

Memorandum

To: ISO Board of Governors
From: Eric Hildebrandt, Director, Market Monitoring
Date: March 15, 2012
Re: **Market Monitoring Report**

This memorandum does not require Board action.

EXECUTIVE SUMMARY

This memo provides comments by the Department of Market Monitoring on Management proposals being presented to the Board on two issues:

- **Pay for performance regulation.** Management is proposing to modify the current regulation market design to incorporate changes required to comply with FERC Order 755 issued in October 2011. These changes include separate pricing for regulation capacity and the actual usage of this capacity or *mileage*. DMM is supportive of the proposed approach as the best option for complying with this FERC requirement. While there are some uncertainties associated with this new market design, DMM believes the potential risks are limited given current market conditions and can be effectively mitigated if necessary through software or market rule refinements. As with all significant market design changes, the ISO will need to monitor market performance after implementation and be prepared to modify software or market rules as appropriate.
- **Circular scheduling settlement rules.** This initiative was undertaken by the ISO in response to requests from some market participants to clarify market rules relating to circular schedules. Management's proposal establishes objective criteria for identifying circular schedules created by a single market participant and establishes a settlement rule to make such scheduling unprofitable. In response to concerns by some stakeholders, Management decided not to extend this settlement rule to circular schedules created by chains of transactions by multiple market participants. Instead, Management proposes to monitor the volume and operational impact of such schedules and consider extending the market rule to such schedules based on these findings. DMM is supportive of this approach, but cautions that circular schedules created by multiple participants could increase as a result of the fact that the ISO is clarifying that such

scheduling is acceptable. Thus, the ISO should be prepared to monitor any increase in such schedules and to assess the actual impact of these schedules on loop flows and congestion costs.

PAY FOR PERFORMANCE REGULATION

Management is requesting Board approval to modify the current regulation market design to incorporate changes required to comply with FERC Order 755 issued in October 2011. Currently, participants in the regulation market submit bids for capacity only and resources with awarded bids are compensated based on the market clearing price for this capacity. To comply with FERC Order 755, the regulation market will be modified to include payment for capacity providing regulation plus a separate *mileage* payment for the performance of the resource in response to a regulation signal. This market design is referred to as *pay for performance* regulation.

Design modifications to comply with this FERC order have evolved substantially through the stakeholder process. A range of different options were identified and vetted by ISO and DMM staff, stakeholders and members of the Market Surveillance Committee. The final proposal incorporates an approach that was specifically developed to address the concerns identified in this process, while still meeting the requirements in FERC Order 755. DMM supports Management's proposal as the best option for complying with Order 755.

The MSC's opinion on Management's proposal notes that there are several fundamental uncertainties about the effect of this proposal once it is implemented. These uncertainties ultimately arise from the combination of two factors:

- Order 755 requires separate bids, market clearing prices and compensation for two attributes of regulation service (capacity and mileage). However, regulation capacity is dispatched by the ISO without regard to the actual mileage cost incurred when each resource is utilized.
- Regulation capacity and potential mileage must still be procured jointly from each resource in the auction for regulation service. Thus, the market software must ultimately make some assumption about the amount of mileage that will be utilized from each resource when evaluating the overall cost of the resource given its bids for capacity and mileage. In practice, the actual mileage for which a regulation resource is compensated is likely to often differ substantially from the mileage that is assumed in the regulation market clearing.¹

¹ Actual usage and performance of resources providing regulation capacity is governed by the control rules embodied in the automated generation control system and response to unexpected very short-term deviations in the supply-demand balance. Because regulation is designed in part to cover unexpected events, the exact usage of this service is impossible to precisely anticipate in advance.

As described in the MSC opinion, the divergence between actual and assumed mileage of resources potentially creates some market inefficiencies. The MSC opinion also provides a detailed description of a specific bidding strategy that could theoretically be employed by very fast ramping resources to receive additional compensation through bid cost recovery payments. Consequently, the MSC recommends that the ISO closely monitor market performance and bidding after implementation, and be prepared to adjust the parameters of the regulation payment mechanism quickly if problems arise.

DMM agrees that the issues highlighted by the MSC warrant monitoring and potential mitigation if any significant inefficiencies are observed. In the short run, DMM believes that the potential for these issues to materialize is very limited due to several factors:

- Currently, the market for regulation is highly competitive due to a large amount of overall supply relative to requirements. In addition, a large portion of this supply is owned or under the control of regulated load serving entities. DMM believes that in the near future it is likely that competition from these existing resources will ensure that regulation capacity prices continue to be low or even lower under the pay for performance market design. DMM expects this competition will have a similar impact on keeping prices for the new mileage product relatively low, thereby limiting the potential for the scenario outlined in the MSC opinion. Over the longer term, this may change if the supply of regulation decreases due to retirement of existing gas fired capacity and the demand for regulation increases due to increased reliance on intermittent renewable energy sources.
- In practice, there are currently few if any very fast ramping resources providing regulation that may seek to employ a bidding strategy aimed at increasing bid cost recovery payments. Fast ramping resources providing regulation in the current market are typically hydro resources – all of which are owned by the regulated load serving entities. DMM believes that participation by substantial amounts of new merchant resources capable of providing very fast ramping regulation – such as battery storage or flywheels – may only occur over a much longer time horizon.

Over the medium term, DMM believes that modifying the algorithm used to dispatch regulation capacity to dispatch regulation energy in economic merit order based on each resource's mileage bids, represents another option that may significantly increase the efficiency of the regulation market and mitigate the undesirable bidding strategies highlighted in the MSC opinion.² With this approach, the cost actually paid to each unit for

² The potential benefits of introducing merit-order dispatch of regulation energy that reflects the mileage bid costs of regulation resources is also acknowledged in the MSC Final Opinion, item number 6 on page 12, at <http://www.caiso.com/Documents/MSCFinalOpinion-Pay-for-PerformanceRegulation.pdf>.

mileage would be used to prioritize resources dispatched for regulation energy. This would decrease the degree to which units with high costs were dispatched for regulation, as well as decreasing the incentive for fast ramping units to submit very high mileage bids in excess of their actual costs.

The MSC's opinion on this proposal notes four other options for mitigating the potential inefficiencies outlined in their opinion should these problems be observed in the market.

- There are two ways in which specific parameters of the bid evaluation algorithm that impact the weight of each resource's mileage bids and the amount of capacity awarded can be adjusted to more accurately reflect the actual mileage of each resource.³ DMM has considered both of these alternatives and feels the potential issues identified in the MSC opinion are more directly addressed by the composition and competitive pool of supply and by modifying the algorithm used to dispatch regulation energy to consider the mileage bid of each resource.
- Two other options for mitigating the bidding scenario described in the MSC opinion would involve more direct limitations on mileage bids or bid cost recovery associated with high mileage bids and dispatches mileage bids.⁴ However, as acknowledged in the MSC opinion, both these approaches may introduce other market inefficiencies. Thus, DMM does not recommend pursuing these mitigation options at this time.

In conclusion, DMM is supportive of the proposed approach as the best option for complying with FERC Order 755. While there are some uncertainties associated with this new market design, DMM believes the potential risks are limited given current market conditions and can be effectively mitigated through software refinements. As with all significant market design changes, the ISO will need to monitor market performance after implementation and be prepared to modify software or market rules as appropriate.

³ See Alternative 1 (adjusting the lower bound on mileage "scheduled") and Alternative 3 (adjust the resource-specific mileage multiplier) on page 11 of the MSC Draft Opinion.

⁴ See Alternative 4 (not allowing BCR for differences between 'scheduled' mileage from the market software and actual mileage) on page 11 and Alternative 5 (allowing BCR based on a limited "default mileage bid" on page 12 of the MSC Draft Opinion.

CIRCULAR SCHEDULING RULES

Background

This initiative was undertaken by the ISO in response to requests from some market participants to clarify market rules relating to *circular schedules*. As described in Management's memo on this issue, circular schedules are pairs of import and export schedules on a single electronic scheduling tag (or *e-tag*) with a source and sink in the same balancing area.

Circular schedules change scheduled flows on inter-ties between balancing areas, but do not change actual power flows. Consequently, circular schedules can exacerbate *loop flows* – or the difference between schedules and actual power flows. The ISO has indicated that circular schedules can be detrimental to market efficiency and system reliability by exacerbating loop flows and making it difficult to manage congestion in the hour-ahead and real-time markets. In addition to creating operational reliability issues, DMM notes that loop flows can also impose additional congestion costs on other participants.

Most circular schedules tend to be created in response to differences in congestion into the ISO on different inter-ties. For instance, if congestion into the ISO occurs on one inter-tie, it becomes economical to export energy on that inter-tie (where the locational price is lower due to congestion) and re-import energy back into the ISO on a different inter-tie (where the price is higher due to the lack of congestion). Such circular import and export schedules may be done by a single participant, or by multiple participants through a chain of transactions and schedules that tend to occur due to price differences at different inter-ties.

While such circular imports and exports schedules are treated by the ISO's market model as causing changes in power withdrawn and injected at these inter-ties, actual real-time power flows would not change as a result of this type of scheduling change. Thus, the actual power flow would not be reduced on the congested inter-tie as a result of this type of circular schedule. This would increase the loop flow, or difference in actual flows compared to scheduled flows on this congested inter-tie. If this loop flow created additional congestion within the ISO during the 5-minute real-time dispatch process, this would increase real-time congestion costs within the ISO.

In practice, the volume of circular schedules that may occur due to price differences is ultimately limited by the amount of transmission capacity outside of the ISO that can be used to schedule energy from one inter-tie (where energy is exported from the ISO) to another (where energy is re-imported into the ISO). However, the amount of available transmission outside the ISO that may allow circular schedules between different interties to occur appears to vary substantially.

Management proposal

Management's proposal establishes objective criteria for identifying circular schedules created by a single market participant based on e-tag information. In such cases, the proposal would establish a settlement rule to make such schedules unprofitable by settling these import and exports at the same price.⁵ This element of Management's proposal is widely supported by participants and is consistent with a provision of ISO market rules prior to the new market design that explicitly prohibited such schedules. This is also consistent with some prior FERC reports and rulings which have indicated that this type of circular schedules can be detrimental to system reliability and may represent a form of misleading information or false relief of congestion.

Circular schedules can also contribute to congestion in the day-ahead market and thus increase the payments for a participant's congestion revenue rights. To mitigate any potential for circular schedules to benefit a participant in this manner, Management's proposal calls for another settlement rule that would rescind any profits from congestion rights revenues that a participant would receive from congestion on inter-ties that was exacerbated by a circular schedule they submitted. DMM has offered several specific recommendations pertaining to the details of this settlement rule as it is further defined and implemented.⁶ DMM believes Management's final proposal is consistent with the details suggested by DMM, and that this approach will provide a relatively simple but effective means for mitigating a potential incentive for participants to submit circular schedules to increase congestion revenue rights.

Management previously proposed extending these settlement provisions to circular schedules on a single e-tag comprised of transactions by multiple different participants. Under this proposal, these settlement provisions would only be triggered if the volume of circular schedules in which a participant was involved exceeded a specific threshold. This threshold was designed to avoid triggering the settlement rule for participants with a relatively low level of circular schedules that may be inadvertently created as the result of independent bilateral market transactions.

DMM supported Management's previous proposal for several reasons:

- Circular schedules, even if not intentionally submitted, still contribute to unscheduled flow, and do not deliver the physical response a particular price at a tie point is designed to reflect. The proposed settlement rule simply aligns the

⁵ As described in Management's memo, a limited number of specific exclusions to this settlement rule are provided for imports and exports that have a source and sink the balancing area that are acceptable due to specific power flow and scheduling issues.

⁶ *Comments on Update on Circular Scheduling Final Proposal*, Department of Market Monitoring, March 14, 2012, at <http://www.caiso.com/Documents/DMMComments-CircularSchedulingDraftFinalProposal.pdf>

settlement of these circular imports/exports more closely with the actual market impact of these schedules.

- Analysis of historical data by the ISO indicates the impacts of the proposed settlement on any circular schedules inadvertently created by bilateral market transactions between different participants should be relatively small and infrequent typically. Thus, DMM believes that the ISO's prior proposal would have a *de minimus* impact on bilateral market activity that was inadvertently resulting in relatively low levels of circular scheduling.

This previous proposal was opposed by numerous participants – including most power marketers and some generation owners – who argue that it would have a significant detrimental impact on bilateral market activity. In response to these concerns, Management decided not to extend this settlement rule to circular schedules created by chains of transactions by multiple market participants. Instead, Management proposes monitor the volume and operational impact of such schedules and consider modifying market rules based on these findings.

DMM is supportive of Management's proposed approach to this issue. However, DMM cautions that the incidence of circular scheduling may increase as a result of the clarifications being provided by the ISO. Specifically, DMM notes that many participants may have avoided engaging in bilateral transactions with specific other participants because they knew these were likely to have resulted in circular schedules. Thus, the ISO should be prepared to monitor any increase in such schedules and to assess the actual impact of these schedules on loop flows and congestion costs

As part of this initiative, the ISO has developed the capability to electronically analyze e-tag data and identify circular scheduling chains with a source and sink in the same balancing area. This provides a strong foundation for more detailed analysis of the impact of these schedules on loop flows and congestion costs if an increase in circular scheduling chains is observed. In several other major ISOs, the increased congestion costs associated with of loop flows created by such scheduling have been found to be significant. DMM looks forward to collaborating with the ISO to perform such monitoring and analysis.

DMM also notes that another market design option for mitigating circular scheduling by one or more entities is to modify the way in which schedules at each inter-tie are modeled and priced by the ISO market software. For example, if a substantial degree of circular scheduling chains and loops flows is observed on two interties, it may be more appropriate to model these two interties as a single pricing bus. This approach has been employed by PJM to reduce scheduling that creates loop flows and related congestion on its southern interface with other balancing areas.