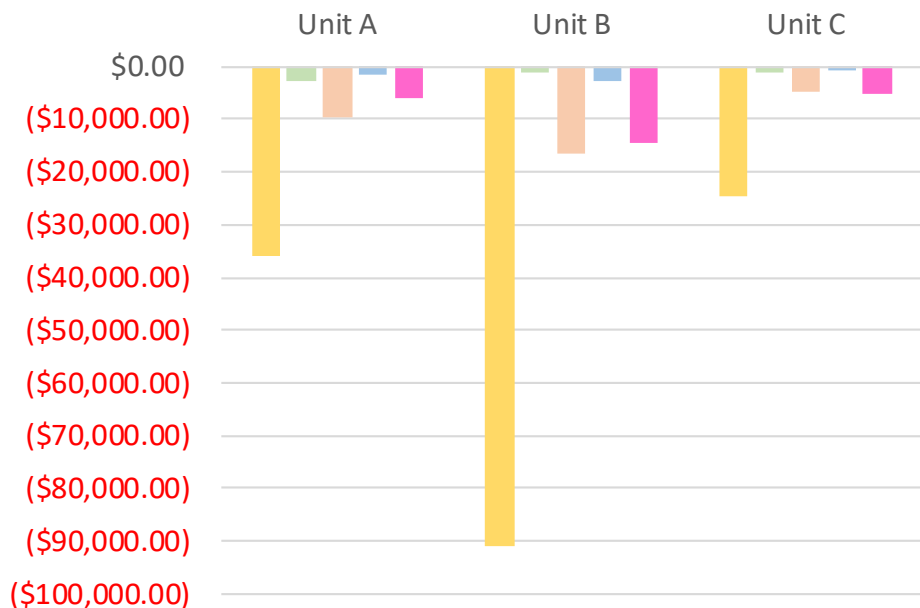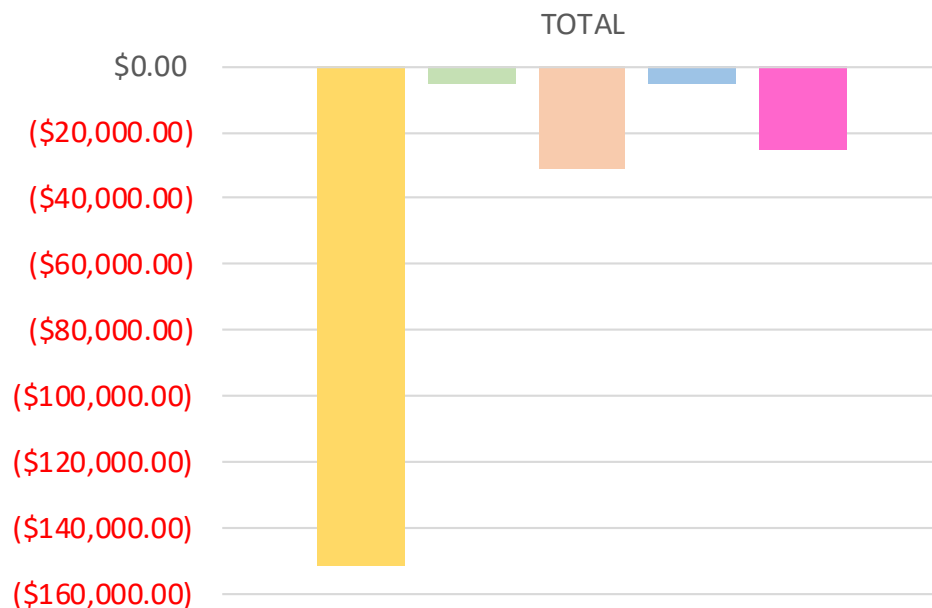

Figure 5. All Assets, Approaches Applied to All Intervals

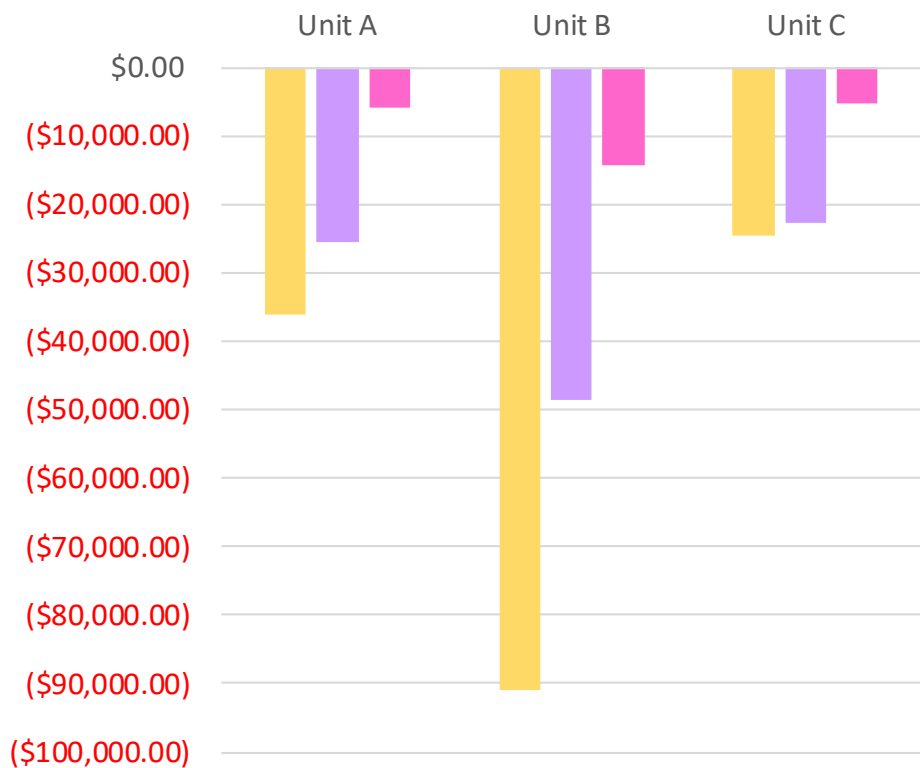Figure 6. Total for all Assets, Approaches Applied to All Intervals

Examples included in the DFP

Figure 7. All Assets, Status Quo versus Latest Min/Max Proposals

Figure 8. Total for all Assets, Status Quo versus Latest Min/Max Proposals
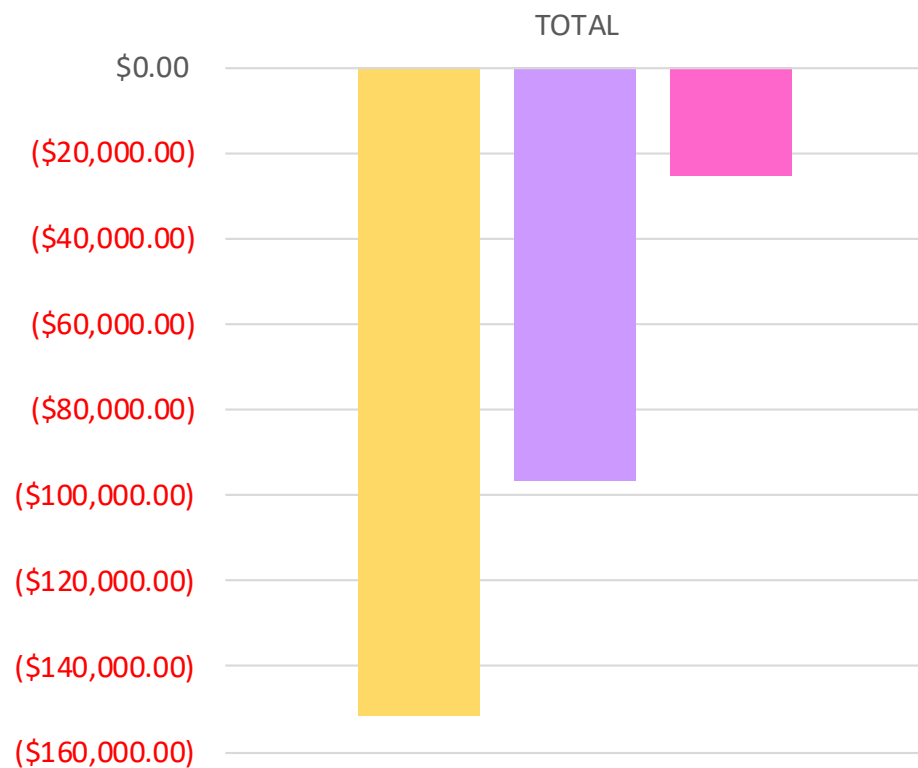
Applying a modified BCR calculation across all intervals to eliminate the opportunity for bidding strategically to inflate BCR payments ensures storage resources are made whole to a reasonable proxy of their costs as an interim solution

- The examples illustrate that the application of different approaches results in differentiated outcomes per unit
  - This is driven by several variables, including the number of intervals that meet all of the trigger conditions
  - The frequency of such intervals is largely determined by the fact that the trigger conditions are "and" statements, which for some units result in few intervals triggering an alternative calculation despite the fact that some of them meet one or two of the three conditions
  - In this context, the application of modified calculations across all intervals is necessary to eliminate the possibility of strategic bidding across the board

Applying a modified BCR calculation across all intervals to eliminate the opportunity for bidding strategically to inflate BCR payments ensures storage resources are made whole to a reasonable proxy of their costs as an interim solution

- The extension of the existing BCR construct to storage resources has resulted in complications and unintended outcomes that merit a holistic revision of the uplift mechanism applicable to this resources
  - The need for this redesign does not justify a delay to address the current design gap that could allow for strategic bidding behavior to unduly inflate BCR payments for storage assets

A modified formula that takes into account other cost proxies such as the RT DEB and the day-ahead LMP presents a measured approach to ensure that the bidding behavior of market participants does not result, even inadvertently, in unduly inflated BCR calculations

- Today, the BCR formula solely uses the RT bid as its cost proxy to determine surpluses and shortfalls despite the fact that the bids of storage resources have been found to not only express marginal costs, but opportunity costs and economic willingness to dispatch the underlying commodity whose value varies with time

Applying a modified BCR calculation across all intervals to eliminate the opportunity for bidding strategically to inflate BCR payments is a viable compromise for a near-term, interim solution

- Applying the modified BCR calculation across all intervals is desirable and viable for three reasons:
  - It is feasible to develop in the near-term and resettle as needed, thus curing the current design gap as soon as possible
  - Since BCR calculates either a shortfall or a surplus for each interval of the day, it is the only means to effectively eliminate the ability of resources to bid strategically in a manner that unduly inflates BCR
  - It is a measured approach to solve some of the concerns described herein while allowing for the continued development of a new uplift mechanism for storage assets

Applying a modified BCR calculation across all intervals to eliminate the opportunity for bidding strategically to inflate BCR payments ensures storage resources are made whole to a reasonable proxy of their costs as an interim solution

- Regarding the applicability of these modified formulations to resources outside the CAISO BAA, the ISO currently favors near-term modifications that treat WEIM Only and CAISO/EDAM resources equally
  - Instead of the DA LMP term in the modified BCR calculation, the ISO proposes to use a null value for WEIM-Only assets

- The ISO appreciates the discussion regarding this matter put forth by stakeholders and welcomes consideration of whether circumstances may warrant differentiated treatment as part of the holistic uplift redesign for storage assets

Development of a near-term, interim solution to address strategic bidding will allow efforts to focus on the holistic redesign of storage uplift

- The ISO reiterates its commitment to continue working on an uplift redesign for storage assets

- If the present near-term interim solution is approved by the joint Board of Governors and WEM Governing Body, the ISO will commence a storage initiative to holistically redesign uplift for storage assets in a manner aligned with the specific characteristics and complexities of these resources, including consideration of:
  - Modifications to the storage DEB formulation
  - Non-linearity of storage performance
  - Evaluation of the impacts of outages, bid parameters, and mitigation with relation to BCR

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Issues regarding mitigation

California ISO

Stakeholders have noted that there are instances that would still warrant BCR, specifically underscoring mitigation

- Some stakeholders have noted that instances in which resources were mitigated in intervals prior to a buy- or sell-back may merit specific BCR provisions

- The MSC noted that, depending how material this concern is, the ISO should consider applying the same approach used for the Hold Exceptional Dispatch could be used to calculate BCR for dispatch due to mitigation that reduced resource revenues over the day

California ISO

Stakeholders have noted that there are instances that would still warrant BCR, specifically underscoring mitigation

- During the September 11th stakeholder meeting, DMM presented metrics that indicated that, in practice, mitigation has had a minimal impact on battery dispatch; and, when material, mitigation has had the greatest impact during the three peak net load hours, HE 19 to 21

- As such, mitigation is unlikely to have affected the SOC of storage resources in a manner that would compromise their ability to meet day-ahead schedules

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Stakeholders have noted that there are instances that would still warrant BCR, specifically underscoring mitigation

- Since the analysis referenced above is historical, DMM also conducted additional analysis to estimate the impact of mitigation under a circumstance where the ISO has eliminated BCR for storage assets buying and selling back day-ahead schedules
  - To assess the potential impact of bid mitigation under this scenario, DMM used the same data used to assess the actual impact of mitigation, but assumed that all batteries bid at the $1,000/MWh bid cap during all hours and all batteries choose the storage DEB option, which includes an estimate of intraday opportunity cost based on day-ahead prices

Stakeholders have noted that there are instances that would still warrant BCR, specifically underscoring mitigation

- DMM's additional analysis shows that, even if batteries bid at $1,000/MWh in every hour, mitigation would likely have had minimal impact on dispatch prior to the peak net load hours on critical days

- In this context, DMM does not believe that mitigation has or could have played a significant role in impacting the ability of resources supporting their day-ahead schedules

  - As such, changes to BCR rules should not be deferred or delayed until enhancements related to mitigation, such as an enhanced storage DEB, are made

California ISO

Stakeholders have noted that there are instances that would still warrant BCR, specifically underscoring mitigation

- While the current and future impact of mitigation on storage's ability to meet day-ahead schedules appears minimal given DMM's analyses, DMM underscored that some loss remains possible and, as a result, the ISO should consider additional settlement provision targeted at preventing revenue losses in this situation, such as those recommended by MSC

California ISO

The ISO conducted additional analyses to further understand the impact of mitigation, reaching similar conclusions as DMM

- In order to assess and better understand the potential impacts of mitigation, the ISO conducted further analysis focused on the amount of SOC depletion associated with mitigated dispatch in the five-minute market (i.e., Real-Time Dispatch or RTD) and the actual MW amount of day-ahead buy- and sell-back in RTD
  - RTD mitigation impacts the SOC which in turn has RTD dispatch implications for later in the day
  - This can have an impact of BCR for the revenue side in both the fifteen-minute market (FMM) and RTD
  - Since FMM results are financially binding but only operationally advisory, only RTD schedules have direct implications on future hours

California ISO

The ISO conducted additional analyses to further understand the impact of mitigation, reaching similar conclusions as DMM

- Percentage impact of RTD mitigation on BCR is estimated as:
  - $Percentage\ impact = (Extra\ MW\ dispatch\ from\ RTD$ $Mitigation\ in\ hours\ 12{-}17)\ /\ (RTD\ MW\ short\ during\ peak$ $hours\ 18{-}22)$

- BCR impact is estimated as:
  - $BCR\ impact\ \$ = (Percentage\ impact)(RTM\ BCR)$

California ISO

The ISO conducted additional analyses to further understand the impact of mitigation, reaching similar conclusions as DMM

- The extra MW dispatch is estimated as the difference between the original market dispatch (with mitigated bids) and a counterfactual dispatch using original resource bid (no mitigation)

- The counterfactual dispatch is calculated using the existing bids to determine the optimal dispatch under the original prices

- For simplicity, the counterfactual dispatch does not consider the impact on SOC binding conditions

California ISO

The ISO conducted additional analyses to further understand the impact of mitigation, reaching similar conclusions as DMM

- The ISO's analysis found that percentage impact of RTD mitigation by MW volume is small: 3% annually and up to 6.6% in the month with the highest impact

- The analysis also suggests that the overall distribution of percentage impact at the system level is low, with limited outliers

- The analysis also indicates that the portion of real-time BCR impacted by mitigation was relatively low compared to the total real-time BCR paid to storage assets in the ISO
  - According to the ISO's analysis, less than 25% of the resource-days were impact by mitigation, with only 8 resource-days having a BCR impact of $10,000 or more
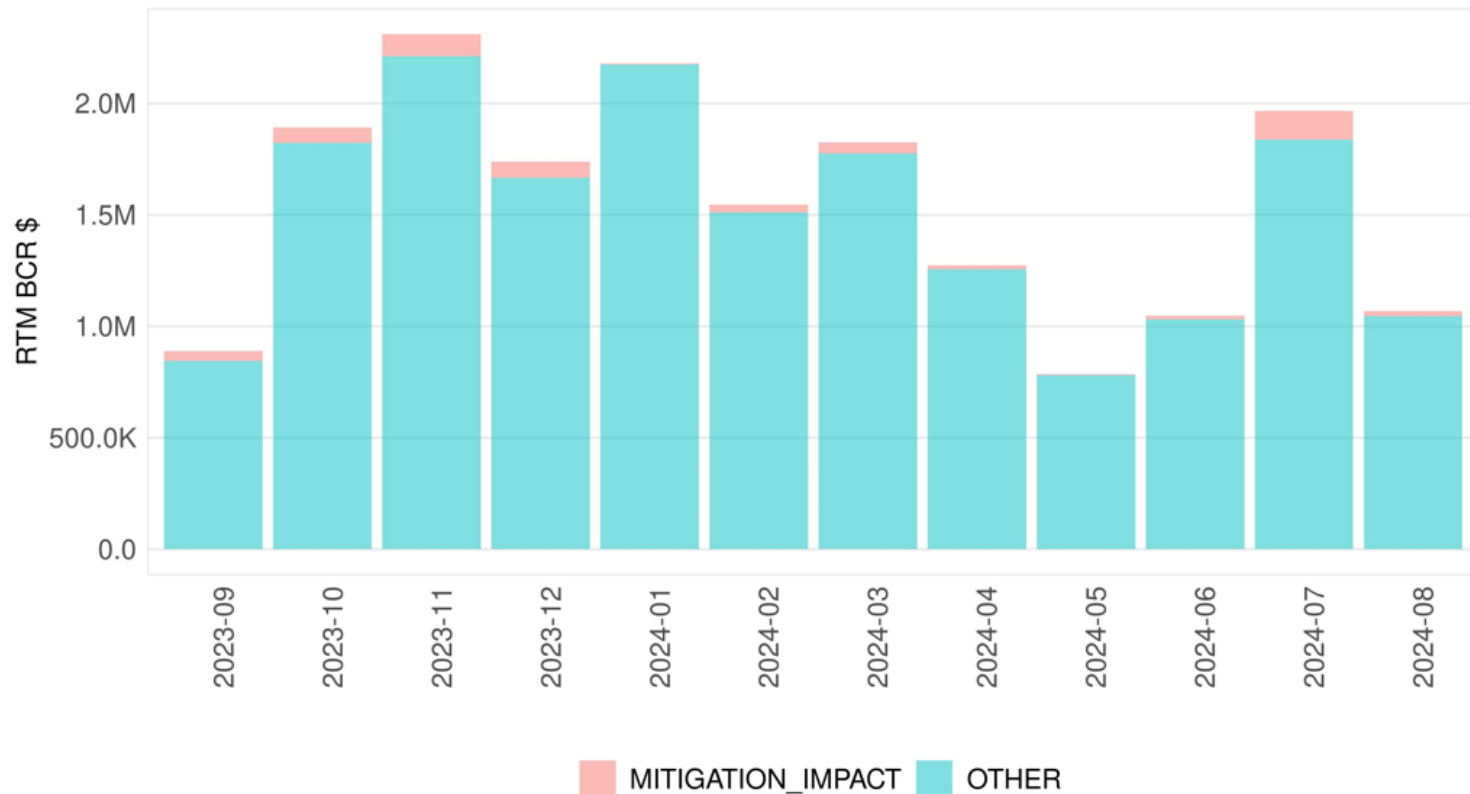
California ISO

The ISO conducted additional analyses to further understand the impact of mitigation, reaching similar conclusions as DMM

Figure 1: Impact of RTD mitigation on dispatch volume (%)
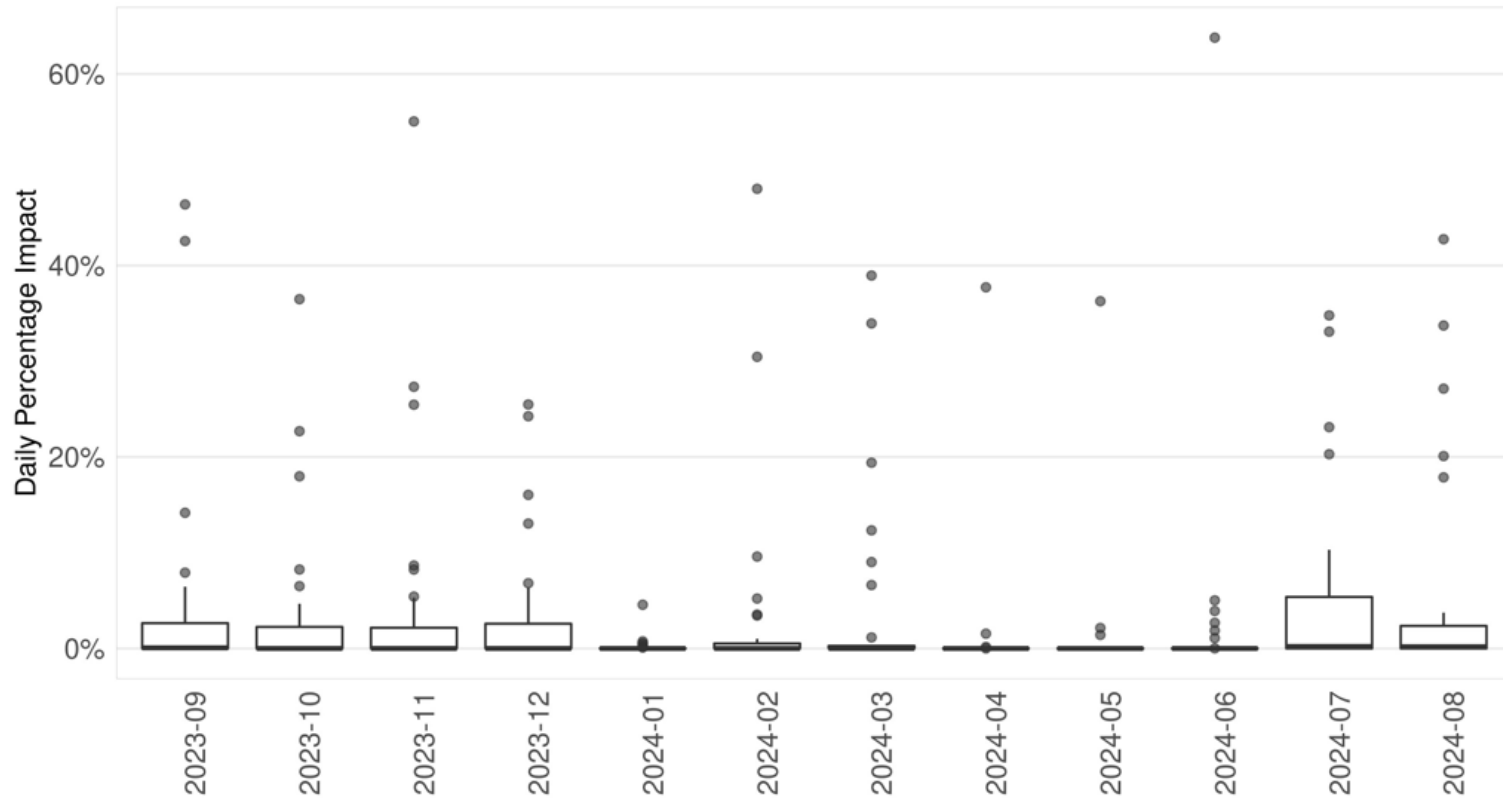
The ISO conducted additional analyses to further understand the impact of mitigation, reaching similar conclusions as DMM

Figure 2: Relative impact of RTD mitigation on real-time BCR

The ISO conducted additional analyses to further understand the impact of mitigation, reaching similar conclusions as DMM

- Given the analyses presented by DMM and the ISO, it is apparent that the current and future impact of mitigation on SOC depletion remains minimal and should not delay or complicate the implementation of a near-term solution focused on closing the gap that would allow for strategic bidding behavior to unduly inflate BCR payments

- Given the fact that outlier impacts of mitigation exist, the ISO agrees that consideration of a specific exception for instances of mitigation may be warranted as part of a holistic redesign of the uplift mechanism applicable to storage resources

Next Steps

Next steps

- Upcoming milestones:*
  - 10/21: Comments on DFP due

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

California ISO

For reference

- Visit initiative webpage for more information: https://stakeholdercenter.caiso.com/StakeholderInitiatives/storage-bid-cost-recovery-and-default-energy-bids-enhancements

- If you have any questions, please contact Brenda Marquez at ISOStakeholderaffairs@caiso.com

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By Joanne Serina

10/08/2024

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Symposium program - Oct. 30
SAFE Credit Union Convention Center
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