Memorandum

To: ISO Board of Governors

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

Date: January 29, 2021

Re: **Briefing on MSC activities from Nov. 11, 2020 to January 27, 2021**

This memorandum does not require Board action.

During the period covered by this memorandum, the MSC held two general session meetings.[1] The first, on November 13, 2020, addressed the ISO's initiatives on resource adequacy and system market power mitigation. The second, on December 11, 2020, included discussions of scarcity pricing principles; proposed resource adequacy requirements and unforced capacity evaluations under the ISO's resource adequacy initiative; and proposed deviation settlement for imbalance reserves and treatment of exports under the day-ahead market enhancements initiative.

General Session Meeting of November 13, 2020

The agenda of this general session meeting included two substantive items. The first was presentation of an analysis of the potential effects of the ISO's proposed system market power mitigation system upon market outcomes during the August heat wave events. The second item addressed the ISO's proposed portfolio reliability assessment, which is an important component of the ISO's resource adequacy initiative. The presentations and discussions during these agenda items are briefly summarized below.

1. Potential Effects of System Market Power Mitigation on the August, 2020 Events

This agenda item started with a presentation by Mr. Danny Johnson, Lead Market Design Policy Developer at the ISO. The presentation was coauthored by Ms. Danielle Tavel and Mr. Brad Cooper of the ISO. Mr. Johnson reviewed an ISO staff analysis of how the system market power trigger and competitive LMP would have performed during August and September, 2020. The trigger considered was the one in the ISO's revised draft final proposal, which in the real-time market makes the following requirements:

- The California ISO is in the highest priced energy imbalance market region, and
- ISO system marginal energy prices exceed the proxy peaker price (both an internal proxy peaker cost, and an external proxy peaker cost that would include amortized start-up costs)

[1] All presentation materials from MSC meetings available at: www.caiso.com/informed/Pages/BoardCommittees/MarketSurveillanceCommittee/Default.aspx

The presentation displayed the levels and ranges of the ISO prices over that two-month time period. This trigger was met in 225 fifteen-minute intervals (about 56 hours) in 28 different days, and the median ISO energy price at those times was $224/MWh. Then Mr. Johnson described how the proposed system market power mitigation approach would have been applied on August 14 and 15, 2020. Out of the 32 fifteen-minute intervals when the trigger was met in the hour-ahead market during those two days, the analysis projected that;

- mitigation would have left ISO system energy prices unchanged or slightly higher in 14 intervals, and
- mitigation would have reduced prices in 18 intervals.

Also presented was a comparison for these intervals of the following prices with actual prices at default load aggregation points:

- prices that would result if marginal cost-based offers (default energy bids) were submitted, and
- the proposed competitive locational marginal prices.

Marginal cost-based offers appeared to lower prices in many intervals, but increase them in others, while the proposed competitive price was usually lower.

These preliminary results stimulated discussion among stakeholders, staff, and the MSC concerning several issues. Some stakeholders expressed concern that if the problem is that ISO prices were too low, then mitigation might make imports to the ISO less attractive. They also stated the view that that this implies that the ISO should only implement system market power mitigation if scarcity pricing is implemented at the same time. There was discussion concerning various anomalies in the simulated results including intervals in which mitigated system prices were higher than actual prices. ISO staff noted that these results are preliminary and agreed that further analysis is needed to verify the preliminary calculations and understand the reasons for, and implications of, the various anomalies.

2. Resource Adequacy Enhancements: Portfolio Evaluation Procedures

Dr. Karl Meeusen, Senior Advisor, Infrastructure and Regulatory Policy at the ISO provided a presentation concerning the ISO's proposed approach to conducting monthly portfolio deficiency test of the shown fleet of resources. The presentation was technical, emphasizing inputs, calculation procedures, and metrics for gauging adequacy of a resource portfolio.

The Committee members provided many comments. In introducing Dr. Meeusen, Dr. Ben Hobbs, Chair of the MSC gave a brief overview of the development of resource adequacy assessment . He emphasized that the methods developed in the 1960s and still in use today to assess the adequacy of a portfolio of resources work well when the system is dominated by a large number of thermal resources whose forced outages are statistically independent, and also independent of load. In that case, adequacy can be assessed by tallying capacity (derated by forced outage rates) and comparing the total to load plus a reserve margin. But with significant amounts of demand response and variable renewables, which do not satisfy the independence assumption, more sophisticated methods are needed to account for correlations of resource availability and load, and the operation of battery storage.

In their other comments, MSC members addressed several general issues such as: whether the proposed procedure tends to be pessimistic because it doesn't consider the possibility that imports or other resources that are not under resource adequacy contracts would be available at times that contracted resources are insufficient; whether the approach can assign responsibility for deficits to load servicing entities if the system is inadequate; and the need to consider multiple years of wind data, because sample error from year-to-year is significant. There was also discussion by the MSC members, stakeholders, and staff on data inputs, the Monte Carlo sampling procedures used, and interpretation of the reliability metrics (frequency of resource shortfalls; magnitude of shortfalls as measured by unserved load). Stakeholders expressed concern about the consistency of ISO metrics with those used in integrated resource planning by the State of California, and which metric will be more stringent, and therefore might drive investment.

General Session Meeting of December 11, 2020

The agenda of this general session meeting had three substantive items: scarcity pricing; two components of the ISO's resource adequacy initiative; and two components of the ISO's day-ahead market enhancements initiative. Each item is summarized below.

1. Scarcity Pricing Principles

This agenda item began with an announcement by Mr. James Friedrich, Market Design Policy Specialist at the ISO about the start of the ISO's scarcity pricing initiative. Then MSC member Dr. Scott Harvey gave a detailed presentation on the principles of scarcity pricing, and their implementation in other North American ISO markets.[2] In the first part of his presentation, he provided a summary of the mechanics of reserve shortage pricing. He contrasted the theory of reserve shortage pricing with the evolution of prices during the August 14 shortage event. At that time, despite a Stage 2 emergency being declared, shortages of reserves sometimes were being experienced at the same time as sub-$100/MWh energy prices in several intervals of the five-minute real-time dispatch market. When asked by a stakeholder, Dr. Harvey confirmed that one issue was lack of cooptimization of reserves and energy in the ISO's real-time market.

In the second part of the presentation, Dr. Harvey summarized several trends at other US and Canadian ISOs, including:

- cooptimization of reserves and energy in real-time;
- higher and graduated penalties for shortages;
- replacement of ad hoc setting of reserve requirements by operators with explicitly modeled reserve requirements, and introduction of or increases in 30 minute reserve targets;
- consideration or implementation of locational reserve targets; and
- recognition that inflexible and lumpy demand response could suppress prices during

[2] Dr. Harvey's presentation is a useful reference work that provides extensive documentation of issues as well as potential and implemented procedures in seven other ISOs: www.caiso.com/Documents/ScarcityPricingBackgroundDiscussionHarvey-Presentation-Dec11_2020.pdf

shortage events, and implementation of procedures to ensure prices are at scarcity levels during such times.

In the third part of his talk, he reviewed the scarcity pricing mechanisms at seven other ISOs.

There was active stakeholder discussion during and after the presentation. A stakeholder suggested that out-of-market operator actions and load conformance practices might interfere with the operation of scarcity pricing, and asked how this could be prevented. Another stakeholder asked about the interaction of scarcity pricing design and capacity market designs and parameters. In response, MSC members argued that capacity markets should be designed to make up for "missing money" in the spot (energy and ancillary service) markets, not vice versa. There was also discussion of the relationship of scarcity pricing and the design of market power mitigation.

2. Resource Adequacy: Unforced Capacity Evaluations and Minimum System Requirements

This agenda item featured a presentation authored by Ms. Lauren Carr, Dr. Bridget Sparks, and Dr. Karl Meeusen of Infrastructure and Regulatory Policy at the ISO on two elements of the ISO's resource adequacy enhancements initiative. This is a continuation of an agenda item of the October 9, 2020 MSC general session meeting.

The purpose of the proposed unforced capacity evaluation procedure is to better reflect actual resource performance in assessments of individual and system resource availability. This procedure would include several enhancements, such as a focus on hours when capacity was most needed, use of seasonal availabilities, and employment of effective load carrying capabilities for variable renewable net qualifying capacities. Stakeholders asked about several issues. These included the need to understand the reasons for the apparent trend of increasing forced outage rates and the anticipated changes in the capacity substitution process. Other stakeholders supported the statement of MSC Member Dr. Harvey that suggested that resources other than just those in the showings be considered in assessments.

The minimum system requirements portion of the initiative would have the ISO set a minimum unforced capacity/net qualifying capacity requirement that all load-serving entities must meet when making resource adequacy showings. In doing so, the ISO is recommending certain technical changes, such as use of a 1-in-5 year load rather than 1-in-2 year to assess requirements. a stakeholder noted that the ISO is taking over a burden that is presently the State of California's by setting these requirements and subjecting them to approval by the Federal Energy Regulatory Commission. Stakeholders and MSC members discussed how reliability studies (such as calculations of loss of load expectation metrics) justify these requirements in California and other markets.

3. Day-Ahead Market Enhancements: Imbalance Reserve Deviations and Priority Exports

Mr. Donald Tretheway, Principal, Market Design Policy at the ISO, made a presentation that briefly summarized this initiative and then focused on two of its proposed features. The first feature concerns settlement of deviations between day-ahead procurement of imbalance reserves and real-time availability of capacity. The ISO's proposal concerning this issue has been evolving, and

Mr. Tretheway gave an overview of the latest version. He described the treatment of deviations attributable to forecasted load movement versus the uncertainty component of ramp product in both the fifteen- and five-minute real-time markets, along with no-pay provisions that apply if the range of capacity a resource offers in real-time does not support the imbalance reserves scheduled day-ahead.

The second issue concerned scheduling priority of exports from the ISO balancing area. Mr. Tretheway outlined how the ISO intends to align its scheduling priorities for exports with priorities that apply in the rest of the WECC region. He also discussed how the demand curve for imbalance reserve interacts with scheduling of exports in the day-ahead market, and the interaction of those decisions with the residual unit commitment process and priority of expert schedules in real time. During that discussion, he noted that because imbalance reserve prices would be capped by the present $247/MW/hour intercept of the demand curve for ramp product, export bids above this level could be cleared in the day-ahead market at the expense of imbalance reserve awards.