Memorandum

To: ISO Board of Governors

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

Date: July 24, 2017

Re: **Briefing on MSC activities from April 20, 2017 to July 10, 2017**

This memorandum does not require Board action.

During the period covered by this memorandum, the Market Surveillance Committee held two general session meetings, on May 5 and July 10, 2017. In addition, MSC members reviewed the draft Department of Market Monitoring quarterly report for Q1 of 2017 and consulted with staff on several initiatives. MSC members also analyzed issues concerning the effect of the load bias limiter on real-time prices in the energy imbalance market, the results of which were presented at the general session meeting of May 5, 2017.

General Session Meeting of May 5, 2017

The issues addressed at this meeting include (1) the ISO staff proposal for commitment costs and default energy bid enhancements (which was also addressed in the July 10, 2017 meeting); (2) MSC analyses of price formation in real-time markets and incentives for flexible capacity; (3) phase 2 of the flexible resource adequacy capacity must offer obligation initiative; and (4) the generator contingency and remedial action scheme modeling initiative.

***1. Commitment Costs and Default Bid Enhancements*.** Cathleen Colbert, Senior Market Design Policy Developer, briefed the Market Surveillance Committee on commitment costs and default bid enhancements. Her presentation presented a comprehensive overview of the principles, issues, and potential changes that could be made. As she explained, the proposed enhancements are motivated by the need for greater flexibility in bidding that is needed in a system with a large and growing share of variable renewables, while at the same time ensuring that local market power could not be exploited. Ms. Colbert reviewed experience at other ISOs with rules concerning limits and market power mitigation of commitment costs. Since her previous presentation at the November 18, 2016, the ISO staff had developed tentative positions on the general design principles that should be the basis of the design of those enhancements. Based on those principles, she outlined several alternatives for (1) hourly rather than daily bidding of commitment cost components; and (2) categories of costs that should be considered in defining caps on commitment cost bids.

During the subsequent discussion, MSC members explored the nature and size of fuel cost risks faced by bidders, and issues involved in including them in cost-based caps. One such issue concerns the risk associated with being scheduled in the day-ahead market, and then being dispatched down in real-time, so that gas has to be sold back at a loss in the gas imbalance market.

2. MSC Presentations on Real-Time Revenues for Flexible Capacity. The first substantive topics of this meeting concerned the general issue of how to incentivize flexible bidding in the ISO markets, while the third concerned the economic incentives for procurement of flexible capacity in the resource adequacy. To inform discussion of the factors impacting the incentive to contract for flexible capacity, MSC members presented discussions of real-time price formation in the ISO markets and returns to flexible capacity.

The major focus of the MSC members' discussions was the possible effects of the load bias limiter. All ISOs, including the CAISO, allow operators to use "load bias"-type adjustments to load in market models to better reflect actual conditions. As explained in Section 4.2 of the 2016 Market Issues and Performance report by the CAISO Department of Market Monitoring (DMM)[1] the load bias limiter procedure was implemented in 2012. There are concerns that the use of the limiter might at times suppress valid scarcity price signals. The CAISO has been considering changes in the limiter process.

Dr. Scott Harvey, member of the MSC made a presentation about the possible effects of the load bias limiter on price formation in the 15 minute and 5 minute markets of the energy imbalance markets. He explained how the limiter works, and summarized Department of Market Monitoring data on the frequency of load adjustments and price impacts in non-CAISO balancing areas in the energy imbalance market. He discussed issues concerning the impact of the load bias limiter on gross margins earned by flexible capacity. He then posed questions about the functioning of the market for flexible ramping capacity, and whether low prices during late afternoon periods were appropriately reflective of system conditions during the evening ramp.

Dr. Ben Hobbs, Chair of the MSC, then presented an oral summary of analyses of the impacts of that limiter on 5 minute market prices in the CAISO balancing area for the last three months of 2016, finding a significant impact. This analysis was a complement to the Department of Market Monitoring analyses of price impacts in the non-CAISO balancing areas of the imbalance market. Using Department of Market Monitoring data, Dr. Hobbs concluded that the limiter had the effect of lowering average 5 minute prices in the CAISO balancing area by $5/MWh over all intervals during the fourth quarter of 2016. Since the load balance limiter only triggers in intervals in which the California ISO dispatch is ramp constrained, Dr. Hobbs analysis indicates that the load balance limiter on average reduced 5 minute prices by several hundred dollars during the intervals in which flexible capacity was most needed to balance load

[1] Available from www.caiso.com/market/Pages/MarketMonitoring/MarketIssuesPerfomanceReports/Default.aspx

and generation. In contrast, the load balance limiter had no significant impact upon 15 minute prices in the ISO balancing area. His analysis is documented in a memo subsequently posted on the MSC website.[2]

Subsequent discussions by stakeholders, ISO staff, and Department of Market Monitoring staff addressed the need for, and impacts of, load biasing by operators and the load bias limiter, and the on-going ISO review of the load bias limiter procedure.

3. Flexible Resource Adequacy Capacity Must Offer Obligation Phase 2. Karl Meeusen, Ph.D., Senior Advisor Infrastructure & Regulatory Policy briefed the Market Surveillance Committee on flexible resource adequacy capacity must offer obligation phase 2. He emphasized the reduced scope of the present initiative, relative to the supplemental issue paper of Nov. 8, 2016, to a focus on short-term enhancements. As Dr. Meeusen explained, the short-term enhancements are intended to ensure that capacity that qualifies for designation by the ISO as flexible capacity can provide the fast start and/or rampability that will lessen the need for renewable energy curtailment. The ISO proposal is that all designated capacity needs to be able to start up within 4.5 hours, and have a minimum run time of less than that duration. Dr. Meeusen stated that the purpose of such a requirement would be to increase the amount of capacity the ISO would be able to commit and decommit within that timeframe in the real-time market.

Dr. Meeusen indicated that this is a short-term measure that can be implemented quickly to affect the characteristics of designated flexible capacity. He stated that the ISO will be addressing longer-term issues concerning market incentives to operate, maintain and invest in flexible resources in a subsequent initiative. Dr. Meeusen said that consideration of these issues have been deferred for now because of their complexity and lack of stakeholder consensus on their resolution

4. Generator Contingency and Remedial Action Scheme Modeling. Perry Servedio, Senior Market Design & Policy Developer, briefed the Market Surveillance Committee on generator contingency and remedial action scheme modeling. His presentation included descriptions of how the remedial action scheme works, how accounting for it within the energy market could affect prices in both the day-ahead and real-time markets, and two alternatives for the modeling of remedial action schemes in the congestion revenue rights market.

Mr. Servedio explained that the implementation of remedial action scheme modeling in the energy markets could contribute to revenue inadequacy problems, in which congestion revenues are less than payouts to congestion revenue rights holders, if these schemes are not accounted for in the CRR allocation and auction processes. One alternative he outlined for taking account of these schemes would modify the congestion revenue rights allocation and auction process to reflect the same remedial action scheme constraints as the energy market. The other alternative he described would withdraw an amount of rights from the allocation and auction process based on historical data on the maximum amount of transmission that would

[2]www.caiso.com/Documents/
Analysis_SelectedEffects_LoadBiasLimiter_CAISO_EIMpricesOctDec2016-Memo-May2017.pdf

have had to been reserved on each constraint as a result of remedial action schemes. The latter approach was explained by Mr. with examples that Mr. Servedio discussed with the MSC and attending stakeholders. Possible equity issues in terms of impacts on various market participants were discussed.

General Session Meeting of July 10, 2017

Two of the three substantive agenda items of this meeting addressed recent developments concerning initiatives that were on the May 5, 2017 meeting agenda, discussed above: commitment cost and default energy bid enhancements (the first agenda item), and incorporation of generator remedial action schemes in the ISO energy and congestion revenue rights markets (the third item). The other substantive item, which was the second agenda item, was a report on the results of the most recent analyses by the ISO of the performance of the proposed contingency modeling enhancements.

***1. Commitment Costs and Default Bid Enhancements*.** Ms. Colbert presented a briefing updating the MSC on the evolution of the enhancements proposal since the previous MSC meeting. She indicated that the ISO staff's straw proposal favors revision of the present system to allow market-based offers for minimum load costs, start-up costs, and combined cycle transition costs, subject to mitigation based on a local market power mitigation test whose details are to be defined in the near future. Minimum load bids will also be allowed to be changed hourly, rather than be constant for the entire day. According to the straw proposal, a negotiated cost option is also to be introduced for commitment proxy costs.

Ms. Colbert then asked for MSC and stakeholder discussion of the following issues:

- The effectiveness of the straw proposal in allowing sufficient flexibility to reflect suppliers' cost expectations in market.
- The effectiveness of the straw proposal to reflect fuel availability constraints in market.
- Pros and cons of restricting reference levels to estimates based on next day indices or same day trades on ICE.
- Pros and cons of reflecting scarcity when gas companies issuing flow orders.

Following Ms. Colbert's presentation, MSC Chairman Hobbs made a presentation reviewing the MSC opinions and analyses from 2007-2017 that have addressed commitment costs and market power mitigation. He outlined the principles that the MSC has advocated, among them being:

- Dynamic market power tests so that commitment costs are mitigated only when there is a risk of market power being exercised.
- Inclusive definitions of commitment costs, including opportunity costs arising from start-up and run-hour limitations.
- Flexibility for commitment cost offers to respond to rapidly changing fuel price

conditions.

A particular challenge noted in a previous MSC opinion is the application of mitigation in the energy imbalance market in non-CAISO balancing areas. This is because participation in the markets is not subjective to a must offer obligation and reliable gas cost indices are less available.

Concluding this part of the agenda was a presentation by Dr. Harvey of the MSC, in which he summarized three alternative approaches to reducing the adverse impact from the incorrect application of commitment cost mitigation. These include:

1. More accurate measurement of commitment costs,
2. Limiting application of the local market power test for commitment costs to constraints that are generated in the iterative transmission feasibility checks used in the market software, since constraints that are not generated could not have forced the commitment of a generating unit.
3. Limiting the ex ante application of commitment cost mitigation to when a transmission constraint binds in the energy dispatch, and then applying commitment cost mitigation to the calculation of uplift only after the fact.

These proposals were then discussed by the MSC members, ISO staff, and attending stakeholders.

2. Contingency Modeling Enhancements. This agenda item involved review of results by Mr. Servedio of market simulations of the effect of explicit inclusion in the market operations software of reactive (post-contingency) actions to manage certain crucial transmission contingencies in the ISO network, as opposed to managing those contingencies using constraints that require a certain amount of capacity to be on-line within the ISO's zones. The stated objective of the proposed constraints, according to the ISO's proposal, is to minimize the cost of returning the ISO's system to a secure operating point within 20 minutes.

Mr. Servedio summarized the results of market simulations of the price and other impacts of the contingency constraint for twelve days that were chosen to represent high stress conditions. Only on one simulated day did the new constraint bind, although it is possible that it still affected the commitment of generators. The stakeholders, ISO staff, and MSC members discussed the significance of these results. The MSC looks forward to receiving information on the system costs of using the contingency constraint rather than the minimum on-line constraint which the system operators now use to ensure compliance with the particular post-contingency requirements of concern. The MSC is planning to write an opinion on the contingency modeling enhancements for consideration by the Board at an appropriate time.

3. Generator Contingency and Remedial Action Scheme Modeling. The third agenda item was introduced by Mr. Servedio. His presentation started by summarizing the

extension of the modeling scheme to represent remedial action schemes that involve transmission switching or load shedding, as well as automatic generator tripping. He then discussed an example that illustrated the possible interactions of virtual bidding and modeling of remedial action schemes.

The next topic covered in Mr. Servedio's presentation was a proposal for how to make certain calculations in the monthly congestion revenue rights market concerning the operation of the remedial action scheme model. In particular, the issue described by Mr. Servedio is that the generation distribution factors (used by the scheme to model the sources of make-up generation when a remedial action trips a generator) vary by hour in the scheme, but only a single value can be used for the entire month in the congestion revenue rights auction. Based on a stakeholder proposal, the ISO is recommending that the distribution factors used in the auction be based on the average of the generation distribution factors over the month. Mr. Servedio summarized calculations that showed that the resulting error from using a single average value for the entire month is inconsequential, in terms of contributing to revenue inadequacy of the congestion revenue rights system.