

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

Coordination Across the Midcontinent)	Docket No. AD14-3-000
Independent System Operator, Inc./PJM)	
Interconnection, L.L.C. Seam)	
)	

**RESPONSE TO REQUEST FOR INFORMATION
OF THE INDEPENDENT MARKET MONITOR FOR PJM**

Pursuant to the notice issued on February 24, 2015, and the Commission’s Open Meeting convened January 22, 2015, Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor for PJM (“Market Monitor”), submits this response to the Commission’s order issued February 24, 2015, requesting further information on the specific issues of (A) interface pricing; (B) capacity deliverability; (C) day-ahead market coordination; (D) modeling of the Ontario/Michigan phase angle regulators for congestion management; (E) use of commercial flow in the market-to-market process (“February 24th Order”); and (F) firm flow entitlement freeze date.¹

I. COMMENTS

A. Interface Pricing.

The Commission states the issue raised by the Independent Market Monitor for the Mid-Continent Independent System Operator, Inc. (MISO IMM) as follows:

...[W]hen using these interface prices in the Market-to-Market process to solve a transmission constraint, both RTOs are

¹ *Coordination Across the Midcontinent Independent System Operator, Inc./PJM Interconnection, L.L.C. Seam*, 150 FERC ¶ 16,132.

calculating shadow prices on the constraint, and therefore both RTOs include the congestion component on that constraint in their price calculation. ... [T]his leads to over-counting of the congestion component and creates inefficient incentives for interchange.²

The MISO IMM contends that the congestion component of LMP (CLMP) of the monitoring RTO's interface price accounts for all congestion in the combined MISO and PJM systems with respect to a market to market constraint. Therefore, any additional congestion included in the interface prices of the non-monitoring RTO as a result of this constraint overcounts congestion. This follows from the MISO IMM's interpretation of a PJM to MISO transaction as energy injected at PJM's load-weighted reference bus and withdrawn at MISO's load-weighted reference bus. The MISO IMM assumed that MISO's definition of its PJM interface, which includes most generator buses in PJM's footprint, equally weighted, was equivalent to PJM's load-weighted reference bus. Therefore, any congestion component of LMP calculated by PJM for the market-to-market constraint is redundant.

However, the MISO IMM's assumption that a simple average of the non-monitoring RTO's generation nodes is equivalent to the non-monitoring RTO's load-weighted reference bus is incorrect.

In addition, the monitoring RTO model's CLMP cannot account for all of the congestion in the combined MISO and PJM systems, because each individual RTO model, by definition, is not a complete representation of the joint network. One RTO does not know all of the other RTO's load or offer prices. As a result, the distribution factors and shadow prices will be different for two partial models than they would be for a joint model. Either model's resulting CLMP, which is a function of distribution factors and shadow

² February 24th Order at P 11, citing Potomac Economics, Joint and Common Market Update: Interface Pricing Flaw, Docket No. AD12-16-000, at 2 (January 22, 2015).

prices, will also be different than it would be for a comprehensive joint model. Neither RTO model can fully capture the impact of congestion on the entire system with partial information.

1. Process Used to Study Optimal Pricing at Interfaces.

The Commission requests information (at P 12) on “(1) the process ... used to study the issue; (2) any efforts to develop a joint network model to study the issue; (3) any efforts to jointly study actual dispatches to determine the scale of the issue; and (4) how they have studied the unintended consequences of any of the proposed solutions discussed, the results of those studies, and their plans for additional studies.”

On June 1, 2014, PJM changed the PJM/MISO interface price definition. The new definition comprises ten buses including both PJM and MISO buses located at the seam between the RTOs. MISO did not change the MISO/PJM interface price definition. MISO continues to define interface prices based on most PJM generator buses. Currently, MISO treats all power flows from PJM as originating from or terminating at every generator bus located in the PJM footprint, while PJM treats flows from MISO as originating from or terminating at the defined ten buses close to the seam. A common approach to interface pricing is needed.

To understand the impact of various proposals on the optimal dispatch, price formation and incentives for market participants selling power between markets, the Market Monitor developed a scaled version of the two-RTO dispatch model. The model results were discussed in detail with PJM, MISO and the MISO IMM on several occasions. The model provides the ability to evaluate the impacts of alternative interface pricing methods.

Features of the model include the ability to solve the model from the perspective of either PJM or MISO, and to optimize over the combined RTOs. It also allows for a variety of interface pricing designs, defined by nodes and associated weights. It allows for scheduled

transactions from one RTO to the other, and accommodates shadow price convergence logic.

The Market Monitor used the dispatch model to compare PJM's interface pricing proposal to the MISO IMM's proposal.

In the PJM proposal, the interface pricing node for both RTOs includes an identical set of buses with equal weights, consisting of a mix of MISO and PJM nodes at the seam to represent tie lines.

The MISO IMM proposal: defines the interface pricing node of each RTO to include all generator buses (equally weighted) in the neighboring RTO; and removes the distribution factor of the Market-to-Market constraint for the interface pricing nodes in the non-monitoring RTO's dispatch model. The Market Monitor also modeled a modified version of the MISO IMM proposal: defines the interface pricing node of each RTO to include all generator buses (equally weighted) in the neighboring RTO; and removes the CLMP of the interface pricing nodes in the non-monitoring RTO's dispatch model.

To evaluate the impact of the proposals, the Market Monitor solved the dispatch model under several scenarios. All scenarios had a binding Market-to-Market constraint, for which MISO is the monitoring RTO. The scenarios included the presence and absence of a scheduled transaction and the presence and absence of a binding constraint internal to PJM. As a benchmark, a dispatch solution for the combined PJM and MISO market was also solved for every scenario.

The metrics used to compare model results were total production costs and price differences between MISO and PJM interface prices. The benchmark for comparison of alternative interface pricing approaches is optimizing over the combined footprint and the resultant single set of LMPs over PJM and MISO.

The Market Monitor made the following preliminary findings based on the model, which have been discussed with PJM and MISO and the MISO IMM:

1. The combined dispatch of PJM and MISO together has a lower production cost than the combined production cost of two separate RTO dispatch models for every scenario tested.
2. The combined production costs of PJM and MISO are larger for both versions of the MISO IMM's proposal than for PJM's proposal. The price separation between PJM and MISO interface prices is larger for both versions of the MISO IMM's proposal than for PJM's proposal, resulting in larger payments to market participants under both versions of MISO IMM's proposal than that under the PJM proposal.
3. The shadow prices of the market to market constraint are less likely to converge under the MISO IMM's proposal in which the distribution factors of the non-monitoring RTO are removed, than under modified MISO IMM proposal, in which the CLMPs of the non-monitoring RTO's interface pricing nodes are removed. The shadow prices of the market to market constraint are more likely to converge under PJM's proposal than under either of the MISO IMM proposals.
4. Under every proposal, the model showed that the monitoring RTO's decision on how to allocate the flows on binding market-to-market constraints between PJM and MISO affects the convergence of shadow prices between PJM and MISO. The monitoring RTO, to the extent that it does not know the non-monitoring RTO's offer prices and associated flows on the market-to-market constraint, will not be able to achieve the optimal allocation that would result in shadow price convergence. It is critical that the allocation process be made transparent and that it be based on objective metrics.

2. Efforts to Develop a Joint Network Model to Study Optimal Pricing at Interfaces.

The Market Monitor developed a scaled version of the two-RTO dispatch model which permits hypothesis testing and has led to the preliminary results reported to and discussed with PJM, MISO and the MISO IMM.

3. Efforts to Jointly Study Actual Dispatches.

Using actual dispatches to study the impact of interface transactions is difficult. There is a 5-minute lag between when a transaction is priced and when a transaction is initiated and a 30-minute lag between when the transaction is initiated and when it actually occurs. It is possible that by the time the transaction occurs, the state of the flow, load and

other conditions on the network have changed such that a transaction scheduled to relieve a constraint may now actually aggravate it. The Market Monitor will continue to work with PJM and MISO and the MSIO IMM to evaluate the actual historical data, including the data before and after PJM's modification to the definition of the interface price.

4. Unintended Consequences of Proposed Solutions.

In the Market Monitor's analyses using the scaled version of the two-RTO dispatch model, the MISO IMM's proposed removal of distribution factors of interface pricing nodes of the non-monitoring RTO for market-to-market constraint decreases the likelihood of shadow prices converging between PJM and MISO.

B. Capacity Deliverability.

The Commission requests information (at P 15) on "(1) any reliability problems associated with modeling capacity in each RTO as a single product across the two markets, (2) the amount of capacity that can flow across the seam in each direction, (3) any differences in assumptions and modeling between the RTOs, and (4) any impediments to treating capacity as a single product."

The fundamental issue facing capacity transactions between PJM and MISO is that the two RTOs have very different capacity market designs. In fact, MISO does not have a capacity market in the same sense as PJM. Most capacity payments in MISO derive from cost of service regulation rather than a market. Any proposal to address capacity transactions must address these design differentials to ensure that the outcome is efficient and does not undermine the PJM capacity market. Capacity cannot be treated as a single product across the RTOs in the absence of a common definition of capacity and a common capacity market design. One risk to the PJM capacity market is that owners of generation in MISO who receive capacity revenues from cost of service regulation would offer excess capacity into the PJM market at subsidized low prices, inefficiently suppress prices in PJM and reduce incentives for new PJM capacity. When the capacity is needed in MISO, it

would be withdrawn from the PJM market, leaving the PJM market potentially short as a result of the distorted price signals.

These issues can be resolved in order to permit efficient capacity transactions between the RTOs, and PJM has taken steps to propose modifications to the definition of capacity related to imports, but the resolution should account for the differences in approaches to capacity markets.

C. Day-Ahead Market Coordination.

The Commission requests information (at P 18) on “(1) any differences in the RTOs’ modeling and assumptions; (2) what the RTOs would need to do to implement Day-Ahead market coordination; and (3) the methodology for flowgate pricing and Firm Flow Entitlement Exchange, and any differences in implementation of that methodology between the Day-Ahead and Real-Time processes.”

The RTOs indicate that they are making progress on the exchange of day-ahead data including data on transfer capabilities and FFEs.

D. Modeling of the Ontario/Michigan Phase Angle Regulators (PARs).

The Commission requests information (at P 20) on “(1) any differences in modeling or assumptions, (2) how they each model the phase angle regulators in the Day-Ahead and Real-Time market, and (3) what information each RTO shares with the other RTO on phase angle regulator settings during the Day-Ahead and Real-Time markets.”

The Market Monitor is not aware of any differences in the modeling or assumptions related to the Ontario/Michigan Phase Angle Regulators (PARs) used by PJM and MISO in the Market-to-Market process. In the Market-to-Market process, both RTOs model the PARs as free flowing devices. PJM models the PARs as free flowing devices in both the Day-Ahead and Real-Time Market. MISO models the PARs based on the real-time status in the Real-Time Market, and models the PARs based on expected system conditions, including loop flow assumptions, in their Day-Ahead Market. Both PJM and MISO receive real-time

data on the PARs regulating status from the NERC Reliability Coordinator Information System (RCIS).

E. Use of Commercial Flow in Market-to-Market Process.

The Commission requests comment (at P 22) on PJM's proposal for "us[ing] commercial flow in the Market-to-Market process."

Market flow is the flow on coordinated flowgates resulting from the dispatch of generation within an RTO to meet load within that RTO. Commercial flow is the actual flow on coordinated flowgates including market flow and imports and exports.

PJM has made a proposal to include commercial flows in the market flow calculations which is being reviewed by MISO and SPP.

The Market Monitor supports PJM's proposal.

F. Firm Flow Entitlement Freeze Date.

The Commission requests information (at P 25) on "(1) the status of the Congestion Management Process Working Group process, and (2) any specific examples of Firm Flow Entitlements that are out of date based on generator retirements or new transmission construction."

Certain components of the calculations utilized to determine the Firm Flow Entitlements that are used to determine Market-to-Market settlements rely on the establishment of a historic reference date on which firm point-to-point reservations and network resources are based, known as the "Freeze Date." The Freeze Date is April 1, 2004, based on the date that PJM and MISO began Market-to-Market coordination. The RTOs and their stakeholders have agreed that the concept of using a Freeze Date, as well as what that specific date to use, should be revisited given that the period since the current Freeze Date is more than 10 years.

The Congestion Management Working Group is currently considering two alternatives to the current "Freeze Date" approach.

MISO proposes to maintain the status quo Freeze Date with slight modifications to include new capacity resources, use the transmission service requests for the planning year, and to allocate excess rights to the owners.

PJM and SPP propose to update the base case on at least a yearly basis to include a complete list of designated network resources that are deliverable and do not violate Market-to-Market constraints. The updated base case would be used as an input to the seasonal, monthly, weekly and daily firm flow entitlement allocations, and would capture all current planning assumptions including: demand, resources, upgrades and outages. A current network model would then be used to calculate impact and determine dynamic flowgate allocations.

The PJM/SPP approach also incorporates the concept of a “reciprocity factor” and “first rights” to the RTO that pays the costs of building new transmission. The Market Monitor understands the concept of “reciprocity factor” as a calculation of each RTO’s utilization of the neighboring systems. Using this calculation, the mutual usage of each system can be established. In the event that one RTO is utilizing more of their neighbor’s system than their neighbor is of their own, a payment is made, either in the form of FFE exchange or monetary payment, to make the RTO’s utilization equal. The “first rights” concept is a modification in the allocation of FFEs that result from network upgrades. The current methodology provides the benefits of transmission upgrades to all parties with a greater than five percent effect on the flowgate as determined by an impact study. Therefore, when a new transmission upgrade occurs, the RTO that pays for transmission upgrade (the “owner”) only receives a portion of the FFEs, and in some cases, may not receive any benefits as a result of the upgrade. The “first rights” concept grants the owner their full share of the FFEs that result from the upgrade. Any additional benefit would be granted to external parties with a greater than five percent effect on the flowgate as determined by an impact study. The “reciprocity factor” and “first rights” concepts provide appropriate incentives for each RTO to make transmission enhancements on its own system.

Using a base case for a single historic year in the calculation of firm flow entitlements does not reflect the most current list of designated network resources which ultimately impact firm flow entitlements. The current process of allocating firm flow entitlements for new transmission upgrades provides the benefits received from the upgrades to all parties with a greater than five percent impact on the flowgate. It is therefore possible for an RTO that pays for a transmission upgrade to receive none of the additional firm flow entitlements that result from the upgrade. As a result, the process does not appropriately incent transmission enhancements on both sides of the seam. The Market Monitor agrees with the PJM/SPP proposal to utilize a base case that is updated at least yearly and to incorporate the concepts of a “reciprocity factor” and “first rights” to properly incent transmission system upgrades.

II. CONCLUSION

The Market Monitor respectfully requests that the Commission afford due consideration to this response as the Commission considers the issues raised in this proceeding.

Respectfully submitted,



Jeffrey W. Mayes
General Counsel

Joseph E. Bowring
Independent Market Monitor for PJM
President
Monitoring Analytics, LLC
2621 Van Buren Avenue, Suite 160
Valley Forge Corporate Center
Eagleville, Pennsylvania 19403
(610) 271-8051
joseph.bowring@monitoringanalytics.com

Monitoring Analytics, LLC
2621 Van Buren Avenue, Suite 160
Valley Forge Corporate Center
Eagleville, Pennsylvania 19403
(610) 271-8053
jeffrey.mayes@monitoringanalytics.com

Dated: May 13, 2015

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Eagleville, Pennsylvania,
this 13th day of May, 2015.



Jeffrey W. Mayes

General Counsel

Monitoring Analytics, LLC

2621 Van Buren Avenue, Suite 160

Valley Forge Corporate Center

Eagleville, Pennsylvania 19403

(610)271-8053

jeffrey.mayes@monitoringanalytics.com