

Comments on Energy Storage Enhancements Final Proposal

Department of Market Monitoring

November 15, 2022

Summary

The Department of Market Monitoring (DMM) appreciates the opportunity to comment on the *Energy Storage Enhancements – Final Proposal*.¹

DMM supports the proposed enhancements aimed at improving the availability of ancillary services awarded to energy storage resources, and the proposal to allow the CAISO to issue exceptional dispatches to energy storage resources in terms of a required state of charge. The current proposal to compensate state of charge exceptional dispatches for the opportunity cost of missed market opportunities improves upon an earlier proposed approach. DMM supports the proposal for the CAISO to consider market bids submitted for battery resources in the calculation of a counterfactual optimal dispatch for battery resources that are exceptionally dispatched to hold a specific state-of-charge.

DMM does not oppose the proposed enhancements for co-located resources, and DMM supports the CAISO's proposal to restrict the use of this new proposed functionality by resources providing regulation. However, DMM believes it would be far more efficient to reflect tax implications of grid charging in energy bids rather than by limiting the ability of resources to charge from the grid. Further, co-located storage resources that are restricted to charging from the output of co-located variable energy resources (VERs) are inherently less flexible and potentially less available in peak hours than storage resources that can charge from the grid at any amount. Therefore, it will be important that the CPUC's new slice-of-day resource adequacy framework and the CAISO's UCAP policy appropriately differentiate between the capacity contributions of the two types of storage resources.

DMM supports the CAISO's proposal to include an opportunity cost component in the day-ahead default energy bid (DEB) for energy storage resources. The explicit inclusion of opportunity costs in the day-ahead DEBs may help to preserve the consideration of opportunity costs in storage resource market awards when storage resources are mitigated in select hours of the day-ahead market, but remain unmitigated in other hours.

Finally, DMM notes that the CAISO does not address the issue of bid cost recovery (BCR) that can result from differences in state of charge between the day-ahead and real-time markets.

¹ *Energy Storage Enhancements – Final Proposal*, California ISO, October 27, 2022:
<http://www.aiso.com/InitiativeDocuments/DraftFinalProposal-EnergyStorageEnhancements.pdf>

DMM continues to recommend that in a future initiative, the CAISO re-evaluate BCR rules for storage resources to prevent unnecessary BCR payments or potential gaming of BCR rules.

Comments

I. Reliability Enhancements

DMM supports market enhancements that improve the availability of ancillary services awarded to energy storage resources

In earlier comments, DMM discussed some of the issues around availability of ancillary services procured from energy storage resources.² The CAISO has also noted that a number of issues have been identified around the ability of storage resources to provide ancillary services to the market, and the feasibility of those awards between day-ahead and real-time. To address some of these issues, the CAISO proposes two enhancements in the final proposal:

- Model the estimated impact of regulation awards on state of charge, and
- Require all ancillary service awards for storage resources to be accompanied by real-time energy bids in the opposite direction, up to 50 percent of the ancillary service award quantity.

DMM supports each of these proposed enhancements. DMM appreciates the functionality to allow hourly multipliers in the estimated impact of regulation awards on state of charge, rather than a static multiplier value for all hours of the day. However, DMM notes that the CAISO confirms in the final proposal that it does not yet have a developed approach to calculate these multipliers.³ DMM recommends the CAISO develop and codify such an approach before finalizing this market design change.

While DMM supports the proposed requirement for real-time energy bids to accompany ancillary service awards, DMM believes this proposal would be strengthened by retaining the earlier proposed requirement to have real-time energy bids accompanying 100 percent of ancillary service award quantities. The CAISO has offered no explanation for the revised proposal to only require energy bids for 50 percent of ancillary service awards. Requiring energy bids for 100 percent of ancillary service awards ensures that the market has maximum flexibility to move the resource to maintain ancillary service awards needed for reliability.

DMM does not oppose the CAISO's proposed revision to only require energy bids to accompany ancillary service awards in the real-time market. The combination of the proposed

² *Comments on Energy Storage Enhancements Working Group*, Department of Market Monitoring, August 10, 2021: <http://www.caiso.com/Documents/DMM-Comments-on-Energy-Storage-Enhancements-Working-Group-Aug-10-2021.pdf>

³ The ISO states on pg. 8 of the final proposal "At this point, a firm methodology has not been adopted for how to develop these values."

enhancements to day-ahead state of charge modeling to account for the impact of regulation awards, and the requirement for submitted real-time energy bids to accompany regulation awards, should improve the feasibility of regulation awarded to batteries in the day-ahead market.

DMM continues to support the proposed enhancements to exceptional dispatch procedures for energy storage resources

The CAISO proposes to expand exceptional dispatch functionality for energy storage resources. The proposed new functionality would allow CAISO operators to issue exceptional dispatches for energy storage resources in terms of a required state of charge rather than megawatt instructions. DMM continues to support these proposed enhancements.

DMM believes that the proposal to allow state of charge values for batteries to be issued through exceptional dispatch instructions will be a significant improvement to existing processes. Issuing exceptional dispatches to batteries as state of charge values could help prevent instructions from being infeasible and could mitigate instances of resources being forced to either discharge or charge uneconomically to meet these instructions. Issuing exceptional dispatches as state of charge values could also allow batteries more flexibility to maintain existing ancillary service awards and could provide resources more flexibility to capture additional revenue opportunities before the time at which the CAISO determines it needs the resource to be at a specific level of charge.

DMM supports CAISO's proposal to use submitted energy bids to calculate counterfactuals for compensation of opportunity cost when storage resources are exceptionally dispatched to hold state-of-charge

The CAISO proposes to compensate energy storage resources for opportunity cost of missed market opportunities when exceptionally dispatched to hold state of charge. The concept of compensating this type of opportunity cost may be appropriate, and the CAISO's approach presented in the final proposal appears to be a further improvement over approaches presented in the earlier straw proposals.

As DMM understands, the CAISO proposes to calculate an optimized charge and discharge schedule for a storage resource exceptionally dispatched to hold state of charge over the period of the exceptional dispatch, and for the remainder of the operating day. The proposed approach will use realized prices to produce two counterfactual examples with and without the exceptional dispatch. The CAISO then proposes to compensate the exceptionally dispatched resource for any profit foregone as a result of the exceptional dispatch, as indicated by the difference between the counterfactual profit calculations.

In the draft final proposal, the CAISO further improved the proposed approach by clarifying that it will only consider counterfactual dispatches when economic based on submitted bids. DMM supports this improvement. DMM appreciates the CAISO's clarification in the final proposal that the example counterfactual calculation shown in the draft final proposal and final proposal

has not been updated to reflect the consideration of energy bids, but that the CAISO does intend to consider energy bids in implementation.

II. Co-located Resource Enhancements

Tax issues and enhanced co-located resource functionality

The CAISO proposes enhancements that would limit the dispatch charging instructions of co-located storage resources to the dispatch operating target of one or more co-located VERs, and allow deviation of the storage resource when the VERs are unable to produce the forecasted amount. The proposed changes would not be available by default, but would be electable by any co-located storage resource. The CAISO proposes these changes to address stakeholder concerns that some co-located storage resources are limited in their ability to charge from the CAISO grid in order to maintain preferential tax treatment.

DMM continues to recommend that the CAISO and stakeholders develop a reasonable model for incorporating the investment tax credit (ITC) reductions into bids. This could be significantly more efficient than most co-located resources resorting to constraining themselves to never charge from the grid, and could represent a long-term solution available to all resources with such limitations now or in the future. However, the investment tax credit and property tax issues seem significant enough to discourage participation, and could even discourage investment in new storage resources, if the CAISO does not acknowledge them as costs or constraints in its dispatch instructions. Therefore, DMM does not oppose the provisions CAISO is proposing to promote resource development and allow some co-located storage resources to avoid charging from the grid. DMM strongly supports the CAISO's proposal to exclude eligibility of this functionality for resources that are providing regulation.⁴

The CAISO states that the proposed functionality will be electable on an hour-by-hour basis, and offered to any co-located storage resource to prevent grid charging. The CAISO also states that the need for this functionality is to manage contracts that expressly prohibit charging from the grid due to investment tax credits. This restriction on grid charging imposed by tax incentives does not appear to be an hourly limitation. Therefore, DMM asks the CAISO to clarify the need for this functionality to be electable on an hour by hour basis, and consider if a more static election of the functionality in Master File may be more appropriate. DMM appreciates that a static election of this functionality may limit the ability of co-located resources to provide certain market products (e.g., ancillary services). However, if the

⁴ The CAISO states in the final proposal that “[t]he premise of regulating energy is that the automatic generator control can dispatch the resource anywhere within the capacity range awarded for this service. This premise is inconsistent with limitations that could result from a resource not being fully or partially available because of output from on-site renewable generation.” DMM agrees with this statement, and further notes that the CAISO's proposed functionality could prevent the ancillary services state of charge (ASSOC) constraint from functioning as intended, when needed to manage SOC and ensure deliverability of awarded ancillary services.

restriction on grid charging is a hard constraint that accurately reflects the operational capabilities of the resource in all hours of the day, then such limitations are appropriate to ensure that market awards to the co-located storage resources are feasible.

Given CAISO's proposal to allow some co-located resources to elect to constrain themselves to never charge from the grid, it will also be important that the CPUC's new slice-of-day resource adequacy framework and the CAISO's UCAP policy appropriately differentiate between the capacity contributions of the two types of storage resources.⁵ Co-located storage resources that can never charge from the grid will be less flexible and less able to supply capacity at all critical hours than standalone storage resources that can charge from the grid. Therefore, co-located resources that are constrained to not charge from the grid should receive a lower capacity payment than storage resources that can charge from the grid. If the CPUC slice-of-day framework and the CAISO's UCAP framework can appropriately discount the capacity values of co-located storage resources that will not charge from the grid, these resources will then be able to weigh the costs and benefits of choosing to limit their ability to charge from the grid.

Pseudo-tie resources functionality

The CAISO proposes to relax the existing requirement that pseudo-tied co-located resources show firm transmission for the full generating capability of the resources from the generator interconnection to the CAISO delivery point. The CAISO then proposes to use the aggregate capability constraint (ACC) to ensure that the aggregate market dispatch of the pseudo-tied co-located resources does not exceed the interconnection limits and firm transmission associated with the project. DMM does not oppose this change, which appears to better align firm transmission requirements for co-located resources with generator interconnection limits.

III. Day-ahead DEB for energy storage resources

DMM supports the CAISO's proposal to introduce an opportunity cost component to the day-ahead DEB for storage resources

DMM supports the CAISO's proposal to introduce an opportunity cost component to the day-ahead DEB for energy storage resources. The application of market power mitigation to only a portion of a day-ahead bid set appears to change the day-ahead bids for a mitigated storage resource such that the optimization may no longer consider intraday opportunity costs. DMM agreed with the CAISO's earlier conclusion that the timeframe of the day-ahead market may be sufficient to consider intraday opportunity costs. However, DMM also noted that

⁵ CAISO estimates in the revised straw proposal that the provisions to prevent grid charging would go into place in 2023. This timeframe could extend into new resource adequacy structures that are currently under development.

explicit inclusion of opportunity costs may be needed where costs are otherwise not considered by the CAISO market optimization.⁶

The existing day-ahead DEB for storage resources does not include an opportunity cost component, based on the theory that explicit inclusion of intraday opportunity cost is not necessary when resources are optimized over a full 24-hour period. As the CAISO has noted observing in practice and as further explained in DMM's comments on the second revised straw proposal, this theory does not hold unless certain assumptions about the bid set are satisfied.⁷

The CAISO's proposed approach to including opportunity cost in the day-ahead storage DEB is likely to improve the existing day-ahead storage DEB, and to improve the ability of the day-ahead market to accurately reflect intraday opportunity costs for storage resources when mitigated. However, DMM continues to recommend that for both the day-ahead and real-time energy storage DEBs, the CAISO consider a more precise estimate of hourly opportunity cost that can reflect changing opportunity costs throughout the operating day.

IV. Additional changes

DMM continues to recommend that the CAISO consider mechanisms to prevent unnecessary BCR and potential BCR gaming opportunities

In earlier comments, DMM expressed concern that significant deviations between day-ahead and real-time state of charge values can create opportunities for potential gaming of bid cost recovery payments.⁸ The CAISO does not address this issue in the final proposal.

DMM continues to recommend that the CAISO consider mechanisms that could better align day-ahead and real-time state of charge levels, or add additional restrictions on bid cost recovery that could be related to differences between real-time state of charge and day-ahead market state of charge.

Early in the ESDER stakeholder processes, DMM recommended the CAISO consider the implications of a day-ahead submitted state of charge as a new and unique intertemporal

⁶ *Comments on Energy Storage and Distributed Energy Resources (ESDER) - Storage Default Energy Bid - Draft Final Proposal*, Department of Market Monitoring, October 9, 2020.
<http://www.caiso.com/Documents/DMMComments-ESDER4StorageDefaultEnergyBidDraftFinalProposal-Oct92020.pdf>

⁷ *Comments on Energy Storage Enhancements – Second Revised Straw Proposal*, Department of Market Monitoring, August 4, 2022:
<http://www.caiso.com/Documents/DMM-Comments-Energy-Storage-Enhancements-Second-Revised-Straw-Proposal-Aug-4-2022.pdf>

⁸ *Comments on Energy Storage Enhancements Working Group*, Department of Market Monitoring, August 10, 2021:
<http://www.caiso.com/Documents/DMM-Comments-on-Energy-Storage-Enhancements-Working-Group-Aug-10-2021.pdf>

constraint between markets.⁹ DMM recommended that the CAISO revisit this topic in future initiatives to address potential settlement implications. DMM remains concerned about potential BCR gaming opportunities related to batteries reaching state of charge limits at different intervals in real-time markets than in the day-ahead market. These issues are exacerbated by a battery having a different initial state of charge in real-time than day-ahead, but they can arise even if the initial state of charge values are identical.

In light of the significant and growing volume of battery resources in the CAISO market (and payment of BCR for these resources), DMM recommends that the CAISO consider enhancements to avoid unnecessary BCR and mitigate potential gaming opportunities related to state of charge limitations.

⁹ *Stakeholder Comments: Energy Storage and Distributed Energy Resources (ESDER) – Revised Draft Final Proposal*, Department of Market Monitoring, February 2, 2016.
<http://www.caiso.com/Documents/DMMComments-EnergyStorageDistributedEnergyResources-RevisedDraftFinalProposal.pdf>