

increasing the economic incentive for market participants to follow PJM's dispatch signal by matching payments with the price signals for each five minute interval rather than averaging payments over an hour. While Order No. 825 corrects the inefficiency caused by the current misalignment between five minute pricing and dispatch and hourly integrated settlement, the Commission's implementation dates will actually make the problems worse for a period. Order No. 825 would have the shortage pricing reforms take effect prior to the settlement reforms. The shortage pricing reforms are expected to cause more frequent triggering of scarcity pricing. But the absence of five minute settlement will attenuate the incentive effect rather than strengthen it for the period from May 11, 2017 through January 11, 2018. To address this issue, PJM urges the Commission (at 30-31) to "allow PJM to implement both sets of reforms concurrently" on February 1, 2018.

The IMM supports PJM's request to modify the implementation schedule so that PJM can implement the shortage pricing and settlement reforms concurrently and avoid incentive issues associated with a misalignment of settlement and dispatch during the transition. The IMM supports PJM's proposed dates for the full implementation of the Commission's order.

B. The IMM Supports PJM's Proposed Requirement that Generation Resources that Have Ever Submitted Revenue Meter Data on a Five Minute Basis May Not Submit Meter Data on a Longer Interval Basis.

PJM raises the concern that market participants with five minute meter capability will choose to provide data on an hourly basis, particularly in cases where there may be a benefit for the participant to do so. For example, in an hour where there is a scarcity event in the first few intervals but the generator was not on line until the latter part of the hour, the generator would have an incentive to submit an hourly average meter read, rather than a five minute meter read for settlement. To address this, PJM has proposed (at 11) market rules that require Market Participants with generation resources that have, at some prior date, submitted revenue meter data on a five minute basis to continue to provide revenue meter data on a five minute basis.

In order to maintain the alignment between dispatch instructions and settlements and to limit opportunities for gaming, the IMM supports PJM's proposal to require Market Participants with generation resources that have the capability to submit revenue meter data on a five minute basis to provide data on a five minute basis.

C. The Commission Should Require that Dispatchable Resources Have Metering Capability that Is Consistent with the Dispatch and Pricing Intervals Used by the Operating RTO under this Rulemaking.

Order No. 825 states (at P 17) "that hourly integrated prices for real-time settlement may: (1) not accurately reflect the value a resource provides to the system; (2) discourage resources from following dispatch instructions; and (3) cause increased uplift payments. Therefore, the Commission preliminarily found that the use of hourly integrated prices for real-time settlement may result in rates that are unjust and unreasonable. To remedy any potentially unjust and unreasonable rates caused by the use of hourly integrated prices for real-time settlement and five minute dispatch instructions, the Commission adopted (at P 18) "the NOPR proposal to require that each RTO/ISO settle energy transactions in its real-time markets at the same time interval it dispatches energy."

The rule requiring settling transactions and dispatching energy at the same time interval is good markets policy. However, the rule should also require that resources have five minute meters so that the proposed alignment between five minute prices and the incentives to follow dispatch can actually be realized. In order to maintain the alignment between dispatch instructions and settlements and to limit opportunities for gaming, dispatchable resources should be required to have metering capability that is consistent with the dispatch and pricing intervals used by the operating RTO under this rulemaking. PJM rules should require that dispatchable resources have five minute meters so that there can be accurate five minute settlements.

D. Energy Withdrawals by Generation Resources Should Be Settled Like Generation Resource Output, As Opposed to Load.

Proposed Section 3.1A describes the five minute settlement for generation resources using five minute meters or profiling. It also specifies hourly settlement for load. Generation resources may withdraw energy from the PJM system during starts, outages, and for fuel in the case of pumped storage hydro units. In other words, generation resources are load at times. Section 3.1A does not make clear the settlement interval for energy withdrawals by generation resources. The settlement interval for energy withdrawal by generators should be the same as generation output. Generation station load may be metered on the same meter as output, as negative output, or on a separate meter, as load. Consistent treatment across generators requires the settlement interval to be consistent in both situations. Proposed Section 3.1A should clarify the settlement interval that applies to withdrawals by generators.

E. The Exemption of Demand Response Resources from Five Minute Settlements Is Not Justified.

Proposed Section 3.1A(f) would apply hourly revenue meter data for Demand Response resources.⁴ Order No. 825 does not exempt Demand Response resources.⁵ PJM dispatches Demand Response resources on a five minute basis. Market Participants with Demand Response resources face the same incentives to alter their curtailment in response to prices during the course of an hour that generators face. The exemption is not required

⁴ Demand Response resources refer to the emergency or pre-emergency load response program and economic load response program.

⁵ See Order 825: Settlement Intervals and Shortage Pricing in Markets Operated by Regional Transmission Organizations and Independent System Operators, 155 FERC ¶ 61,276 at P98 (2016).

by Order No. 825, not justified in the January 11th Compliance Filing, and not appropriate for economic efficiency.⁶

As stated in the State of the Market Report for PJM since 2013, the Market Monitor recommends that PJM adopt the ISO-New England five minute metering requirements in order to ensure that dispatchers have the necessary information for reliability and that market payments to Demand Response resources be calculated based on interval meter data at the site of the demand reductions.⁷

F. Consistent Division by Twelve Is Needed for Precision and Clarity.

The January 11th Compliance Filing would result in making instantaneous measurements of energy output and load in MW. The MW metric is an hourly measure when applied in settlement calculations like capacity performance penalties or lost opportunity cost payments. In all cases where five minute settlements depend on a MW measurement, the OATT should specify the division by twelve. Appropriate division by twelve is not consistently applied throughout the compliance filing tariff revisions. The proposed rules should clarify the units of energy measurement and specify division by the number of intervals in the hour as necessary. In general, the correct specification of settlements in the OATT would be more precise and much clearer if it employed simple mathematical expressions. Lack of clarity lends can lead to inconsistency in application and unintended settlements. In addition, lack of clarity may result in vulnerability to market manipulation.

⁶ See Comments, Complaint and Motion to Consolidate of the Independent Market Monitor for PJM, Docket No. ER14-822-000 (January 14, 2014) at 10.

⁷ See ISO-NE Tariff, Section III, Market Rule 1, Appendix E1 and Appendix E2, "Demand Response," <http://www.iso-ne.com/regulatory/tariff/sect_3/mr1_append-e.pdf>. (Accessed February 17, 2015) ISO-NE requires that DR have an interval meter with five minute data reported to the ISO and each behind the meter generator is required to have a separate interval meter. After June 1, 2017, demand response resources in ISO-NE must also be registered at a single node.

G. The Specification of Operating Reserves Deviation Charges is Imprecise.

Proposed Section 3.2.3(h) would modify the calculation of deviation charges for the allocation of uplift. The proposed use of injections and withdrawals is an improvement to the previous language. The described formulation of the summation and specification of withdrawals (term A), generation deviations (term B), and injection deviations (term C) lacks clarity.

The summation describes an hourly deviation value for each Market Participant calculated as A plus B plus C. However, it is not clear that the formulations of A, B, and C have consistent units of measurement that appropriately result in hourly values. The definitions use “each Real-Time Settlement Interval in an hour,” which would be a five minute measure, rather than an hourly value constructed from twelve five minute measurements of deviations. The definition of A also discusses a daily value. The definitions of A and C use a division by 12, as appropriate for hourly MW measurements broken down into twelve five minute intervals, but the definitions do not specify that the values are measured in MW or that the intervals are five minutes. In addition, the term “injections” is not defined. Because generation, which is covered under term B, is an injection, the rules should make clear what types of injections it includes in term C to prevent overlap between the two sets of injection deviations.

Clarity in the description of settlement charges is important for market transparency and for correct calculation of market settlements. Section 3.2.3(h) should include a precise mathematical formulation of deviation charges with clear definitions of withdrawals and injections, units of measurement, and time periods.

H. The Commission Should Require Documented Rules and Transparent Reporting of Operator Interventions that Alter the Determination of Shortages.

The determination of shortages relies on automated measurements of load, generation, interchange transactions, demand response, and reserves. It also includes discretionary operator inputs to the security constrained economic dispatch program. The

operator inputs that can alter the determination of shortages enter both the power balance equation and the reserve constraints in the dispatch program.

A shortage of reserves occurs when the reserve requirement exceeds the amount of available reserve generation capacity. PJM employs online generation capacity as either generation output, frequency regulating capacity, or Tier 1 synchronized reserves:

$$\textit{Online Capacity} = \textit{Output} + \textit{Regulation} + \textit{Tier 1 Reserves}.$$

PJM also uses Tier 2 reserves to meet the synchronized reserve requirement and non-synchronized reserves to meet the primary reserve requirement. Generation output meets the power balance requirement. Frequency regulating capacity meets the regulation requirement, and Tier 1 reserves contribute to meeting the synchronized reserve and primary reserve requirements.

The reserve requirements interact with the power balance equation, which balances forecasted load, losses, and exports with generating output, demand response, and imports. The reserve requirement and the power balance constraint interact through the use of online generation capacity to meet each requirement. Combining the power balance equation with the synchronized reserve requirement expresses the shortage determination more simply.

Synchronized reserve shortage determination:⁸

$$\begin{aligned} & \textit{Load} + \textit{Exports} + \textit{Losses} + \textit{Reserve Requirement} \\ & > \textit{Generation Output} + \textit{Demand Response} + \textit{Imports} + \textit{Tier 1} + \textit{Tier 2} \end{aligned}$$

The synchronized reserve requirement is defined as the largest contingency on the system. PJM is proposing to make the reserve requirement dynamic, adjusting it in each five minute solution to equal the output of the largest online generator.

PJM operators have the ability to bias both the load forecast, known as SCED or energy bias, and the estimate of Tier 1 reserves used in the market solution for Tier 2

⁸ The determination of a primary reserve shortage could be expressed similarly.

synchronized reserves, known as Tier 1 bias. This impacts both the demand and supply side of the shortage determination.

Tier 1 biasing is used in the hour ahead solution for the synchronized reserve market. Biasing means manually modifying (increasing or decreasing) the tier 1 synchronized reserve estimate used to determine the required MW of tier 2 synchronized reserves. This forces the market to clear more, or less, tier 2 reserve than the market solution requires to satisfy the reserve requirements. In 2016, PJM applied negative tier 1 bias in 915 hours and positive tier 1 bias in 153 hours. Negative biasing causes PJM to clear more reserves than required, decreasing the likelihood of a shortage event. Positive biasing causes PJM to clear fewer reserves than required, increasing the likelihood of encountering a shortage.

PJM dispatch can also apply energy biasing that increases or decreases the demand to which the system is dispatched by thousands of MW in any real time security constrained economic dispatch solution. When the system is close to being fully utilized, the result of increasing the demand is to make scarcity more likely and the result of decreasing demand is to make scarcity less likely, all else equal.

Both forms of bias are used in PJM market solutions. Little transparency and no market rules exist to define PJM's biasing practices. To support the Commission's effort to create transparency and consistency in scarcity price formation, PJM should be required to document biasing practices as used in SCED (Security Constrained Economic Dispatch) and ASO (Ancillary Services Optimizer) and to report its application of biasing as part of its compliance with Order No. 825.

II. CONCLUSION

The Market Monitor respectfully requests that the Commission afford due consideration to these comments as it resolves the issues raised in this proceeding.

Respectfully submitted,



Jeffrey W. Mayes

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

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

Howard J. Haas
Chief Economist
Monitoring Analytics, LLC
2621 Van Buren Avenue, Suite 160
Valley Forge Corporate Center
Eagleville, Pennsylvania 19403
(610) 271-8054
howard.haas@monitoringanalytics.com

Catherine Tyler Mooney
Senior Economist
Monitoring Analytics, LLC
2621 Van Buren Avenue, Suite 160
Valley Forge Corporate Center
Eagleville, Pennsylvania 19403
(610) 271-8050
catherine.mooney@monitoringanalytics.com

Dated: February 1, 2017

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 1st day of February, 2017.



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