



Monitoring  
Analytics

**Activities of the  
Market Monitoring Unit  
2021**

Independent Market Monitor for PJM  
December 14, 2022

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## Preface

This report is posted pursuant to Section VI.C of Attachment M to the PJM Open Access Transmission Tariff (the “PJM Market Monitoring Plan” or “Plan”), which directs the Market Monitoring Unit (“Market Monitor,” also known as the “MMU,” Independent Market Monitor for PJM” or “IMM”) “to prepare a detailed public annual report about the Market Monitoring Unit’s activities, subject to protection of confidential, proprietary, and commercially sensitive information and the protection of the confidentiality of ongoing investigations and monitoring activities.”<sup>1</sup>

Monitoring Analytics, LLC serves as the Independent Market Monitor for PJM.<sup>2</sup> PJM is a regional transmission organization (RTO) that is responsible for ensuring the reliability of the electric power supply system and operating the wholesale power market in 13 states and the District of Columbia. The MMU is responsible for promoting a robust, competitive and nondiscriminatory electric power market in PJM by implementing the PJM Market Monitoring Plan.

During 2021, the MMU continued to perform its responsibilities and functions almost entirely through remote work during the COVID-19 crisis. A required subset of the IT department reported to work on site to maintain the substantial hardware and systems necessary for the continued operation of the MMU.

The Federal Energy Regulatory Commission (FERC) assigns three core functions to MMUs: monitoring, reporting, and market design.<sup>3</sup> The PJM Market Monitoring Plan provides the Market Monitoring Unit shall objectively monitor the competitiveness of PJM Markets, investigate violations of FERC or PJM Market Rules, recommend changes to PJM Market Rules, prepare reports for the Authorized Government Agencies and take such other actions as are specified in the Plan.<sup>4</sup>

The PJM Market Monitoring Plan provides 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 potential for a market participant to exercise market power or violate any of the PJM or FERC Market Rules; the actual exercise of market power or violation of the PJM or FERC Market Rules: PJM’s implementation of the PJM Market

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<sup>1</sup> PJM Open Access Transmission Tariff (OATT) Attachment M § VI.C.

<sup>2</sup> See 144 FERC ¶ 61,238 (2013).

<sup>3</sup> 18 CFR § 35.28(g)(3)(ii); see also *Wholesale Competition in Regions with Organized Electric Markets*, Order No. 719, FERC Stats. & Regs. ¶31,281 (2008) (“Order No. 719”), *order on reh’g*, Order No. 719-A, FERC Stats. & Regs. ¶31,292 (2009), *reh’g denied*, Order No. 719-B, 129 FERC ¶ 61,252 (2009).

<sup>4</sup> PJM Open Access Transmission Tariff (OATT) Attachment M § IV.A.

Rules or operation of the PJM markets; and such matters as are necessary to prepare reports.<sup>5</sup>

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.<sup>6</sup> The MMU has direct, confidential access to the FERC.<sup>7</sup> The MMU may also refer matters to the attention of state commissions.<sup>8</sup>

The MMU monitors market behavior for violations of FERC Market Rules.<sup>9</sup> The MMU investigates and refers "Market Violations," which refers to any "tariff violation, violation of a Commission-approved order, rule or regulation, market manipulation, or inappropriate dispatch that creates substantial concerns regarding unnecessary market inefficiencies..."<sup>10 11</sup> The MMU also monitors PJM for compliance with the rules, in addition to market participants.<sup>12</sup>

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

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<sup>5</sup> OATT Attachment M § IV; 18 CFR § 1c.2.

<sup>6</sup> OATT Attachment M § IV.

<sup>7</sup> OATT Attachment M § IV.K.3.

<sup>8</sup> OATT Attachment M § IV.H.

<sup>9</sup> OATT § 1 (Definitions–E-F) ("FERC Market Rules' mean the market behavior rules and the prohibition against electric energy market manipulation codified by the Commission in its Rules and Regulations at 18 CFR §§ 1c.2 and 35.37, respectively; the Commission-approved PJM Market Rules and any related proscriptions or any successor rules that the Commission from time to time may issue, approve or otherwise establish."); OATT § 1 (Definitions–O-P-Q) ("PJM Market Rules' shall mean the rules, standards, procedures, and practices of the PJM Markets set forth in the PJM Tariff, the PJM Operating Agreement, the PJM Reliability Assurance Agreement, the PJM Consolidated Transmission Owners Agreement, the PJM Manuals, the PJM Regional Practices Document, the PJM-Midwest Independent Transmission System Operator Joint Operating Agreement or any other document setting forth market rules.")

<sup>10</sup> The FERC defines manipulation as engaging "in any act, practice, or course of business that operates or would operate as a fraud or deceit upon any entity." 18 CFR § 1c.2(a)(3). Manipulation may involve behavior that is consistent with the letter of the rules, but violates their spirit. An example is market behavior that is economically meaningless, such as equal and opposite transactions, which may entitle the transacting party to a benefit associated with volume. Unlike market power or rule violations, manipulation must be intentional. The MMU must build its case, including an inference of intent, on the basis of market data.

<sup>11</sup> OATT Attachment M § I (Definitions–L-M-N).

<sup>12</sup> OATT Attachment M § IV.C.

*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 should be set to the lower of its price-based or cost-based offer. The MMU monitors offer capping and identifies situations when it does not prevent the exercise of market power. Effective offer capping prevents the exercise of market power and ensures competitive pricing, provided that the cost-based offer accurately reflects short run marginal costs.

The MMU performs its reporting function by preparing annual and quarterly state of the market reports, including detailed market design recommendations, and detailed reports on specific market issues. The MMU issues reports on each RPM base residual auction. The MMU’s reports also respond to the needs of FERC, state regulators, or other regulatory authorities, to assist policy development, decision making in regulatory proceedings, and in support of investigations. The MMU participates in FERC technical conferences as appropriate.

In order to perform its role in PJM market design, the MMU evaluates existing and proposed PJM Market Rules as well as the design and implementation of the PJM markets.<sup>13</sup> The MMU initiates and proposes changes to the design of such markets or the PJM Market Rules in stakeholder or regulatory proceedings.<sup>14</sup> 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 regarding market design matters; publishes proposals, reports or studies on such market design issues; and makes filings with the Commission on market design issues.<sup>15</sup> The MMU may also recommend changes to the PJM Market Rules to the staff of the Commission’s Office of Energy Market Regulation, state commissions, and the PJM Board.<sup>16</sup> The MMU may provide in its annual, quarterly and other reports “recommendations regarding any matter within its purview.”<sup>17</sup>

The MMU posts market data, public reports, presentations, regulatory filings and market messages on the Monitoring Analytics web page at: <http://www.monitoringanalytics.com>.

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<sup>13</sup> OATT Attachment M § IV.D.

<sup>14</sup> *Id.*

<sup>15</sup> *Id.*

<sup>16</sup> *Id.*

<sup>17</sup> OATT Attachment M § VI.A.

# Monitoring

## ***Market Surveillance***

The MMU analyzes and monitors all of the PJM markets, including the Day-Ahead Energy Market, the Real-Time Energy Market, the RPM Base Residual Auctions and Incremental Auctions, the Regulation Market, the Primary Reserve Markets both Synchronized and Nonsynchronized, the Day-Ahead Scheduling Reserve Market and the Annual, Monthly, Long Term and Balance of Planning Period Auction Markets in Financial Transmission Rights (FTRs). The MMU monitors the provision of other cost-based ancillary services including black start service and reactive service. The MMU analyzes and monitors transmission issues, including transmission outages, transmission line ratings, competition to build transmission facilities, and the impact of transmission on competition. The MMU analyzes and monitors generation and transmission planning issues, including the queue process. This ongoing market analysis and monitoring is the basis for all MMU activities.

Correctly defined cost-based offers for the energy market, the reserve markets, and the regulation market should be based on short run marginal costs. The MMU reviews units' fuel cost policies to ensure that they define, in an algorithmic, verifiable and systematic way, how the market value of fuel is calculated in cost-based offers. The MMU calculates energy market opportunity costs for environmentally limited units, which include the impact of state regulations (e.g., Illinois Climate and Equitable Jobs Act (CEJA) (2021)). The MMU reviews emissions rates, heat rates, and variable operations and maintenance costs, as well as the submitted cost-based offers. If a cost-based offer does not adhere to the PJM Market Rules, the MMU recommends that PJM issue a penalty, as defined in OA Schedule 2.

For example, the MMU monitors participant development of inputs to prospective mitigation, including Avoidable Cost Rates and net revenues in RPM; unit-specific offers in the capacity market under the Minimum Offer Price Rule; offer caps for capacity resources, including unit specific offer caps and risk premia; fuel costs, maintenance costs, cost-based offers and operating parameters in the energy markets, including eligibility for Frequently Mitigated Unit (FMU) adders. In the course of this monitoring, the MMU provides feedback to participants and engages in discussions about the appropriateness of costs and cost levels. The MMU monitors compliance with the RPM and CP must offer rules and reviews exception requests to these rules. The MMU monitors compliance with the Minimum Offer Price Rule (MOPR) and reviews unit specific exception requests. The MMU verifies and confirms the results of the Three Pivotal Supplier Test in the capacity market. The MMU monitors compliance with the must offer rule for capacity resources in the day-ahead energy market. The MMU monitors costs included in black start service rates. The MMU reviews proposed deactivations to identify potential market power issues. The MMU prepares monthly notifications to PJM generation owners regarding the status of Frequently Mitigated Units per Schedule 1, Section 6.4.2 of the PJM Operating Agreement. The MMU also

monitors other tariff requirements related to offers in the energy market, the capacity market and the ancillary services markets.

If the MMU determines that it has identified a significant market problem or a potential market violation by a market participant or PJM that may require further inquiry, a referral, and/or action by the Commission, the MMU is required to notify the Commission's Office of Enforcement.<sup>18</sup>

If the MMU determines that it has sufficient credible information that PJM's or a participant's market behavior may require investigation, it is required to submit a formal confidential referral of such behavior to the Commission's Office of Enforcement.<sup>19</sup> Such referrals typically include substantial analysis of the issue referred. After a referral, the MMU provides further assistance to FERC staff at their request.

The MMU monitors how PJM implements the market rules. For example, the MMU replicates the clearing of the capacity market and provides feedback to PJM when it identifies issues, and monitors the clearing of the energy market, including operator interventions. The MMU monitors uplift payments, especially the determination of whether a resource follows PJM's dispatch instructions and whether a resource is eligible for uplift payments. The MMU monitors PJM's application of the Three Pivotal Supplier Test in the energy, capacity and regulation markets. The MMU analyzes the causes of shortage pricing events. The MMU monitors the testing and application processes for demand response, energy efficiency, and distributed energy resources. The MMU monitors outage reporting and the outage approval process. The MMU verifies and confirms the results of PJM's application of the FTR Forfeiture Rule, a retroactive mitigation measure, prior to PJM billing PJM members. The MMU provides detailed information to market participants who have questions about the application of the rule to the participant's portfolio. The MMU monitors the profitability of virtual transactions and whether the profitability is the result of false arbitrage due to modeling and operational differences between the day-ahead and real-time energy markets.

If the MMU believes that market design flaws exist that could be remedied by rule changes, the MMU is required to make a referral to the Commission's Office of Energy Market Regulation.<sup>20</sup>

## ***Discussions with Market Participants***

The PJM Market Monitoring Plan provides that in addition to informing Commission staff, the MMU may "Engage in discussions regarding issues relating to the PJM Market Rules or FERC Market Rules in order to understand such issues and to attempt to

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<sup>18</sup> OATT Attachment M § IV.I.

<sup>19</sup> *Id.*

<sup>20</sup> OATT Attachment M § IV.I.2.

resolve informally such issues or other issues.”<sup>21</sup> In fulfilling this role in 2021, the MMU monitored participant behavior and discussed relevant matters with market participants. In addition, the MMU received and investigated confidential complaints.

The MMU regularly discusses issues with market participants from all parts of the market. For example, the MMU engaged in discussions with market participants, including generation owners, renewable suppliers, demand side providers, industrial customers, financial participants, public power entities, transmission owners, load serving entities, state public utility commissions, environmental interests, and public advocates.

### ***Discussions with PJM***

The MMU engaged in frequent discussions with PJM about, among other things, the fuel cost policy approval process, specific generator fuel cost policies, unit specific parameter limit adjustments, parameter limit exceptions, cost-based offers, and the application of penalties for incorrect cost-based offers; the calculation of variable operating and maintenance expense includable in energy offers; the definition of following dispatch; the application of uplift rules; RPM rules (e.g., market seller offer caps, MOPR offer floors; must offer exceptions; market power mitigation; the application of rules in RPM auctions); credit and default issues; FTR issues; reactive power; regulation; the real-time energy market dispatch and pricing processes; specific high price events; reserve measurement and deployment; market efficiency transmission projects; transmission constraints; transmission constraint penalty factors; distributed energy resources; and changes to the reserve markets.

### ***Communications with Regulators***

The MMU provides information to regulators, subject to compliance with applicable rules protecting confidentiality:

The MMU communicated with FERC staff regarding current issues; provided data in response to requests from FERC staff; met with the FERC Office of Enforcement; met with state regulators; met with the Organization of PJM States, Inc. (OPSI); met with the OPSI Advisory Committee; and met with the Consumer Advocates of PJM States (CAPS) to answer questions and discuss a range of topics.

### ***Referrals***

The MMU filed confidential referrals of market violations under OATT Attachment M § IV.I.1 with FERC’s Office of Enforcement.

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<sup>21</sup> OATT Attachment M, § IV.J.1.



## Reporting<sup>22</sup>

### **Reports and Analyses**

Publication of four state of the market reports fulfilled the reporting requirements in the tariff and Commission regulations on market monitoring policy by providing a comprehensive analysis of PJM markets and an assessment of the competitiveness of each market.<sup>23</sup> The reports also provided detailed recommendations related to market design and the details rules related to market design.<sup>24</sup>

### **State of the Market Reports**

- 2020 State of the Market Report for PJM (March 11, 2021).
- 2021 Quarterly State of the Market Report for PJM: January through March (May 13, 2021).
- 2021 Quarterly State of the Market Report for PJM: January through June (August 12, 2021).
- 2021 Quarterly State of the Market Report for PJM: January through September (November 11, 2021).

### **Other Reports:**

- MMU Cost-Based Offer Technical Guide v1 (January 6, 2021).
- MMU Cost-Based Offer Technical Guide - Appendix A (January 6, 2021).
- Analysis of NJ Zero Emissions Credit (ZEC) Applications (January 29, 2021).
- Potential Impacts of the Creation of Virginia FRR (May 18, 2021)
- Potential Impacts of the Creation of District of Columbia FRR (May 7, 2021).2021 Quarterly State of the Market Report for PJM: January through March (May 13, 2021).
- Activities of the Market Monitoring Unit 2020 (December 14, 2021).

### **Market Messages**

- IMM Discovery Correspondence re FERC v Powhatan (February 5, 2021).
- Generation Capacity Resources in PJM Region Subject to RPM Must Offer Obligation for 2021/2022 and 2022/2023 Delivery Years. (February 19, 2021).
- Press Release - 2020 State of the Market Report for PJM (March 11, 2021).

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<sup>22</sup> Public reports by the MMU are posted at <<http://www.monitoringanalytics.com>>.

<sup>23</sup> OATT Attachment M § VII.A

<sup>24</sup> See 2020 State of the Market Report for PJM: Volume 2, Section 2: Recommendations, (March 11, 2021).

- Members Committee Letter – 2020 State of the Market Report for PJM (March 11, 2021).
- CSAPR Ozone Season Changes (April 30, 2021).
- Press Release - 2021 Quarterly State of the Market Report for PJM: January through March (May 13, 2021).
- Members Committee Letter – 2021 Quarterly State of the Market Report for PJM: January through March (May 13, 2021).
- Generation Capacity Resources in PJM Region Subject to RPM Must Offer Obligation for 2022/2023 Delivery Year (May 18, 2021).
- Data Submission Window Opening: 2023/2024 Base Residual Auction (June 28, 2021).
- Updated Data Submission Window Opening: 2023/2024 Base Residual Auction (July 29, 2021).
- IMM Determinations Posted for the PJM 2023/2024 RPM Base Residual Auction (September 2, 2021).
- Data Submission Window Reopening: 2023/2024 Base Residual Auction (September 13, 2021).
- IMM Notification to Members of Discovery Request (September 21, 2021).
- Data Submission Window Reopening for the 2023/2024 RPM Base Residual Auction - Updated (September 30, 2021).
- Generation Capacity Resources in PJM Region Subject to RPM Must Offer Obligation for 2022/2023 and 2023/2024 Delivery Years (September 30, 2021).
- Data Submission Window Opening for the 2022/2023 RPM Third Incremental Auction (October 5, 2021).
- Data Submission Window Opening for the 2022/2023 RPM Third Incremental Auction – Updated (October 6, 2021).
- Unit Specific Net Revenue Calculation (Dispatchable Units) (October 23, 2021).
- Press Release - 2021 Quarterly State of the Market Report for PJM: January through September. (November 11, 2021).
- Members Committee Letter – 2021 Quarterly State of the Market Report for PJM: January through September (November 11, 2021).
- Net Revenue Calculation Update 2023/2024 Base Residual Auction (November 12, 2021).
- eDart Fuel Inventory and Emissions Survey Reminder (November 17, 2021).
- Alternative MSOC Agreement Template (November 23, 2021).
- Alternative Market Seller Offer Caps for the PJM 2023/2024 RPM Base Residual Auction (November 23, 2021).
- IMM Determinations Posted for the PJM 2022/2023 RPM Third Incremental Auction (November 30, 2021).

- Data Submission Window Reopening for the 2023/2024 RPM Base Residual Auction (December 1, 2021).
- Data Submission Window Reopening- 2023/2024 RPM Base Residual Auction – Updated (December 3, 2021).
- IMM Letter to Illinois EPA re Climate and Equitable Jobs Act (CEJA) Public Act 102-0662 (December 22, 2021).
- Generation Capacity Resources in PJM Region Subject to RPM Must Offer Obligation for 2022/2023 and 2023/2024 Delivery Years (December 29, 2021).

## ***Data Postings***

### **Marginal Fuel Postings**

- 202011\_Marginal\_Fuel\_Postings.csv (January 4, 2021).
- 202012\_Marginal\_Fuel\_Postings.csv (March 4, 2021).
- 202101\_Marginal\_Fuel\_Postings.csv (March 4, 2021).
- 202102\_Marginal\_Fuel\_Postings.csv (April 4, 2021).
- 202103\_Marginal\_Fuel\_Postings.csv (May 5, 2021).
- 202104\_Marginal\_Fuel\_Postings.csv (June 7, 2021).
- 202105\_Marginal\_Fuel\_Postings.csv (July 8, 2021).
- 202106\_Marginal\_Fuel\_Postings.csv (August 12, 2021).
- 202108\_Marginal\_Fuel\_Postings.csv (October 1, 2021).
- 202107\_Marginal\_Fuel\_Postings.csv (October 1, 2021).
- 202109\_Marginal\_Fuel\_Postings.csv (November 11, 2021).
- 202110\_Marginal\_Fuel\_Postings.csv (December 1, 2021).

### **Percentage of PJM Load by State**

- PJM Load by State - 2020 (XLS) (March 4, 2021).

### **Components of PJM Price**

- Monthly Total Price Table – 2019 (October 13, 2021).
- Monthly Total Price Table – 2018 (October 13, 2021).

## ***Industry Briefings***

As part of its reporting role, the MMU provided briefings and presentations to industry groups and the Federal Energy Regulatory Commission (FERC). In 2021, the MMU shared the results of its analyses, experience and knowledge regarding competitive markets, market monitoring and market power mitigation at various conferences and meetings.

- Participant. “Investigation of Resource Adequacy Alternatives,” New Jersey Board of Public Utilities, Docket No. EO20030203. Webinar, February 19, 2021.
- Speaker. Market Monitor, OPSI Spring Meeting, Webinar, April 13, 2021.

- Speaker. “Role of the Independent Market Monitor,” University of Wisconsin Public Utility Institute, Webinar, April 28, 2021.
- Speaker. GT Power Hour, Podcast, May 3, 2021.
- Speaker. Modernizing Electricity Market Design, Technical Conferences, FERC Docket No. AD21-10, September 14 and October 12, 2021.
- Speaker. “Regional Roundup: The Impacts of FERC's Minimum Offer Price Rule Expansion in PJM Interconnection,” The William & Mary Law School, the Virginia State Corporation Commission and the Administrative Law Section of the Virginia State Bar, National Regulatory Conference, Webinar, May 27, 2021.
- Speaker. Northeast Power and Gas Virtual Conferences – “The Electricity Markets of Today,” Platts, May 27, 2021.
- Speaker. “ERCOT and Lessons Learned,” Norwegian Association of Energy Economics, Webinar, May 28, 2021.
- Speaker. “Aligning the Natural Gas & Electricity Industries,” Northwestern Electricity Dialogue, Northwestern Center on Law, Business and Economics and Wallace Stegner Center for Land, Resources and the Environment, Webinar, June 22, 2021.
- Speaker. “IMM MOPR Review,” PA House Environmental Resources & Energy Committee, Webinar, September 27, 2021.
- Speaker. “MOPR Review (Minimum Offer Price Rule),” PA Senate Environmental Resources & Energy Committee, Webinar, September 28, 2021.
- Speaker. “Power Markets in 2021 and Beyond,” Platts the Nodal Trader, Webinar, October 21, 2021.
- Speaker. “Applying ELCC in ISOs and Utility Balancing Areas to Ensure Resource Adequacy,” EUCI, Webinar, December 13, 2021.

## ***FERC Proceedings***

In 2021, the MMU intervened in proceedings at the FERC, filed substantive pleadings, and participated in numerous settlement and technical conferences with FERC staff in an effort to achieve compensation for reactive capability that is consistent with the PJM market design.

- **Affiliate Reporting (Docket No. EL21-14).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (January 12, 2021).
- **Hollow Road Solar Petition (Docket No. EL21-35).** Comments of the Independent Market Monitor for PJM (January 15, 2021).
- **FTR Default Proposal (Docket No. ER21-520).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (January 26, 2021).
- **New MBR Filings.** The Market Monitor routinely intervenes in requests by owners of generating facilities in PJM for new market based rates authorization (Docket No.

ER21-632; ER21-573; ER21-574; ER21-575; ER21-578; ER20-2845-001; ER20-2846-001; ER20-2847-001; ER20-2881-001; ER21-706; ER21-445; ER21-258; ER21-706)

- **Triennial Market Based Rates Filings for Non-Transmission Owners.** The Market Monitor protested reliance on PJM market power mitigation rules by owners of generating facilities submitting triennial filings in December 2020.
- **Chalk Point MBR (Docket No. ER21-573, et al).** Protest of the Independent Market Monitor for PJM (January 4, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (January 26, 2021) Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (February 5, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 1, 2021).
- **Toms River MBR (Docket No. ER21-632).** Protest of the Independent Market Monitor for PJM (January 4, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (January 27, 2021)
- **Albemarle, Mechanicsville, AB and Harts Mill MBR (Docket No ER20-2845-001, et al)** Motion for Clarification of the Independent Market Monitor for PJM (January 8, 2021);
- **Paulsboro MBR (Docket No. ER21-706).** Protest of the Independent Market Monitor for PJM (January 12, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (February 3, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 1, 2021).
- **Hilltop Energy Center MBR (Docket No. ER21-445).** Protest of the Independent Market Monitor for PJM (January 19, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (February 18, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 1, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 12, 2021).
- **Todd Solar MBR (Docket No. ER21-258).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (January 26, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 1, 2021).
- **Dickerson Power MBR (Docket No. ER21-574).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 1, 2021).
- **Lanyard Power Marketing MBR (Docket No. ER21-575).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 1, 2021).
- **Morgantown Power MBR (Docket No. ER21-577).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 1, 2021).
- **Morgantown Station MBR (Docket No. ER21-578).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 1, 2021).
- **Altavista Solar MBR (Docket No. ER21-44).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 1, 2021).

- **Battery Utility of Ohio MBR (Docket No. ER13-1667, et al).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 1, 2021).
- **Cube Yadkin Generation MBR (Docket No. ER16-2278, et al).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 1, 2021).
- **Longview Power MBR (Docket No. ER10-1556, et al).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 1, 2021).
- **Kestrel Acquisition MBR (ER18-1106, et al).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 1, 2021).
- **Whitetail Solar Reactive (Docket No. ER21-936).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 22, 2021). Reply of the Independent Market Monitor for PJM in Opposition to Offer of Settlement (April 21, 2021). Testimony of Joseph E. Bowring (November 15, 2021).
- **Jackson Complaint (Docket No. EL21-62, et al).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 31, 2021). Comments of the Independent Market Monitor for PJM (April 12, 2021).
- **MSOC (Docket No. EL19-47-001, et al).** Answer of the Independent Market Monitor for PJM (April 19, 2021). Brief of the Independent Market Monitor for PJM. (April 28, 2021). Reply Brief of the Independent Market Monitor for PJM (June 9, 2021). Answer of the Independent Market Monitor for PJM (July 26, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (June 25, 2021). Motion for Clarification of the Independent Market Monitor for PJM (October 12, 2021). Answer of the Independent Market Monitor for PJM (October 20, 2021). Motion for Clarification, or in the Alternative, Motion for Waiver of the Independent Market Monitor for PJM (November 18, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (December 1, 2021).
- **Real-Time Values (Docket No. ER21-1591).** Protest of the Independent Market Monitor for PJM (April 22, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (May 12, 2021).
- **Elk Hill Solar 2 Reactive (Docket No. ER21-1633).** Protest of the Independent Market Monitor for PJM. (April 28, 2021).
- **Black Start CRF Values (Docket No. ER21-1635).** Comments of the Independent Market Monitor for PJM (April 28, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (May 20, 2021). Comments of the Independent Market Monitor for PJM (July 2, 2021). Comments of the Independent Market Monitor for PJM (September 30, 2021).
- **ELCC (Docket No. ER21-278).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (April 29, 2021).
- **Panda Stonewall Reactive (ER17-1821-002).** Request for Rehearing of the Independent Market Monitor for PJM (April 30, 2021).
- **LS FRR Complaint (EL21-72).** Comments of the Independent Market Monitor for PJM (May 12, 2021).



- **ELCC (Docket No. EL19-100 and ER20-584).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (May 19, 2021).
- **Stability Limits (Docket No. ER21-1802).** Comments of the Independent Market Monitor for PJM (May 21, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (June 7, 2021).
- **PJM Capacity Market CRF (Docket No. ER21-1844).** Comments of the Independent Market Monitor for PJM (May 25, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (July 1, 2021).
- **Real-Time SCED (Docket No. ER21-1919).** Comments of the Independent Market Monitor for PJM (June 7, 2021).
- **Oxbow Reactive (Docket No. ER19-2847).** Reply of the Independent Market Monitor for PJM in Opposition of Settlement (June 16, 2021).
- **ELCC (Docket No. ER21-2043).** Comments of the Independent Market Monitor for PJM (June 22, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (July 9, 2021).
- **TLR Buy Through (Docket No. ER21-2079).** Comments of the Independent Market Monitor for PJM (June 25, 2021).
- **Mechanicsville Solar (Docket No. ER21-2091).** Protest of the Independent Market Monitor for PJM (June 28, 2021).
- **Jackson Complaint (Docket No. EL21-82).** Comments of the Independent Market Monitor for PJM (June 29, 2021).
- **IMEA Complaint (Docket No. EL21-79).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (July 13, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (August 5, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (August 26, 2021).
- **SOO Green Complaint (Docket No. EL21-85).** Comments of the Independent Market Monitor for PJM (July 27, 2021).
- **TO's Reversal of Upgrade Funding (Docket No. ER21-2282).** Protest of the Independent Market Monitor for PJM (July 28, 2021).
- **Fast Start Compliance Filing (Docket No. ER19-2772-005).** Comments of the Independent Market Monitor for PJM (August 6, 2021).
- **FTR Forfeiture Rule Compliance Filing (Docket No. ER17-1433-003).** Comments of the Independent Market Monitor for PJM (August 9, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (August 24, 2021).
- **MOPR Reform (Docket No. ER21-2582).** Protest of the Independent Market Monitor for PJM (August 20, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (September 22, 2021).
- **Kendall County Complaint (Docket No. EL21-95).** Comments of the Independent Market Monitor for PJM (August 30, 2021).

- **Lakehurst Solar Reactive (Docket No. ER21-737)**. Reply and Motion to Hold Proceedings in Abeyance of the Independent Market Monitor for PJM (September 7, 2021).
- **PJM Non Firm Point to Point Transmission (Docket No. ER21-2770)**. Comments of the Independent Market Monitor for PJM (September 17, 2021).
- **SOO Green Capacity Complaint (Docket No. EL21-103)**. Comments of the Independent Market Monitor for PJM in Support of Motion for Extension (September 27, 2021). Comments of the Independent Market Monitor for PJM (October 22, 2021).
- **Neptune Transmission Cost Allocation Complaint (Docket No. EL21-39)**. Brief of the Independent Market Monitor for PJM (October 8, 2021).
- **PLS Investigation (Docket No. EL21-78)**. Comments of the Independent Market Monitor for PJM (October 15, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (November 16, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (December 16, 2021).
- **PSEG/ArcLight Transaction (Docket No. EC21-128)**. Comments and Market Power Analysis of the Independent Market Monitor for PJM (November 1, 2021). Comments of the Independent Market Monitor for PJM (November 19, 2021).
- **CRF Formula 206 Investigation (Docket No. EL21-91)**. Comments of the Independent Market Monitor for PJM (November 11, 2021). Errata Filing of the Independent Market Monitor for PJM (November 18, 2021). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (December 20, 2021).
- **Ingenco Reactive (Docket No. ER20-1863)**. Reply in Opposition to Offer of Settlement and Motion for Abeyance of the Independent Market Monitoring for PM (November 22, 201).
- **Incremental Energy Offer and No Load Cost (Docket No. ER22-429)**. Comment of the Independent Market Monitor for PJM (December 9, 2021).

### ***FERC Technical Conferences***

- **Modernizing Electricity Market Design (Docket No. AD21-10)**. Comments of the Independent Market Monitor for PJM (April 26, 2021). Technical Conference Speaker. (October 12, 2021).
- **Hybrid Resources (Docket No. AD20-17)**. Comments of the Independent Market Monitor for PJM. (September 27, 2021).
- **Transmission Planning and Cost Allocation (RM21-17)**. Comments of the Independent Market Monitor for PJM (November 1, 2021).

### ***Settlement Proceedings***

In 2021, the IMM participated in multiple settlement conferences, technical conferences, and hearing conferences, in proceedings concerning the establishment of rates for reactive capability under Schedule 2 of the PJM OATT. Issues in these cases included:



the appropriate power factor; unit specific rates, applicability of the *AEP* Method; ability of battery storage resources to deliver reactive power, deliverability of reactive to the PJM Grid; and prevention of over recovery

In 2021, dockets, included: EL21-21; ER20-2148; ER20-2576; ER20-2847; ER20-2881; ER20-1863; ER20-1851; ER18-2497; ER20-2108; ER21-936; ER20-2446; ER19-2847; ER20-2953; ER20-2503; ER21-673; ER21-737; ER21-521; ER20-2186; ER21-511; ER21-864; ER21-1501; ER21-1365; ER21-1633; ER21-1696; ER21-1365; ER21-521; ER21-1937; ER19-391; ER21-2819; ER21-2091; ER21-2832; and ER21-2833; .

## ***State Proceedings***

In 2021, the MMU addressed market topics in proceedings at state public utility commissions and state legislatures:

### **New Jersey Board of Public Utilities**

- **Zero Emission Certificate Program for Eligible Nuclear Power Plants (Docket No. EO18080899).** Analysis of NJ Zero Emissions Certificate (ZEC) Applications. (January 29, 2021)
- **Zero Emission Certificate Program (Docket Nos. EO20080557, EO20080558 and EO20080559).** Post-Hearing Reply Brief of the Independent Market Monitor for PJM. (April 9, 2021).
- In the Matter of the Application of PSEG Nuclear, LLC and Exelon Generation Company, LLC for the Zero Emission Certificate Program–Salem Unit 1, et al., Superior Court of New Jersey, Docket No. A-2518-20 (November 11, 2021). Brief of the Independent Market Monitor for PJM.

### **Maryland Public Utility Commission**

- **Exelon 10 Year Report (Case No. 9271).** Report to the Maryland Public Service Commission, Case No. 9271. (March 11, 2021); Response of the Independent Market Monitor for PJM to Exelon (June 15, 2021); Response to Second Exelon Response of the Independent Market Monitor for PJM (August 16, 2021); IMM/Exelon Settlement Agreement (December 30, 2021); IMM Letter re IMM/Exelon Settlement Agreement (December 30, 2021).

### **North Carolina Public Utilities Commission**

- **Dominion Energy North Carolina (DENC) entry in PJM (E-22 sub 418):** Report to the North Carolina Utilities Commission: Congestion in the Dominion Service Territory in North Carolina (July 15, 2021 and revised on December 27, 2021). The IMM has since 2008 filed congestion reports required by order as a condition of DENC’s entry into PJM. The IMM also intervened in the proceeding and filed a response to a congestion analysis filed by DENC. Comments of the Independent Market Monitor for PJM on Dominion Report, NCUC Docket No. E-22, SUB 418 (December 27, 2021).

### **Ohio Siting Board**

- **Power Transmission System (Case No. 21-796-EL-UNC)** Comments of the Independent Market Monitor for PJM (August 4, 2021).

## ***Court Proceedings***

In 2021, the MMU addressed enforcement issues in proceedings in federal courts.

### **United States District Court for the Eastern District of Virginia**

- **FERC v. Powhatan (Case # 3:15-cv-00452-MHL)**. MMU Staff Deposition. (December 1-2, 2021).

## ***Participation in Stakeholder Process***

During 2021, the MMU regularly participated in meetings of all the major PJM committees and task forces, and formally presented information, analysis and recommendations to committees and task forces as needed.<sup>25</sup>

## **Markets and Reliability Committee (MRC)**

- **ARR/FTR Market Design and Design Components: IMM Proposals** (September 29, 2021).
- **Mileage Ratio Issue** (September 29, 2021).

## **Members Committee/MC Webinar (MC)**

- **Market Monitor Report** (January 25, 2021).
- **Market Monitor Report** (February 22, 2021).
- **Market Monitor Report** (March 22, 2021).
- **Market Monitor Report** (April 19, 2021).
- **Market Monitor Report** (July 26, 2021).
- **Market Monitor Report** (September 27, 2021).
- **Market Monitor Report** (October 18, 2021).
- **Market Monitor Report** (November 15, 2021).
- **ARR/FTR Market Design and Design Components** (November 17, 2021).
- **Market Monitor Report** (December 13, 2021).

## **Market Implementation Committee (MIC)**

- **Reactive Power Compensation – IMM Additions** (April 7, 2021).
- **Reactive Power Issue Charge** (April 7, 2021, May 13, 2021).
- **RPM Capacity Transfer Rights: Education** (April 7, 2021).
- **Mileage Ratio Issue** (July 14, 2021, August 11, 2021, September 9, 2021).
- **EE Addback in Capacity Auction Clearing – Problem Statement** (July 14, 2021).

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<sup>25</sup> OATT Attachment M § IV.D.

- EE Addback in Capacity Auction Clearing – Issue Charge (July 14, 2021).
- EE Addback Issue (August 11, 2021).
- EE Addback Issue Charge Revised (August 11, 2021).
- Fast Start Reserve Pricing Issue (August 11, 2021).
- IMM Proposals: ARR/FTR Design and Design Components (September 9, 2021).

### ***MIC Special Session: Capacity Market Workshop***

- Next Steps in Capacity Market Design (March 4, 2021).
- Capacity Market Design Issues (March 12, 2021).
- Capacity Market Phase 2 Issues (September 29, 2021).

### ***MIC Special Session: Quadrennial Review***

- Quadrennial Review Issues (August 27, 2021).

### ***MIC Special Session: MSOC/Net ACR***

- IMM Informational Session on MSOC (September 17, 2021).
- Market Seller Offer Cap (MSOC) Information (September 23, 2021).

### **Operating Committee (OC)**

- Synchronized Reserve Deployment: IMM Package (October 7, 2021 and November 4, 2021).

### **OC Special Session: Dynamic Line Ratings Education**

- DLR Education (March 30, 2021).

### **Finance Committee (FC)**

- Monitoring Analytics 2020 Financial Results (March 25, 2021).
- Monitoring Analytics Preliminary 2022 Budget (August 16, 2021).
- Monitoring Analytics Proposed Budget (September 13, 2021).

### **Critical Issue Fast Path – Minimum Offer Price Rule (CIFP – MOPR)**

- IMM MOPR Matrix Entries (June 16, 2021, June 30, 2021).

### **ARR FTR Market Task Force (AFMTF)**

- The PJM ARR/FTR Design: The LEI and IMM Observations (February 23, 2021).
- ARR/FTR As An Offset To Congestion (March 25, 2021).
- ARR/FTR Market Design and Design Components: IMM Proposal (June 11, 2021).
- ARR/FTR Data Update and IMM Package Proposal (July 13, 2021).

### **Electric Gas Coordination Senior Task Force (EGCSTF)**

- Electric and Gas Coordination (December 16, 2021).

## **Energy Price Formation Senior Task Force (EPSTF)**

- Circuit Breaker Preliminary Proposal (December 10, 2021).

## **Synchronized Reserve Development Task Force (SRDTF)**

- Synchronized Reserve Event Response (April 8, 2021).
- Synchronized Reserve Events: SCED (April 30, 2021).
- Synchronized Reserve Deployment: IMM Options (July 1, 2021).
- Synchronized Reserve Deployment: IMM Package (August 6, 2021, August 30, 2021).
- Synchronized Reserve Deployment: Comparison of PJM and IMM Packages (August 30, 2021).

## **Resource Adequacy Senior Task Force (RASTF)**

- Capacity Market Phase 2 Issues (October 22, 2021).

## **Cost Development Subcommittee (CDS)**

- Energy Offer Calculation Education (January 14, 2021, February 16, 2021).
- Equivalent Service Hours and Cyclic Maintenance Factors (April 14, 2021).
- Start and Soak Costs Proposal (June 14, 2021).
- IMM Start Cost Alternate Proposal (December 2, 2021).

## **PJM-NYISO Joint Initiative**

The MMU participated in discussions concerning Ramapo PAR cost allocations.

## **DER and Inverter Based Resources Subcommittee (DIRS)**

The MMU participated in discussions concerning public distribution microgrids, solar/battery hybrid resources, and FERC Order 2222, concerning the integration of distributed energy resources in the PJM markets.

- Order 2222 Design Discussion (May 17, 2021).
- IMM Order 2222 Issues (September 24, 2021).

## **Tech Change Forum**

- 2021-Q1 Changes Member Information Reporting Application (MIRA) (February 19, 2021).

## **Other Activities**

### ***OPSI Advisory Committee***

The OPSI Advisory Committee is established pursuant to Section III.G of Attachment M of the OATT, which provides:

“There shall be an OPSI Advisory Committee comprised of five (5) representatives appointed by the Organization of PJM States, Inc. The OPSI Advisory Committee shall meet

with the Market Monitoring Unit on a regular basis and as otherwise necessary to receive and discuss information relevant to this Plan. In addition to the specific responsibilities regarding budget and termination set forth in Sections III.E and III.F, the OPSI Advisory Committee may provide advice to the Commission, Market Monitor, the PJM Board, stakeholder committees, and stakeholder working groups regarding any matter concerning the Market Monitor, Market Monitoring Unit or Market Monitoring Plan. Any formal advice shall be in writing and, subject to confidentiality provisions, shall be made publicly available.”

The MMU met with the OPSI Advisory Committee on October 25, 2021. The OPSI Advisory Committee Meeting with Dr. Joseph Bowring (President, Monitoring Analytics, LLC), the Independent Market Monitor for PJM is a separate meeting and not a part of the OPSI Annual Meeting. This meeting is open to the public.

### ***Market Monitoring Unit Advisory Committee***

The Market Monitoring Unit Advisory Committee (“MMUAC”) is established pursuant to Section III.H of Attachment M of the OATT, which provides:

“There shall be an MMU Advisory Committee, chaired by the Market Monitor that is open to all stakeholders and representatives of Authorized Government Agencies. The MMU Advisory Committee shall act as a liaison between stakeholders and the MMU and shall provide advice from time to time on matters relevant to the MMU's responsibilities under this Plan. The MMU Advisory Committee shall have no authority to direct, supervise, review, or otherwise interfere with the functions of the MMU under this Plan, nor any authority to terminate or propose to terminate the Market Monitor.”

The MMU convened a meeting of the MMUAC on December 16, 2021. The MMU requested comments from stakeholders concerning the MMU’s implementation of the PJM Market Monitoring Plan. The MMU discussed: the Commission’s ANOPR: Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection (Docket RM21-17); Stage 1A ARR allocation issues and concerns with PJM’s ARR/FTR proposal; principles related to operating reserve demand curves and circuit breakers; the effect of fast start pricing on the PJM energy market for the period from September through November 2021; and the calculation of capacity Market Seller Offer Caps and associated issues.