Memorandum

To: ISO Board of Governors

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

Date: December 10, 2014

Re: Briefing on MSC Activities from October 26, 2014 to December 7, 2014

This memorandum does not require Board action.

1. Overview

Over the time period covered by this memorandum, members of the Market Surveillance Committee (MSC) have interacted informally with staff and stakeholders on several ISO initiatives, including the following:

- The Load Granularity Refinements Study that the Federal Energy Regulatory Commission has requested that the ISO submit by June, 2015. The previous chair of the MSC, Dr. Frank Wolak, conducted the previous statistical study of the relationships of locational marginal prices to load aggregation point (LAP) prices,[1] and MSC members are advising ISO staff on updating and expansion of that analysis.
- The Energy Imbalance Market.
- The Flexible Ramping Product design.
- The Pricing Enhancements initiative, which is discussed in the next section.

The Load Granularity Refinements Study and Energy Imbalance Market will be discussed further by the full MSC at the general session meeting to be held at Folsom on December 16, 2014. In addition, the general session meeting agenda will include discussion of future needs for flexible resources in the ISO system and the ISO's Flexible ramping product requirement initiative.

2. **Pricing Enhancements Initiative**

The MSC has not been asked to issue a formal opinion on this initiative. However, the

[1] Frank Wolak, Comments on Load Granularity, Meeting of the Market Surveillance Committee, California ISO, http://www.caiso.com/Documents/CommentsonLoadGranularity-MSCPresentation.pdf. See also Frank Wolak, Measuring the Benefits of Greater Price Granularity, *American Economic Review: Papers & Proceedings* 2011, Vol. 101:3, 247–252, http://web.stanford.edu/group/fwolak/cgi-bin/sites/default/files/files/benefits_of_spatial_granularity_aer_wolak.pdf

MSC has informally reviewed the draft final proposal[2] and I summarize several general comments that members have made. The responsibility for any errors or opinions in this summary are mine, since the MSC members have not formally considered or voted on these comments as part of a formal opinion process.

There are four components of the pricing enhancements initiative. These include:

1. the administrative pricing initiative when normal market procedures are suspended;
2. priority for schedules protected with existing transmission rights;
3. minimizing the impact of compounded pricing of multiple contingencies; and
4. elimination of multiple prices which occur when a market solution is mathematically degenerate.

The MSC does not have any concerns to report on the second and third initiatives, and I believe that those initiatives represent reasonable approaches to the solution of the problems they are intended to address.

Administrative Pricing. Regarding the first component, the administrative pricing initiative is an attempt to balance the objectives of clarity, simplicity, and predictability with the need to provide incentives for resources to supply the energy needed by the ISO system during periods when the market is suspended. MSC members are supportive of many aspects of this proposal, and have concerns about other parts of it.

Concerning the proposed procedure in the case that day-ahead prices are unavailable, there are the following general comments.

- When day-ahead prices and schedules are not available by 18:00 hours, we understand that the ISO will be revising their proposal to allow the ISO to either (1) announce that day-ahead prices and schedules will be posted late, perhaps while simultaneously taking steps to commit long-start units or otherwise inform generators of schedules so that they can secure fuel; (2) use the previous day's day-ahead prices and schedules to settle the day-ahead market; or (3) to not use any day-ahead market schedules and settle the market using real-time (fifteen minute) prices and schedules, whichever is judged to be most appropriate in a given circumstance (p. 12 of the draft final proposal). The original proposal only included items (2) and (3). Although some stakeholders expressed concern that this is giving too much discretion to the ISO and will result in more uncertainty, members of the MSC support the ISO position that it is undesirable and indeed not possible to explicitly define ahead of time the exact circumstances under which each would be used. Members of the MSC believe that this discretion is needed so that ISO can post prices that are most reflective of market conditions.

[2] *Pricing Enhancements, Draft Final Proposal,* California ISO, Oct. 30, 2014,http://www.caiso.com/Documents/DraftFinalProposal_PricingEnhancements.pdf

- However, we would prefer that the ISO should be given more discretion than in the proposal to define administrative day-ahead prices that best reflect market conditions. In general, giving the option to operators to choose to use the best available prices is valuable. This is recognized in other ISOs where such discretion is available. PJM, for instance, allows posting until at least 23:59 PM.

- The addition of option (1) (described in the previous paragraph), in our opinion, provides some of this needed flexibility. We believe that it is highly preferable to use such discretion to avoid option (2) described above, which is the imposition of day-ahead schedules upon market parties based upon previous days' results, especially upon market parties whose day-to-day physical availability can vary greatly (as for renewables) or cannot be verified (such as importers, whose day-ahead transactions are financial only). The imposition of such schedules without consideration of physical availability or bids increases risk to those parties, and can be viewed as unfair. Although this risk is very small, as the MRTU system has yet to fail to produce day-ahead prices, we would prefer that the ISO have a policy of only imposing previous days' schedules as a last resort.

- We support the proposed change relative to the final draft proposal that addresses the settlement of congestion revenue rights when day-ahead prices are not available but real-time prices are used to settle all energy transactions. We understand that the ISO will propose that those rights, which normally are settled using day-ahead prices, will instead be settled using the average (over the hour) of the fifteen minute real-time prices. We believe that this will be more effective in providing the hedge against congestion costs that is the intention of the congestion revenue rights system.

Regarding the real-time market, the proposed procedures to substitute fifteen minute prices for unavailable 5 minute prices, or to substitute recent 5 or 15 minute prices for prices that are missing in periods soon after are reasonable. However, we see a potential problem when real-time prices are missing for more intervals and these procedures cannot be used (addressed in Tier II, circumstance (b) and Tier III on pages 15-18 of the draft final proposal).

In particular, the proposal advocates use of day-ahead prices, if available, in those circumstances, with the possible use of previous days' real-time prices in some cases under Tier II(b). Arguments in favor of using day-ahead prices include simplicity of calculation and settlements, and that these events will hopefully continue to be very rare.

However, we are concerned that if system conditions are very different in real-time relative to day-ahead, then this use of day-ahead prices would result in inadequate incentive for within-ISO and importing resources to provide the imbalance energy needed by the ISO. Further, there would, in effect, be no consequence to a market party if it does not follow its day-ahead schedules except to forfeit the day-ahead revenue. The ISO in those instances could then turn to out-of-market transactions to secure needed supply (essentially, pay-as-bid transactions), but we are concerned that the lack of transparency of such transactions and the application of (probably too low) day-ahead prices to most imbalances may discourage non-ISO resources from providing that supply. A counter-argument to this concern is that the tariff compels internal resources to follow operational instructions, and that emergency support agreements with neighboring balancing authorities will ensure delivery of exports to the CAISO that are under their control. However, we note that exports to the CAISO that originate in non-neighboring balancing areas would not have this assurance of delivery.

Our general concern with this portion of the proposal is that the ISO is not leaving itself sufficient flexibility to deal with extreme circumstances, where real-time prices (and even offers) would vary substantially from day-ahead. It is precisely those circumstances where market participants could find it profitable to disregard their day-ahead commitments and underperform in the ISO market. Under the ISO's proposal, they would face little or no penalty for doing so under these circumstances.

However, MSC members do not advocate use of a pre-specified, fixed premium on day-ahead prices in such a circumstance, which was another option considered by the ISO. We agree with the ISO that such a premium might be inconsistent with real-time conditions and create additional challenges for ISO operators during difficult conditions. Rather, some members suggest that the operator should have discretion to calculate real-time prices that best approximate actual conditions, for instance, gas prices, load changes, or supply availability that are appreciably different than day-ahead, especially if there is a risk of inadequate real-time supply.

Multiple Prices. The fourth component of the pricing enhancements proposal makes a change to the ISO's market scheduling and pricing software in an attempt to eliminate the situation in which more than one set of prices are mathematically consistent with the market schedule. This is a mathematical condition called degeneracy. There are two sets of comments.

First, I have reconstructed the mathematical solution and verified independently the examples in the draft proposal. The draft proposal did not explicitly present the mathematics of the proposed procedure to eliminate degeneracy because of intellectual property concerns. However, general versions of such procedures have been well-known in the applied mathematics community since the 1960s, and it was straight-forward to reconstruct what is being proposed in this particular case. Using my own computer implementation, I verified that for the particular situation of concern in the draft proposal (the existence of multiple alternative prices on an intertie when zero power is flowing in a particular direction, p. 32) that the procedure works as described and furthermore does not affect the amount paid to or by any party, as long as the schedule is zero MW.

However, I have not been able to verify whether the proposed procedure would similarly have no effects on settlements when degeneracy occurs on constraints within the ISO system. Since the proposed solution is being proposed for application to all system constraints, it is possible that it would have settlement implications for some market parties, in which different possible prices would result in different total payments to or from specific parties.

Second, it would be preferable for the precise mathematical formulation to be public information for two reasons. First, this general type of approach to resolve degeneracy and derive unique prices has been generally known since the 1960s, although this may be the first application in electric market software. Second, this should not be viewed as a small technical change since the procedure's choice of one set of prices over another could in some cases affect settlements. The potential effects upon market participants would be best explored in public documents.

Of course, the present system also lacks the desired transparency, in that alternative prices for the same schedule are now possible, and it is not clear when this happens or which market parties are affected. This, however, should not be an argument against being clear on what the proposed market changes will be, and how market parties might be affected.