Comments on Storage Design and Modeling
Updated Discussion and Issue Paper on Uplift and Default Energy Bid

Department of Market Monitoring

January 8, 2026

Summary

The Department of Market Monitoring (DMM) appreciates the opportunity to comment on the *Storage Design and Modeling Uplift and Default Energy Bid Working Group Updated Discussion and Issue Paper* dated December 12, 2025.[1]

DMM supports the ISO addressing storage bid cost recovery (BCR) issues and enhancements to the storage default energy bid (DEB) as top priorities. DMM recommends the ISO prioritize incremental improvements to the storage DEB without further delay, and independent of any proposed revisions to storage BCR.

Specifically, DMM recommends that the ISO place priority on taking near term action to:

1.) Create a standardized storage DEB option for Western Energy Imbalance Market (WEIM) resources, and
2.) Implement software changes to allow the default energy bids to vary hourly.

DMM recommends the ISO fast-track these enhancements separately, while continuing to discuss storage uplift issues and further refinements to the storage DEB, such as the specific values the DEB may take on at different times of the day.

While DMM continues to support an hourly storage DEB that reflects estimated intraday opportunity cost associated with future intervals and changing real-time conditions, DMM recommends the ISO prioritize development of a simpler storage DEB that incorporates some degree of intraday variability and attempts to address dynamic market conditions.[2] This simpler approach may only result in two or three values of the DEB at different points in the day, but could be much easier to implement and would likely still be a substantial improvement over the current storage DEB.

DMM continues to recommend a default position of no BCR for storage resources, with only narrowly defined exceptions where BCR is necessary to promote efficient bidding and market outcomes of storage resources.[3] The ISO and stakeholders have not demonstrated that day-ahead (DA) BCR for storage resources is necessary to support market efficiency and therefore DMM supports eliminating BCR for storage resources in the DA.

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[1] *Storage Design and Modeling Uplift and Default Energy Bid Working Group Updated Discussion and Issue Paper,* California ISO, December 12, 2025: https://stakeholdercenter.caiso.com/InitiativeDocuments/Storage-Design-and-Modeling-Updated-Discussion-and-Issue-Paper-on-Uplift-and-Default-Energy-Bid-Dec-12-2025.pdf

[2] *Comments on Storage Design and Modeling Working Group Presentation on November 12, 2025,* Department of Market Monitoring, November 26, 2025: https://www.caiso.com/documents/dmm-comments-on-storage-design-and-modeling-nov-12-2025-working-group-presentation-nov-26-2025.pdf

[3] *Comments on Storage Design and Modeling Working Group Presentation on September 29, 2025,* Department of Market Monitoring, October 14, 2025: https://www.caiso.com/documents/dmm-comments-on-storage-design-and-modeling-sep-29-2025-working-group-presentation-oct-14-2025.pdf

One scenario in real-time (RT) where uplift may be appropriate is when storage resources are dispatched less efficiently due to local market power mitigation. Instead of continuing to have broadly applicable RT BCR for storage resources to address this situation, DMM recommends ISO and stakeholders focus on alternative compensation mechanisms to provide RT uplift to storage resources in certain instances of bid mitigation, while specifically targeting BCR or other uplift payments as appropriate for other identified scenarios.

DMM continues to support addressing the current lack of incentive for storage resources to submit accurate DA initial state-of-charge (ISOC) parameters. DMM believes this can be achieved through establishing a default of no BCR for storage resources. DMM supports requiring DA ISOC submission independent of the BCR issues. DMM continues to recommend strengthening the tariff language to better define expected use of the DA ISOC in order to promote reliability and discourage misuse of this parameter.

DMM recommends consideration of market enhancements that would enable re-optimization of ancillary services in real-time. Until those updates are in place, DMM does not support the proposals made by stakeholders to change the ancillary services state-of-charge framework.

Comments

The ISO should prioritize incremental improvements to the storage DEB

DMM has previously noted issues with the current storage DEB and has long recommended the storage DEB be refined to better incorporate real-time intraday opportunity costs.[4] In particular, since the DEB is static across all hours of the day, the DEB does not account for how intraday opportunity costs vary across the day. In addition, the utilization of day-ahead prices does not account for differences that can materialize between the day-ahead and real-time, and prohibits WEIM resources from being able to utilize the storage DEB.

While DMM continues to believe the most accurate DEB would vary hourly and dynamically reflect real-time conditions, DMM also recognizes that development of such a DEB may involve significant design and implementation complexities. Therefore, DMM recommends that the ISO and stakeholders prioritize an incremental approach to storage DEB enhancements and concentrate on the software updates required to make this approach feasible. Specifically, DMM recommends that the ISO modify the software to enable storage DEBs to vary hourly and provide an option for WEIM resources to utilize the storage DEB. While a simplified storage DEB may only have two or three different values within the day, software changes that would allow different values each hour would provide a flexible implementation that would not predetermine the number of different values within the day or the hours in which different values apply.

The ISO should place priority on creating an option that enables WEIM resources to utilize the storage DEB

WEIM resources are currently unable to utilize the storage DEB option available to resources within the CAISO simply because there are no day-ahead market prices for WEIM areas that can be used in calculating the DEB. DMM recommends the ISO create an option that leverages other price data to implement the storage DEB calculation for WEIM resources.

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[4] *Comments on Storage Design and Modeling Working Group Session 2 and 3,* Department of Market Monitoring, March 7, 2025: https://www.caiso.com/documents/dmm-comments-on-storage-design-and-modeling-working-group-sessions-2-and-3-mar-07-2025.pdf

Currently, market participants must use the negotiated DEB (NDEB) process to establish a version of the storage DEB for WEIM resources. This calculation typically utilizes default generation aggregation point (DGAP) prices, along with an hourly shaping factor multiplier that captures volatility between day-ahead and real-time. After the scaled hourly prices are calculated, the opportunity cost component is equal to the n^{th} highest hourly scaled DGAP price, similar to the storage DEB calculation available to CAISO resources. DMM recommends the ISO consider a solution similar to this approach that could allow the storage DEB calculation to be utilized by all WEIM storage resources, without the need for an NDEB.

DMM would support a simpler storage DEB that does not vary for each hour, but allows use of several different values for different periods of the day

While DMM recommends the ISO implement software changes that allow the DEB to vary hourly, DMM recognizes that hourly DEBs may be more challenging to calculate. DMM would support an incremental enhancement to the storage DEB design that allows the DEB to take on two or three values across the day, rather than 24. The purpose of implementing a software change that enables hourly variation in the DEBs is to allow flexibility in assigning values to individual hours and to support future enhancements that may calculate hourly intraday opportunity costs.

The primary objective of the variability of storage DEBs is to allow hours with the greatest intraday opportunity costs to have higher DEBs, but not to apply these higher DEBs in hours where the intraday opportunity costs are much lower—particularly during net peak hours when market conditions are tight and market power can be more easily exerted. Therefore, DMM would support a storage DEB that focuses on providing more headroom for storage resources during hours leading up to the net peak hours and less headroom during the net peak hours when intraday opportunity costs are much lower. A third value between these values might also be used to estimate opportunity costs in the remaining hours of the day when recharge opportunities are plentiful before reaching the highest priced hours of the day during the net load peak.

DMM recommends an approach that does not hard code the net peak hours and hours that tend to be those leading up to the net peak, as these hours likely change seasonally and there may be changes in long-term trends as well. DMM believes that implementing software changes that enable DEBs to vary hourly would allow for a more sophisticated mechanism that designates which hours the DEBs should provide more or less headroom, and would position the ISO to potentially adopt an hourly storage DEB design in the future.

DMM continues to recommend storage resources only be eligible for BCR under specific situations where BCR is deemed appropriate

DMM continues to recommend a bottom-up approach to BCR which assumes storage resources should not be eligible for BCR, and only adds eligibility under specific situations where deemed appropriate.[5] Therefore, DMM continues to support the ISO's proposal to eliminate DA BCR for storage resources, as the ISO and stakeholders have not demonstrated that DA BCR for storage resources is necessary to support market efficiency.

[5] *Comments on Storage Design and Modeling May 28, 2025 Presentation,* Department of Market Monitoring, June 11, 2025: https://www.caiso.com/documents/dmm-comments-on-storage-design-and-modeling-may-28-2025-presentation-jun-11-2025.pdf

DMM believes a similar approach should be taken for RT BCR, but acknowledges that bid mitigation may result in situations where it may be appropriate for storage resources to receive RT BCR. DMM recommends a targeted approach to providing uplift in this or other situations where appropriate, instead of providing RT BCR eligibility by default and seeking targeted exclusion of RT storage BCR payments.

DMM does not believe rules establishing the removal of DA BCR should be deferred until the implementation of the extended day-ahead market (EDAM) and day-ahead market enhancements (DAME). DMM does not believe that these market changes would necessitate providing DA BCR for storage resources to maintain market efficiency, particularly for EDAM. While DAME introduces new products that could potentially affect DA BCR, the ISO and stakeholders have not identified other circumstances in which DA BCR for storage resources would be necessary.

Given that the current DA BCR framework is well documented to produce unwarranted BCR payments and be susceptible to gaming, DMM continues to recommend a default position of no DA BCR for storage resources, but recommends the ISO and stakeholders work to identify situations under DAME where DA BCR payments may be necessary, developing targeted uplift approaches as appropriate. While DMM acknowledges there may be unforeseen interactions with new DAME products, the period following EDAM and DAME go-live before new storage BCR rules are implemented would allow the ISO to address those additional cases in a targeted manner before any BCR rule changes are implemented.

As DMM has previously stated, allowing storage resources to receive RT BCR for day-ahead buybacks due to insufficient state-of-charge removes their exposure to real-time prices, and fails to incentivize efficient bidding for storage resources in the real-time and can lead to inefficient market outcomes.[6] DMM continues to recommend that storage resources only be eligible for RT BCR under specific situations where deemed appropriate. DMM acknowledges that uplift may be warranted when local market power mitigation leads to inefficient dispatch of storage resources and recommends these and any other specifically identified scenarios be carved out specifically.

The working group should discuss alternatives to appropriately compensate storage resources whose dispatch was impacted by bid mitigation

The Option A approach in the issue paper follows the bottom-up approach recommended by DMM. This approach would remove eligibility for both DA and RT BCR but would create a mechanism to provide uplift to storage resources in certain scenarios where their bids were mitigated. DMM previously supported an approach like the mechanism used to compensate storage resources that are exceptionally dispatched to hold state-of-charge. The ISO indicated that applying this mechanism more broadly would impose a significant implementation burden and could make Option A less feasible.

DMM requests the ISO provide additional information about why the wider application of this mechanism would create such a substantial burden. DMM's understanding is that the counterfactual calculation is a post-production process, so it is unclear to DMM why increasing the number of counterfactual runs would impose such significant technical challenges as to significantly jeopardize the feasibility of Option A. DMM requests that the ISO provide a clearer explanation of which aspects of the compensation mechanism make broader applicability so burdensome, and allow consideration of alternative approaches that avoid the ISO's concerns.

[6] *Comments on Storage Design and Modeling Working Group Presentation on June 30, 2025,* Department of Market Monitoring, July 16, 2025: https://www.caiso.com/documents/dmm-comments-on-storage-design-and-modeling-jun-30-2025-working-group-presentation-jul-16-2025.pdf

Although Option A may require a significant implementation effort, DMM notes that Option B would also require a significant implementation effort, would introduce numerous challenging design issues, and may not address all of the scenarios where storage resources would receive unwarranted BCR. To accurately determine which intervals storage resources are bidding inefficiently would require more sophisticated DEBs, potentially more complex than the incremental improvements currently being discussed in the working group.[7] Aside from the difficulties in assessing whether the bidding behavior was efficient, DMM believes that designing a framework that systematically identifies which intervals with inefficient bidding behavior result in shortfalls in other intervals will be extremely challenging.

DMM does not see Option C (eliminating BCR and mitigation of storage resources) as a workable approach, as it would be inappropriate to eliminate mitigation of storage resources. DMM recommends the ISO prioritize discussion of a potential alternative for addressing uplift associated with local market power mitigation of storage resources to make Option A more feasible. A more easily implementable compensation approach would capture the benefits of Option A while avoiding the shortcomings of Options B and C.

DMM continues to support changes aimed at increasing the incentive for resources to submit accurate day-ahead initial state-of-charge and recommends strengthening the tariff language to better define how this parameter should be used

DMM supports the ISO's proposal to address the current lack of incentive for storage resources to submit accurate DA ISOC parameters. DMM believes this can be achieved by removing BCR eligibility for day-ahead buybacks due to insufficient SOC along with the ISO's proposal to require the submission of DA ISOC as part of DA bids. Outside of the BCR context, DMM continues to support the ISO requiring the submission of the DA ISOC parameter for reliability purposes.[8]

DMM also continues to support strengthening the tariff language to better define the expected use of DA ISOC. Specifically, DMM recommends the tariff language highlight that the parameter should be used to reflect a physical expectation of how the resource will be positioned in real-time at the beginning of the operating day, and explicitly state that it is not to be used solely for the purpose of effectuating a desired day-ahead schedule for economic purposes.

[7] Specifically, it would be imperative for DEBs to vary hourly under the Option B framework. Bidding in any hour can affect BCR eligibility in all other hours. Therefore, it would be very important for the DEBs to vary hourly to ensure resources are properly ineligible/eligible for BCR in other hours. For instance, if a DEB is too high, then resources may be bidding to charge at reasonable prices but if it's not higher than their DEB, this could trigger the resource to be ineligible for BCR in a following hour as it may appear the resource was not bidding efficiently to ensure a charging schedule.

[8] *Comments on Storage Design and Modeling Working Group Presentation on November 12, 2025,* Department of Market Monitoring, November 26, 2025: https://www.caiso.com/documents/dmm-comments-on-storage-design-and-modeling-nov-12-2025-working-group-presentation-nov-26-2025.pdf

DMM supports the ISO considering real-time optimization of ancillary services, but strongly recommends maintaining the ASSOC constraint until such a large policy initiative is taken

DMM continues to support the ISO considering enhancements to re-optimize ancillary services (AS) in real-time.[9] However, until such a policy change is implemented, DMM does not support the proposals made by stakeholders to change to the current ancillary service state-of-charge (ASSOC) framework.[10]

DMM does not support providing bid cost recovery for uneconomic dispatches due to the ASSOC constraint. Costs associated with state-of-charge management to ensure deliverability of awarded ancillary services are costs of storage resources providing ancillary services, and like other operating costs, should be borne by the resource and factored into market bids. By providing BCR for uneconomic dispatches of storage resources associated with maintaining ancillary services, storage resources do not face the full cost of their ancillary service provision. Providing BCR associated with the ASSOC constraint binding may also incentivize dependence on the constraint instead of incentivizing resources to take more efficient actions to manage state-of charge leading up to ancillary service awards.

Ensuring storage resources are properly incentivized to provide their ancillary service awards is necessary for market reliability. DMM does not believe that subjecting storage resources to AS no-pay when ancillary service awards are undeliverable is sufficient incentive for storage resources to be available for their ancillary service awards. Additional constraints and market incentives are necessary to support reliability by ensuring deliverability of awarded ancillary services.

[9] *Comments on Price Formation Enhancements: Discussion Paper and Stakeholder Recommendations,* Department of Market Monitoring, October 14, 2024: https://www.caiso.com/documents/dmm-comments-on-price-formation-enhancements-discussion-paper-oct-14-2024.pdf

[10] *Comments on Storage Design and Modeling Working Group Presentation on August 14, 2025,* Department of Market Monitoring, September 5, 2025: https://www.caiso.com/documents/dmm-comments-on-storage-design-and-modeling-aug-14-2025-working-group-presentation-sep-05-2025.pdf