Memorandum

To: ISO Board of Governors

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

Date: March 20, 2023

Re: **Briefing on MSC activities January 25 to March 16, 2023**

This memorandum does not require ISO Board of Governors action.

During this period of time, the Market Surveillance Committee of the California ISO undertook the following activities.

- The Committee also adopted an Opinion on the Extended Day-Ahead Markets initiative, which was adopted in a general session MSC meeting on January 27, 2023. The Committee's Board update of January 24, 2023 summarized the draft of that Opinion, whose final version had no substantial changes.
- The Committee held a general session meeting on the day-ahead market enhancements initiative on March 10, 2023, whose discussions summarized in the rest of this memo.

General Session Meeting of March 10, 2023[1]

This meeting included addressed several elements of the day-ahead market enhancements initiative, which was originally to be considered for adoption by the Board of Governors and WEIM Governing Body in January 2023, but has been deferred until later in 2023. In this general session meeting, the MSC considered several elements of that proposal.

Deliverability Tests for Day-Ahead Imbalance Reserves and Real-Time Flexible Ramp Product

In its January 11, 2023 Final Proposal,[2] the ISO had proposed a nodal deliverability test for these two products, consistent with the present zonal design for flexiramp. The purpose of the nodal deliverability test would be to ascertain that intrazonal constraints would not prevent the products from being deployed if needed. Stakeholder concerns concerning the deliverability test led to January's deferral of consideration of the entire day-ahead market enhancements proposal.

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

[2] www.caiso.com/InitiativeDocuments/FinalProposal-Day-AheadMarketEnhancements.pdf

Subsequently, a series of three workshops was held during which alternatives to the ISO's proposal were presented and discussed by stakeholders.[3]

James Friedrich, who is Lead Policy Developer at the ISO, began the discussion with a summary of the proposal's nodal-based approach for modeling the effect of congestion on deployment of imbalance reserves. He then briefly described broad alternatives proposed by stakeholders, including a zonal approach proposed by Vistra, a hybrid approach that could make limited use of deployment scenarios, and an approach proposed by Southern California Edison that would either procure imbalance reserves in the residual unit commitment process or adjust the deployment scenarios so that only a fraction of imbalance reserves result in flows.

Mr. Friedrich's presentation stimulated extensive discussion by stakeholders and MSC members on the need for a nodal approach; on the details of calculations of requirements by the ISO's Mosaic approach; and the advantages of a preventative versus corrective approach to dealing with net load deviations from day-ahead forecasts. Jeff Nelson of Southern California Edison presented their rationale for removing imbalance reserve procurement from the integrated forward market because of the potential for deployment scenarios (which are individually unlikely) to cause congestion that would affect energy dispatch against the expected load forecast (which is much more likely to occur). An MSC member noted, however, that there is a tradeoff between the costs of redispatch in the expected scenario and the benefits of ensuring that imbalance reserves can flow in deployment scenarios. Although precisely the right balance might not be struck without extensive experience and testing, it should not be assumed that those costs always outweigh the benefits.

Dr. Scott Harvey, Member of the MSC, followed Mr. Friedrich's presentation with a detailed overview and critique of alternative proposals for the design of deliverability tests for imbalance reserves and flexiramp during the MSC meeting. This Board memo can only mention some of many important points that were made, and the reader should consult the posted presentation for full details.[4] Dr. Harvey gave an overview of 10 options for the deliverability test, some of which were variants of either zonal and nodal deliverability tests that had been previously presented by the ISO and stakeholders. He also summarized the status quo load conformance mechanism. Dr. Harvey also presented detailed summaries of his views of the advantages and disadvantages of each option.

One focus of his presentation was on potential problems with zonal designs. Examples include continued deliverability issues and inefficiently low price signals; implementation and operational complexities; and foregone benefits and potential market power in the extended day-ahead market and energy imbalance markets if zonal requirements are restricted to being met by resources within the zone.

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[3] https://stakeholdercenter.caiso.com/StakeholderInitiatives/Day-ahead-market-enhancements

[4] www.caiso.com/Documents/Day-AheadMarketEnhancementsZonalIBRDesign-Presentation-Mar10_2023.pdf

Dr. Harvey also noted a number of complexities in applying delivery tests using the nodal model, including computational time associated with full network models, especially those involving more than two deployment scenarios; the precise spatial distribution of net load uncertainty distributions within as few as two deployment scenarios, which might result in under-procurement of imbalance reserves; and under-procurement of imbalance reserves due to binding intrazonal constraints with high penalty prices. He went on to observe that the ISO's software engine had considerable flexibility that would allow the ISO to adjust the implementation of the nodal dispatch over time to address emerging issues.

Dr. Harvey also summarized advantages and disadvantages of the present apparent use by operators of load conformance to deal with existing ramp deliverability problems. Examples of disadvantages include its present use being limited to the ISO's zone; complexities involved in extending the approach to other zones; its equivalence to just a single deployment scenario; and lack of demand curves that could cause anomalous prices.

In summary, Dr. Harvey recommended implementation of a nodal approach, with the implementation flexibility the ISO has built into the nodal software engine. He stated that a nodal approach would provide better price signals for investment and operation than at present, lessening the need for less transparent and ad hoc load conformance adjustments. He does not foresee imbalance reserves as outcompeting energy for use of congested transmission, given reasonable definitions of demand curves for the product as well as adjustments to transmission penalties in the deployment scenarios. He closed by proposing several ways to proceed, each involving gaining experience with a nodal approach and modifying it to address any problems that might arise. Examples of such problems include computational times, deliverability of reserves, or zonal slack variable formulations that could cause shortages of procured imbalance reserves in some balancing areas to cascade to other areas.

Extensive discussion by stakeholders, MSC members, and ISO staff followed. An example of issues discussed included whether experience now being obtained with nodal deliverability tests for real-time flexiramp in the energy imbalance market this winter and spring will provide sufficient experience for a decision later this year on nodal versus zonal deliverability tests for day-ahead imbalance reserves. Another example is the extent of evidence for flexiramp deliverability problems in the present zonal system, such as zero prices for flexiramp when the system is stressed.

Calibrating the Demand Curve for Imbalance Reserves

Dr. Jim Bushnell, Member of the MSC, made a presentation that addressed the shape and height of the demand curves that will determine the amount of imbalance reserves to be procured, balancing the cost of procurement with the anticipated benefits. An inelastic (fixed requirement) for imbalance reserves or a curve with high penalty prices would likely result in excessive costs that are disproportionate to the incremental benefits of additional reserves. He proposed that relatively

low penalty prices be used initially to insure against unexpected implementation problems. This would also prevent purchasing very high cost imbalance reserves rather than energy. He noted that the 15 minute rampability constraint upon imbalance reserves might result in apparently less supply than actually might be the case and thus unnecessarily inflate procurement costs.

Other Day-Ahead Market Design Issues

Dr. Harvey then made a presentation summarizing several other design issues that the MSC has identified as meriting consideration in revising the day-ahead market enhancements. The three issues that Dr. Harvey highlighted in his design issues presentation included the following: the 15 minute ramp requirement for imbalance reserves, the market power mitigation design for imbalance resources, and the modeling of imbalance reserve deployments in RUC. Following that presentation, Mr. Friedrich and Dr. Harvey made presentations on congestion revenue issues arising from congestion from imbalance reserve and energy flows in the deployment scenarios.

Fifteen Minute Ramp Requirement. The current DAME design would require that all imbalance reserves scheduled in the day-ahead market be dispatchable within a 15 minute ramp period. Dr. Harvey asserted that this requirement makes sense for the flexiramp design in the 15 minute real-time market as well as for procuring capacity in the day-ahead market to provide flexiramp. However, he questioned the justification for this requirement when applied to capacity scheduled to cover load forecast uncertainty that gradually materializes over time during the operating day. Dr. Benjamin Hobbs, Chair of the MSC, presented data for March 1-9, 2023 that indicates that day-ahead net load forecast errors are highly autocorrelated for lags of 1, 2, 4, and even 8 hours, implying that there might be predictability on an hours-ahead timeframe of the direction and even size of errors. More analysis is needed to confirm whether this is actually the situation under a range of conditions.

Restricting eligibility to provide imbalance reserves to 15 minute capacity could unnecessarily increase committed capacity, costs, and prices for both imbalance reserves and energy. Significant autocorrelations could also imply that net load errors can persist for several hours, which means that battery storage would not be a good choice to meet imbalances. Dr. Harvey proposed that the imbalance reserve requirement could be met by a mixture of 15 minute rampable capacity and either 30 or 60 minute rampable capacity. The latter could be provided by introducing a 30 minute reserve product, as several other ISOs have done.

Market Power Mitigation. Dr. Harvey noted that the presence of an elastic demand curve with prices that are not too high can mitigate market power in procuring imbalance reserve capacity, although there is too little experience with demand curves combined with nodal flexiramp procurement to be fully confident in this conclusion. The possibility that a low number of balancing areas outside California might initially participate in EDAM, together with high market concentrations in those areas, could create the potential for the exercise of market power due to lack of both internal competition and competition from imports. As discussed earlier in the meeting, this risk would be much greater under some types of zonal designs.

Dr. Harvey expressed support for a backstop market power mitigation design. He observed that if a nodal design for imbalance reserves is implemented that corrects the non-deliverability problems of the present zonal flexiramp design, market power may be easier to exercise due to intrazonal constraints, and thus there would be a greater need for the application of market power mitigation at locations within a balancing area or zone.

Deliverability of Residual Unit Commitment and Other Ancillary Services. The use of deployment scenarios in a nodal deliverability assessment could enhance the deliverability of imbalance reserves. But if at the same time other ancillary services are subject to only zonal constraints, or residual unit commitment capacity deliverability considers competition for network capacity only from energy schedules, simultaneous deliverability of all three (services, committed residual capacity, and imbalance reserves) may be compromised. In particular, it is possible that implementation of nodal deliverability for imbalance reserves might create or exacerbate deliverability problems for ancillary services or committed residual capacity; this would need to be monitored and, if a serious problem, addressed.

Shortfalls in Congestion and Transfer Limit Revenues. The ISO has pointed out that if imbalance reserve costs allocated to load are calculated based on payments to generators, these charges will not recover the cost of any transmission that is used in deployment scenarios over binding transmission or transfer limit constraints. Thus, there may be a shortfall in paying congestion revenue rights on constraints that bind in the deployment scenarios. In the last topic of the March 10, 2023 MSC meeting, Mr. Friedrich and Dr. Harvey made short presentations about this potential issue.

Mr. Friedrich presented a simple three-node example illustrating how congestion induced by imbalance reserve flows can result in under-collection. He summarized the ISO's proposal to recover those shortfalls by adding their costs to the imbalance reserve uplift costs for allocation. Stakeholders suggested several possible outcomes, either that such shortfalls may be quite small if imbalance reserve congestion turns out to be minor, or that the necessary uplifts may be very large. Dr. Harvey supported the CAISO's proposal, noting that even if shortfalls are small, they might consistently occur on the same small subset of constraints and affect the same LSE or balancing area. He notes that it is not possible to determine prior to implementation whether the potential problems identified might indeed arise.