

Memorandum

To: ISO Board of Governors

From: Benjamin F. Hobbs, Chair, ISO Market Surveillance Committee

Date: December 9, 2022

Re: **Briefing on MSC activities from October 21, 2022 to December 6, 2022**

This memorandum does not require ISO Board of Governors action.

The Market Surveillance Committee of the California ISO held two general session meeting on October 21 and November 21, 2022, respectively. As summarized below in Sections 1 and 2, the agendas of those meetings addressed several ongoing initiatives of the ISO, including energy storage enhancements, three components of the day-ahead market enhancements initiative, and Western Energy Imbalance Market (WEIM) resource sufficiency evaluation enhancements Phase 2.¹ In addition, the September 2022 heatwave event was reviewed.

As reported in the MSC's Board Memo of October 20, 2022, the Committee held a public meeting on October 17, 2022, to review a draft Opinion on the ISO's initiative on the WEIM resource sufficiency evaluation enhancements.² The Committee decided to defer adoption of the Opinion at that time due to the ISO announcing that it would delay submission of the proposal to the Board until December 2022. Since then, the Committee has posted and, on December 6, 2022, adopted a revised Opinion that addresses general issues in resource sufficiency evaluation, as well as the particulars of the ISO's revised proposal.³ The conclusions from that Opinion are summarized below (Section 3).

During the December 6, 2022 meeting, the Committee also adopted an Opinion on the ISO's energy storage enhancements initiative.⁴ The conclusions of that Opinion are summarized in the last section of this memo.⁵

¹ www.caiso.com/informed/Pages/BoardCommittees/MarketSurveillanceCommittee/Default.aspx

² <https://stakeholdercenter.caiso.com/StakeholderInitiatives/EIM-resource-sufficiency-evaluation-enhancements>

³ www.caiso.com/informed/Pages/BoardCommittees/MarketSurveillanceCommittee/Default.aspx

⁴ <https://stakeholdercenter.caiso.com/StakeholderInitiatives/Energy-storage-enhancements>

⁵ www.caiso.com/informed/Pages/BoardCommittees/MarketSurveillanceCommittee/Default.aspx

1. General Session Meeting of October 21, 2022⁶

This meeting consisted of three agenda items, each of which addressed one component of the extended day-ahead market initiative.

In the first agenda item of this meeting, Danny Johnson, Market Design Sector Manager, Market and Infrastructure Policy made a presentation on issues and possible implementations of resource sufficiency evaluation for the extended day-ahead market. He described principles for its design, which have the goal of determining if each balancing area authority has a feasible day-ahead operating plan, in terms of whether bid-in supply in the area is sufficient to meet day-ahead forecast demands and flexibility requirements. Among the issues discussed in the presentation were:

- omission of within-area congestion;
- treatment of different types of resources in the evaluation procedures;
- the proposed requirement that non-resource specific supply contracts specify a source area;
- tagging requirements for imports;
- publication of advisory results for the day following hour 24 to provide information for gas nomination decisions;
- tiered penalties for failures of the resource sufficiency evaluation; and
- coordination with the sufficiency evaluation process for the real-time energy imbalance market.

The second agenda item concerned accounting for greenhouse gas emissions in the extended day-ahead market. It included presentations by Anja Gilbert, Lead Policy Developer, Policy Development, and Dr. Scott Harvey, Member of the Committee. Ms. Gilbert described the policy as an extension of the greenhouse gas accounting rules in the WEIM, and presented four design differences for the day-ahead market, including:

- Updating the geographic boundaries in the accounting system from the balancing area authority to the relevant greenhouse gas regulation area (California or Washington State under present greenhouse gas rules);
- Accommodating multiple greenhouse gas regulation areas (Washington State and California) for bidding and dispatch. This part of the presentation included a discussion of the possibility of doubling counting of emissions in the absence of linkage of the California and Washington State regulations;
- A new counterfactual approach based on a market simulation with limited greenhouse net import transfer, for use in defining responsibility for emissions under the rules. In contrast, the WEIM uses the base schedules as the counterfactual; and

⁶ www.caiso.com/Pages/documentsbygroup.aspx?GroupID=C03EC110-FF1B-489D-9D1D-93EB1782D6F0

- Inclusion of new constraints to limit attribution of emissions to resources whose output increases compared to the counterfactual, including additional constraints proposed by some stakeholders. A focus of the discussion of the latter issue by Committee members and stakeholders was concerns that the proposed additional constraints raise for computation of the market solution due to the need to use binary variables, the possibility that prices would not support the energy and greenhouse gas schedules, and whether the effort involved would be effective in providing incentives to reduce the issues of leakage and contract shuffling.

Dr. Harvey then made his presentation on greenhouse gas accounting. He first criticized as overly restrictive the proposed rule that that no supply from balancing authority areas that are net importers in the counterfactual run could be deemed exporters to a greenhouse gas region in the market run. His argument was that some of the incremental supply to greenhouse gas regions could indeed originate from importing regions, manifested as reduced imports displaced by increased internal area generation. He stated that imposition of the proposed restriction could unnecessarily reduce import supply to greenhouse gas regions. Dr. Harvey's presentation also raised concerns about greenhouse gas constraint price formation in the present energy imbalance market accounting system, and implications for the implementation of the constraint in the extended day-ahead market.

The third agenda item addressed transmission commitment in the extended day-ahead market. In that item, a presentation was made by Partha Malvadkar, Principal, Resource Adequacy Infrastructure and Grid Enhancements, and Milos Bosanac, Regional Markets Sector Manager, Market & Infrastructure Policy. The presentation reviewed the "three bucket" proposal for making transmission available to the market, including:

- who makes it available (transmission customer for buckets 1 and 2, or transmission provider in bucket 3),
- whether it can be used in the resource sufficiency evaluation (only bucket 1 capacity is eligible), and
- what revenues owners of the transmission capacity receive (transfer revenue from the market, and, in the case of bucket 3, cost recovery)

Treatment of the ISO's balancing area transmission in this three bucket proposal was discussed, followed by a review of stakeholder comments and possible revisions that could be made in response.

Each of the presentations stimulated discussion among stakeholders, Committee members, and ISO staff.

2. General Session Meeting of November 21, 2022

This meeting included three agenda items. The first addressed the Sept. 5-8, 2022 heat wave's impacts on the ISO system, which consisted of a presentation by Guillermo Bautista Alderete,

Ph.D., Director, Market Analysis and Forecasting. He discussed the heatwave conditions, the reasons why the ISO was able to avoid any load disruption, the results of resource sufficiency evaluations in the WEIM, and contributions and performance of storage resources.

The second agenda item concerned the WEIM resource sufficiency evaluation enhancements phase 2. This agenda item began with a presentation was made by Danny Johnson, Market Design Sector Manager, Market and Infrastructure Policy. The presentation focused on the revisions made in the final proposal concerning the formulation of limits and penalties for assistance energy for balancing area authorities that fail the resource sufficiency evaluation. Penalties are now proposed to be levied after the fact, rather than included in the objective function of the real-time market software. Mr. Johnson also described the procedures to be applied for calculating quantities of energy that are subject to the penalty, giving several examples of the procedures.

In the final agenda item, Gabe Murtaugh, Storage Sector Manager at the ISO, made a presentation on the energy storage enhancements initiative. He reviewed the major components of the proposal, which are discussed further in the summary of our Opinion concerning this initiative (Section 4, *infra*).

Extensive discussion among stakeholders, Committee members, and ISO staff took place addressing each of the agenda items.

3. Opinion on phase 2 of the WEIM Resource Sufficiency Evaluation Enhancements Initiative

The Market Surveillance Committee was asked to comment on phase 2 of the proposed enhancements to the WEIM resource sufficiency evaluation process.⁷ This initiative is a continuation of the ISO's refinement of the resource sufficiency evaluation in the WEIM that began with the summer 2021 readiness initiative.⁸ As part of that initiative, a set of changes to the RSE

⁷ D. Johnson and B. Cooper, *WEIM Resource Sufficiency Evaluation Enhancements: Phase 2. Revised Final Proposal*, California ISO, November 7, 2022.

<http://www.caiso.com/InitiativeDocuments/RevisedFinalProposal-WEIMResourceSufficiencyEvaluationEnhancementsPhase2.pdf>. This version is a revision of the Final Proposal posted on September 30, 2022.

⁸ *Market Enhancements for 2021 Summer Readiness: Final Proposal*. California Independent System Operator. March 19, 2021, www.caiso.com/InitiativeDocuments/FinalProposal-MarketEnhancements-Summer2021Readiness.pdf

were approved and adopted for summer 2022 as phase 1 of this process.⁹ Phase 2 addresses several outstanding questions and issues that remained unresolved by phase 1. In a previous opinion addressing the phase 1 proposal,¹⁰ we extensively discussed the motivation for the resource sufficiency evaluation and many of the issues addressed in the September 30, 2022, version of the phase 2 final proposal. In October 2022, the Committee posted a draft Opinion which was then discussed at the October 17, 2022 public meeting of the Committee.¹¹ Adoption of the Opinion at that time was deferred due to the ISO announcing that it would delay submission of the proposal to the Board until December 2022. The ISO posted further revisions to the proposal,¹² which we addressed in a revised version of the original draft Opinion posted on December 5, 2022. The final version of the Opinion was adopted at a general session meeting of the Committee on December 6, 2022.

Below are our conclusions from the Opinion.

We support the changes to the WEIM resource sufficiency evaluation procedures being put forward in this proposal. The change to the treatment of low priority exports in the hour ahead scheduling process should help prevent inappropriate failures of the evaluation by the ISO. The addition of an emergency energy assistance option should allow for more flexibility in serving resource deficient areas during periods of true scarcity. However, because it is proposed that balancing area authorities will be able to toggle between the existing approach to penalizing evaluation failures and the newly proposed assistance penalty approach, we believe that the risk of spurious penalties under the *ex post* penalty design may cause most authorities to opt out most of the time. As a result, we anticipate that reliability and efficiency problems can still arise when a balancing area authority has opted for the status quo during a scarcity event, or when an authority has opted for the new approach but fails the resource sufficiency evaluation during a period of no scarcity. In addition, there are pricing complications with applying the penalty *ex post*.

Even with the above change, we are concerned that this dual approach will leave many parties unsatisfied. We believe that the ultimate penalty design should adopt a unified approach where

⁹ D. Johnson and B. Dean, *EIM Resource Sufficiency Evaluation Enhancements, Phase 1: Revised Draft Proposal*, CAISO, Dec. 16, 2021. www.caiso.com/InitiativeDocuments/RevisedDraftFinalProposal-EIMResourceSufficiencyEvaluationEnhancements.pdf

¹⁰ J. Bushnell, S. Harvey, and B.F. Hobbs, *Opinion on EIM Resource Sufficiency Evaluation Enhancements*, Market Surveillance Committee of the CAISO, Feb. 2, 2022, www.caiso.com/Documents/MSCFinalOpiniononEIMResourceSufficiencyEvaluationEnhancements-Phase1.pdf

¹¹ That draft Opinion is posted at www.caiso.com/Documents/MSCDraftOpiniononWEIMResourceSufficiencyEvaluationEnhancements-Phase2.pdf

¹² Johnson and Cooper, *op. cit.*

there is a graduated penalty that would apply to all WEIM transfer imports. This penalty should be based upon system conditions, such as prices from the prior fifteen-minute real-time market run, so that the severity of the evaluation failure and the size of the penalty to be applied are determined prior to when the binding fifteen minute interval is cleared. Stakeholders should also consider tiered penalties based on the degree of failure of the WEIM resource sufficiency evaluation.

The question of whether the penalty should be exclusively an *ex post* financial charge, or influence the WEIM dispatch is one that will need to be further vetted by the stakeholder community. Many who support the current proposal likely do so in recognition that it is limited by an implementation time frame targeting next summer. The move to a financial penalty was therefore a matter of practical expedience. That said, there appears to be support amongst a portion of the community for such a shift and it would be helpful for there to be more consensus of what form a penalty should take in a long-term design, for both the energy imbalance market and extended day-ahead market.

Finally, there are several additional pieces of evidence and pending developments that will almost certainly imply that the ISO and its stakeholders should take another look at the resource sufficiency evaluation process in the future. The lessons of the September 2022 heatwave are still being analyzed. Potentially important changes to the flexiramp product are pending implementation. The implementation of these flexiramp changes will provide information about the design of an uncertainty adder for the evaluation's capacity test. More importantly, an improved flexiramp could help mitigate the concerning outcomes that can potentially be produced today by the interactions of the hour-ahead scheduling process, resource sufficiency evaluation, and energy imbalance market. Last, it will be important to better understand the role of operator load conformance, both in general, and in particular during the September 2022 heatwave, in response to many of the flexiramp and hour-ahead scheduling process issues we discuss in this opinion.

Regardless of the lessons from September 2022 and the performance of the flexiramp improvements, there are several remaining aspects of the WEIM resource sufficiency evaluation that will need to be addressed. It is clear that a long-term, its implementation needs to 1) address the issue of base schedules that include hour-ahead scheduling process transactions that did not clear; and 2) develop a tiered penalty design.

4. Opinion on the Energy Storage Enhancements Proposal

The Market Surveillance Committee was asked to comment on the energy storage enhancements proposal,¹³ which concerns the market rules for short duration (typically 4 hour or less) battery-based energy storage facilities. The Committee has held public meetings addressing this initiative on May 21, Aug. 27, and Oct. 1, 2021; and Feb. 11, Sept. 19, and Sept. 26, 2022. On December 4, 2022, our draft Opinion on the proposal was posted, and the final Opinion was adopted during an MSC general session meeting on December 6, 2022.

The proposal has four components that we comment on, dealing with improving the dependability of regulation scheduled from battery storage; the ISO's exceptional dispatch capability for storage and compensation; the ability of owners of co-located storage to restrict recharging from the grid to protect investment tax credits; and the inclusion of an opportunity cost term in default energy bids to be used in the day-ahead market power mitigation process. Our major observations and conclusions from the Opinion are as follows.

4.1. State-of-charge management for storage that provides regulation. An important issue with the current design for procuring regulation services is that the consequence of failing to deliver day-ahead procured regulation in real-time is simply "no pay," rather than requiring that the resource buy back its day-ahead market schedule at the real-time price for regulation. The proposal's changes are just addressing one manifestation of the underlying problem. Therefore, we recommend that consideration be given to penalizing regulation non-performance based on the costs that the ISO would incur to replace that regulation, or the software's constraint relaxation penalty for regulation, whichever applies in a particular market situation.

The ESE proposal's recommendation of adjustments the state-of-charge balance equations in the market software to account for expected discharge and charge of energy associated with deployment of regulation-up and -down are reasonable initial approximations that should lessen the likelihood that real-time states-of-charge will reach levels that will make it infeasible to actually deploy the procured regulation. But there will always be considerable uncertainty around the expected changes in state-of-charge associated with regulation.

Because actual state-of-charge changes due to regulation deployment can deviate significantly from the average values that the ISO proposes to use in the state-of-charge adjustments, we also support the proposed requirement of minimum levels of charging bids/discharge energy offers in real-time to accompany reg-up and -down that has been procured day-ahead. This requirement is needed to ensure that state-of-charge levels can be maintained that ensure feasibility of deploying procured regulation.

Several elements of the proposal are not based on empirical analysis and may have impacts different from those envisioned by the ISO. More extensive data is needed on regulation

¹³ "Energy Storage Enhancements," Final Proposal, Market & Infrastructure Policy, California ISO, Oct. 27, 2022, www.caiso.com/InitiativeDocuments/FinalProposal-EnergyStorageEnhancements.pdf.

scheduling patterns that typically result in depleted state-of-charge, and their correlations with system conditions; these data could be used to refine the elements of the design.

4.2. Exceptional dispatch of storage resources. The first element of this part of the storage enhancements proposal is to expand the range of exceptional dispatch tools for storage to allow operators to directly specify minimum states-of-charge for storage. We believe that making this tool available is likely to improve system reliability because operators will potentially have greater assurance that needed states-of-charge will be available for critical evening peaks.

We also support the second element of this part of the proposal, which would compensate storage for exceptional dispatch by calculating foregone revenues through a two-counterfactual approach. We think that result would be improved incentives for complying with dispatch instructions. Because this is a departure from the ISO's general approach to bid cost recovery, we recommend that the performance of this approach be closely monitored for effectiveness and possible strategic behavior.

4.3 Co-located storage and variable renewable supply resources. We are disappointed that investment tax credit provisions of the present tax code that apply to some hybrid/co-located storage-renewable facilities have the potential to hobble the ISO's ability to use that storage to maximize system reliability. It is important to recognize and quantify the reduced reliability value of storage resources that cannot be grid charged at times when it is either economic, or/and or needed to maintain reliability, and to reflect the conclusions in California's resource adequacy mechanism. If the reduction is significant, consideration should be given in the future to providing economic incentives for such facilities to grid charge rather than imposing a hard constraint to prevent such charging.

4.4 Market Power Mitigation in the Day-Ahead Market. The ESE's proposal to add an opportunity cost component to default energy bids in the day-ahead market addresses an obvious potential for inefficient storage management under the present system of mitigating discharge offers on an hour-by-hour basis. In our opinion, however, the overall system of default energy bids in the day-ahead market is likely to be ineffective in addressing market power that could be exercised by storage. This is because that system does not address bids to charge and the resulting bid-offer spread, which can still be readily manipulated to economically withdraw storage from the market at times the system needs storage for economic and reliability reasons.

Given the absence of publicly available data on the frequency and magnitude of mitigation of storage market power in the day-ahead market, and the general lack of understanding of how storage can affect the efficiency and payments in the ISO markets, we cannot assess whether the revised day-ahead default energy bids in the proposal will result in local market power mitigation whose benefits to consumers will outweigh the schedule inefficiencies that might still result from mitigation.

We doubt that mitigation's benefits exceed the costs of inefficient schedules for smaller storage facilities. Although we do not have data on the frequency of mitigation for small versus larger storage facilities, it seems possible that the present 5 MW safe harbor threshold is lower than necessary.

As we noted in our previous Opinion on energy storage and distributed energy resources phase 4 initiative,¹⁴ the economically most efficient way to reflect opportunity costs arising from operations in the day-ahead market is for charge bids/discharge offers to simply exclude IFM-related opportunity cost components, and to let the day-ahead software automatically calculate those costs by considering states-of-charge, prices, and operating limits over the 24 hour horizon, with appropriate recognition of the value of stored energy in the last period. But if (i) that recommendation is not acceptable to the ISO and its stakeholders; (ii) market power for storage is a potential concern; and (iii) the ISO wants to effectively mitigate the market power, then we believe that it is essential to carefully consider the entire 24 hour profile of bids/offers and how mitigation decisions affect operations. There is not time to design such a feature in the present energy storage enhancements proposal, but it should be revisited in the near future.

¹⁴J. Bushnell, S.M. Harvey, and B.F. Hobbs "Opinion on Energy Storage and Distributed Energy Resources Phase 4, Market Surveillance Committee of the California ISO," Sept. 9, 2020, www.caiso.com/Documents/MSC-OpiniononEnergyStorageandDistributedResourcesPhase4-Sep8_2020.pdf