

## Testimony of Joseph Bowring, Independent Market Monitor for PJM

Good morning Co-Chairs Balderson and Roegner and members of the Energy Mandates Study Committee. I appreciate the opportunity to appear before you today. My name is Joseph Bowring and I am the Independent Market Monitor for PJM. As the Market Monitor for PJM, my role is to be an independent and objective monitor of the wholesale power markets operated by PJM. The role of the Market Monitor is to support and promote the public interest in competitive markets. The role of the Market Monitor includes monitoring the PJM markets to detect and deter the potential exercise of market power as well as recommending market design changes to increase competition and reporting on the markets to the public.<sup>1</sup> I am independent of PJM, and I do not speak for PJM.<sup>2</sup>

The FERC assigns three core functions to the MMU: reporting, monitoring and market design. These functions are interrelated and overlap. The PJM Market Monitoring Plan establishes these functions, providing that the MMU is responsible for monitoring: compliance with the PJM Market Rules; actual or potential design flaws in the PJM Market Rules; structural problems in the PJM Markets that may inhibit a robust and competitive market; the actual or potential exercise of market power or violation of the market rules by a Market Participant; PJM's implementation of the PJM Market Rules or operation of the PJM Markets; and such matters as are necessary to prepare reports.

The MMU performs its reporting function by issuing and filing annual and quarterly state of the market reports; reports on market issues such as RPM auction reports; reports responding to requests from regulators and other authorities; and ad hoc reports on specific topics. The state of the market reports provide a comprehensive analysis of the structure, behavior and performance of PJM markets. State of the market reports and other reports are intended to inform PJM, the PJM Board, FERC, other regulators, other authorities, market participants, stakeholders and the general public about how well PJM markets achieve the competitive outcomes necessary to realize the goals of regulation through competition, and how the markets can be improved.

To perform its monitoring function, the MMU screens and monitors the conduct of Market Participants under the MMU's broad purview to monitor, investigate, evaluate and report on the PJM Markets. The MMU has direct, confidential access to the FERC. The MMU may also refer matters to the attention of state commissions.

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<sup>1</sup> PJM Open Access Transmission Tariff (OATT) Attachment M §§ I, IV.

<sup>2</sup> The Attachment to this testimony includes tables and figures that include relevant information on the operation of the PJM markets.

The MMU monitors market behavior for violations of FERC Market Rules. The MMU will investigate and refer “Market Violations,” which refers to any of “a tariff violation, violation of a Commission-approved order, rule or regulation, market manipulation, or inappropriate dispatch that creates substantial concerns regarding unnecessary market inefficiencies...” The MMU also monitors PJM for compliance with the rules, in addition to market participants.

Another important component of the monitoring function is the review of inputs to mitigation. The actual or potential exercise of market power is addressed in part through *ex ante* mitigation rules incorporated in PJM’s market clearing software for the energy market, the capacity market and the regulation market. If a market participant fails the TPS test in any of these markets its offer is set to the lower of its price based or cost based offer. This prevents the exercise of market power and ensures competitive pricing, provided that the cost based offer accurately reflects short run marginal cost. Cost based offers for the energy market and the regulation market are based on incremental costs as defined in the PJM Cost Development Guidelines (PJM Manual 15). The MMU evaluates every offer in each capacity market (RPM) auction using data submitted to the MMU through web-based data input systems developed by the MMU.

The MMU also reviews operational parameter limits included with unit offers, evaluates compliance with the requirement to offer into the energy and capacity markets, evaluates the economic basis for unit retirement requests and evaluates and compares offers in the Day-Ahead and Real-Time Energy Markets.

The MMU reviews offers and inputs in order to evaluate whether those offers raise market power concerns. Market participants, not the MMU, determine and take responsibility for offers that they submit and the market conduct that those offers represent. If the MMU has a concern about an offer, the MMU may raise that concern with the FERC or other regulatory authorities. The FERC and other regulators have enforcement and regulatory authority that they may exercise with respect to offers submitted by market participants. PJM also reviews offers, but it does so in order to determine whether offers comply with the PJM tariff and manuals. PJM, in its role as the market operator, may reject an offer that fails to comply with the market rules. The respective reviews performed by the MMU and PJM are separate and non-sequential.

The PJM Markets monitored by the MMU include market related procurement processes conducted by PJM, such as for Black Start resources included in the PJM system restoration plan. With the introduction of competitive transmission development policy in Order No. 1000, a competitive procurement process for including projects in PJM Regional Transmission Expansion Plan is now in place.

In order to perform its role in PJM market design, the MMU evaluates existing and proposed PJM Market Rules and the design of the PJM Markets. The MMU initiates and proposes changes to the design of such markets or the PJM Market Rules in stakeholder

or regulatory proceedings. In support of this function, the MMU engages in discussions with stakeholders, State Commissions, PJM Management, and the PJM Board; participates in PJM stakeholder meetings or working groups regarding market design matters; publishes proposals, reports or studies on such market design issues; and makes filings with the Commission on market design issues. The MMU also recommends changes to the PJM Market Rules to the staff of the Commission's Office of Energy Market Regulation, State Commissions, and the PJM Board. The MMU may provide in its annual, quarterly and other reports "recommendations regarding any matter within its purview."

The PJM energy market operates following the principle of least cost, security constrained, economic dispatch. This means that PJM dispatches units in economic merit order to meet load subject to transmission constraints which require that units be dispatched out of merit order. The least expensive units are dispatched first and more expensive units are dispatched as the load increases.

Economic merit order is the order of all generator offers from lowest to highest cost. Congestion occurs when available, least-cost energy cannot be delivered to all load because transmission facilities are not adequate to deliver that energy to one or more areas, and higher cost units in the constrained area(s) must be dispatched to meet the load. This is referred to as dispatching units out of economic merit order. The result is that the price of energy in the constrained area(s) is higher than in the unconstrained area. Dispatch within the constrained area follows merit order for the units available to relieve the constraint. Congestion is neither good nor bad, but is a direct measure of the extent to which there are multiple marginal generating units dispatched to serve load as a result of transmission constraints.

Clearing prices in the energy market are a function of the marginal costs of the marginal units. Production costs are the sum of all the short run variable costs of all the units running to meet the demand for power at a point in time including the cost to start if relevant.

While we have not attempted to estimate the impact of renewables on energy or capacity prices in PJM, the attachment to my testimony includes tables that compare the Ohio RPS to those in other states.

PJM meets its reliability objectives through the capacity market. The capacity market is, by design, always tight in the sense that total supply is generally only slightly larger than demand. The demand for capacity includes expected peak load plus a reserve margin, and points on the Variable Resource Requirement (VRR) curve exceed peak load plus the reserve margin. Thus, the reliability goal is to have total supply equal to or slightly above the demand for capacity. The level of purchased demand under RPM has generally exceeded expected peak load plus the target reserve margin, resulting in reserve margins that exceed the target.

The primary purpose of the Minimum Offer Price Rule (MOPR) in the PJM capacity market tariff is to prevent market participants from submitting uneconomic offers based on the receipt of out of market payments which result in artificially depressing RPM auction prices. Procuring capacity when it is not needed for reliability, requiring it to clear in the auction through an offer price below its costs and providing subsidies in the form of additional out of market revenue is not consistent with the PJM market design. The result would be to artificially depress prices in the PJM capacity market. This would negatively affect the incentives to build new generation and would likely result in a situation where only subsidized units would ever be built.

The MMU prepared a report that addresses and quantifies the impact on market outcomes in the Reliability Pricing Model (RPM) Base Residual Auction (BRA) (for the 2017/2018 Delivery Year) of the Short-Term Resource Procurement Target and demand side resources both separately and together. (Demand side resources include Demand Resources, DR, and Energy Efficiency resources, EE.)<sup>3</sup>

Sensitivity analyses of the type in this report show what the market results would have been for identified changes, holding everything else constant. For example, the elimination of all demand side resources from the capacity markets would have increased prices, holding everything else constant. But in the absence of demand side resources, some generating resources that retired in prior years might not have retired, and some new generation resources that did not clear in prior years would have cleared and both would have affected prices in subsequent auctions. In the absence of demand side resources, the market response from generation resources would have been different. In the absence of demand side resources the market response from generation resources would be different in the future. Thus the results of the sensitivity analyses in the study are worst case because they do not include any market response which would mitigate the impact on prices and cleared quantities of eliminating demand side resources.

In the attachment to my testimony, Table 1 on slide 22 includes a summary of the results of the sensitivity analyses. The first column includes the total RPM revenues associated with each identified scenario. The second column is the difference in total RPM revenues between each identified scenario and the actual auction results. The third column is the percent change in total RPM revenues between each identified scenario and the actual auction results.

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<sup>3</sup> *The 2017/2018 RPM Base Residual Auction: Sensitivity Analyses Revised*, Monitoring Analytics, LLC (August 26, 2014)

The inclusion of Limited and Extended Summer DR products in the auction had a significant impact on the auction results (Scenario 1). Based on actual auction clearing prices and quantities and make-whole MW, total RPM market revenues for the 2017/2018 RPM Base Residual Auction were \$7,512,229,630. If only generation, Annual DR, and Energy Efficiency (EE) resources were offered in the 2017/2018 RPM Base Residual Auction and everything else had remained the same, total RPM market revenues for the 2017/2018 RPM Base Residual Auction would have been \$9,738,222,922, an increase of \$2,225,993,292, or 29.6 percent, compared to the actual results. From another perspective, the inclusion of the Limited and Extended Summer DR products resulted in a 22.9 percent reduction in RPM revenues for the 2017/2018 RPM Base Residual Auction compared to what RPM revenues would have been without the Limited and Extended Summer DR products.

The inclusion of sell offers for all Demand Resources and Energy Efficiency resources also had a significant impact on the auction results (Scenario 2). Based on actual auction clearing prices and quantities and make-whole MW, total RPM market revenues for the 2017/2018 RPM Base Residual Auction were \$7,512,229,630. If there were no offers for DR or EE in the 2017/2018 RPM Base Residual Auction and everything else had remained the same, total RPM market revenues for the 2017/2018 RPM Base Residual Auction would have been \$16,859,658,203, an increase of \$9,347,428,573, or 124.4 percent, compared to the actual results. From another perspective, the inclusion of Demand Resources and Energy Efficiency resources resulted in a 55.4 percent reduction in RPM revenues for the 2017/2018 RPM Base Residual Auction compared to what RPM revenues would have been without any Demand Resources or Energy Efficiency resources.