



Monitoring  
Analytics

**Activities of the  
Market Monitoring Unit  
2018**

Independent Market Monitor for PJM  
November 18, 2019

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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 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.

The Federal Energy Regulatory Commission (FERC) assigns three core functions to MMUs: reporting, monitoring and market design.<sup>3</sup> 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.<sup>4</sup>

The MMU performs its reporting function primarily by issuing and filing annual and quarterly state of the market reports, and reports on market issues. The MMU also issues in depth reports on specific topics. The MMU regularly issues reports on RPM auctions. In other reports, the MMU responds to the needs of FERC, state regulators, or other regulatory authorities, in order to assist policy development, decision making in regulatory proceedings, and in support of investigations. The MMU also participates in FERC technical conferences as appropriate.

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

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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> OATT Attachment M § IV; 18 CFR § 1c.2.

and report on the PJM markets.<sup>5</sup> The MMU has direct, confidential access to the FERC.<sup>6</sup> The MMU may also refer matters to the attention of state commissions.<sup>7</sup>

The MMU monitors market behavior for violations of FERC Market Rules.<sup>8</sup> The MMU will investigate and refer “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>9</sup> <sup>10</sup> The MMU also monitors PJM for compliance with the rules, in addition to market participants.<sup>11</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 *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 costs. Cost-based offers for the energy market and the regulation market are based on short run

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<sup>5</sup> OATT Attachment M § IV.

<sup>6</sup> OATT Attachment M § IV.K.3.

<sup>7</sup> OATT Attachment M § IV.H.

<sup>8</sup> OATT Attachment M § II(d)&(q) (“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... “PJM Market Rules” 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>9</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>10</sup> OATT Attachment M § II(h-1).

<sup>11</sup> OATT Attachment M § IV.C.

marginal costs, also referred to as incremental costs.<sup>12</sup> 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.

In order to perform its role in PJM market design, the MMU evaluates existing and proposed PJM Market Rules as well as the design 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 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.<sup>15</sup> 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.<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 and market messages on the Monitoring Analytics web page at: <http://www.monitoringanalytics.com>.

## **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 also analyzes and monitors transmission issues, including transmission outages, and the impact of competition on transmission and the impact of transmission on competition. This ongoing market analysis and monitoring forms the basis for all MMU activities.

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

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<sup>12</sup> See OATT Attachment M–Appendix § II.A.

<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.

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 a participant's market behavior requires investigation it is required to submit a formal confidential referral of such behavior to the FERC 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 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 Performance 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 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 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 Competitive Entry Exemption and Self Supply Exemption requests. 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.

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

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

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

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.

In 2018, the MMU developed and applied metrics to evaluate reactive capability filings at FERC and to participate in those filings.

In 2018, the MMU monitored and analyzed the amount and nature of response to spinning events.

In 2018, the MMU continued to monitor the cost of the DASR Market during normal hours and compare it with the cost of the market during hours when PJM applies adjusted fixed demand for conservative operations.

In 2018, the MMU continued to monitor the regulation market structure and performance.

In 2018, the MMU continued to monitor, report on and work to correct issues with the long term FTR market. In 2018, the MMU worked with PJM to address the identified issues with the Long Term FTR product. In January 2018, the proposal to reserve system capability from reductions for outages and increased system capability for ARRs rather than sold in the Long Term FTR Auction was approved.

### ***Market Participant Discussions***

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 resolve informally such issues or other issues.”<sup>20</sup> In fulfilling this role in 2018, the MMU monitored participant behavior and discussed relevant matters with FERC staff and with market participants. In addition, the MMU received and investigated confidential complaints. The provision of additional details on these issues is governed by confidentiality rules.

The MMU engaged in extensive discussions with generating unit owners about their fuel cost policies, cost-based offers, and requirements for compliance with Market Rules.

In 2018, the MMU received confidential complaints and when appropriate, publicly proposed rule modifications while maintaining market participant confidentiality. A confidential complaint can reveal flaws in existing rules or procedures.

In addition to discussing notices and/or referrals on a confidential basis regarding the activities in the markets in 2018, the MMU engaged in numerous discussions with market participants about issues related to participant behavior in the PJM markets.

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<sup>20</sup> OATT Attachment M, § IV.J.1.

The MMU was involved, with PJM staff, in reviewing the generator parameter adjustment requests for Capacity Performance Resources, and in discussing the technical issues raised by generation owners for the adjustment requests. The MMU provided its input on PJM's criteria for determining the parameter limits for Capacity Performance resources, as well as areas of agreement and disagreement.

The MMU engaged in discussions with generation owners, renewable suppliers, demand side providers, industrial customers, financial participants, transmission owners, load serving entities, state public utility commissions, environmental interests, and public advocates.

The MMU attended meetings with PJM legal, Planning, and Performance Compliance departments regarding PJM's determination of its reactive power requirement and the extent to which existing PJM rules allow those requirements to be satisfied.

The MMU held discussions with PJM regarding the education and potential development of a change in the FTR forfeiture rule.

The MMU held discussions with PJM and members regarding issues with the LTFTR market.

The MMU was involved in discussions with stakeholders, PJM and external experts to determine potential new credit and participant default rules.

The MMU held discussions with PJM regarding the Regulation Market settlement.

The MMU held discussions with PJM regarding compliance with FERC Order No. 841 and defining the market participation model of electric storage resources (ESR) so that it would be consistent with PJM market design objectives.

The MMU held discussions with PJM regarding the compensation for primary frequency response in PJM markets. With a universal requirement to provide primary frequency response, PJM's current markets provide compensation for the provision of primary frequency response in both the capacity and energy markets.

## ***Communications with Regulators***

The MMU provides information to regulators, subject to compliance with applicable rules protecting confidentiality. In 2018, the MMU:

- Notified the Office of Enforcement as appropriate.
- Filed referrals as appropriate.
- Intervened in numerous reactive rate case filings with FERC.
- Communicated with FERC staff regarding current issues.
- Participated in FERC sponsored technical sessions regarding reactive power.
- Provided data in response to requests from FERC staff.



- Attended meetings and participated on conference calls with state regulators and the Organization of PJM States, Inc. (OPSI), to answer questions and discuss current topics.
- Attended meetings and participated on conference calls with state consumer advocates to answer questions and discuss current topics.

## **Reporting<sup>21</sup>**

### ***Reports and Analyses***

The 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 the markets within PJM and an assessment of the competitiveness of each market.<sup>22</sup> The reports also provided recommendations regarding retention and enhancement of market rules.

The MMU issued state of the market reports:

- The 2017 State of the Market Report for PJM (March 8, 2018).
- The 2018 Quarterly State of the Market Report for PJM: January through March (May 8, 2018).
- The 2018 Quarterly State of the Market Report for PJM: January through June (August 9, 2018).
- The 2018 Quarterly State of the Market Report for PJM: January through September (November 8, 2018).

The MMU issued other reports in 2018:

- PJM Energy Market Offer Caps: January 1 through 8, 2018 (January 19, 2018).
- Generation Additions and Retirements in the PJM Capacity Market: MW and Funding Sources (March 9, 2018).
- UTC Activity Pre and Post 162 FERC ¶ 61,139: January 1, 2017 through March 8, 2018 (April 3, 2018).
- Analysis of the 2021/2022 RPM Base Residual Auction – Revised (August 24, 2018).
- IMM Response to PJM re Opportunity Cost Calculations (September 16, 2018).
- MOPR/FRR Sensitivity Analyses of the 2021/2022 RPM Base Residual Auction (September 26, 2018).

The MMU issued Market Messages in 2018:

- Energy Offers Greater Than \$1,000 Per MWh (January 6, 2018).

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<sup>21</sup> Public reports by the MMU are posted at <<http://www.monitoringanalytics.com>>.

<sup>22</sup> OATT Attachment M § VII.A

- Generation Capacity Resources in PJM Region Subject to RPM Must Offer Obligation for 2018/2019, 2019/2020 and 2020/2021 Delivery Years (February 23, 2018).
- Incorrect Calculation of VOM Costs (March 1, 2018).
- Press Release - 2017 State of the Market Report for PJM (March 8, 2018).
- Members Committee Letter – 2017 State of the Market Report for PJM (March 8, 2018).
- PJM Monthly Billings, 2008 through February 2018 (March 22, 2018).
- Generation Capacity Resources in PJM Region Subject to RPM Must Offer Obligation for 2019/2020, 2020/2021 and 2021/2022 Delivery Years (May 9, 2018).
- Press Release - 2018 Quarterly State of the Market Report for PJM: January through March (May 10, 2018).
- Members Committee Letter – 2018 Quarterly State of the Market Report for PJM: January through March (May 10, 2018).
- Generation Capacity Resources in PJM Region Subject to RPM Must Offer Obligation for 2019/2020, 2020/2021 and 2021/2022 Delivery Years (July 6, 2018).
- Press Release - 2018 Quarterly State of the Market Report for PJM: January through June (August 9, 2018).
- Members Committee Letter – 2018 Quarterly State of the Market Report for PJM: January through June (August 9, 2018).
- Generation Capacity Resources in PJM Region Subject to RPM Must Offer Obligation for 2019/2020, 2020/2021 and 2021/2022 Delivery Years (August 24, 2018).
- Press Release - 2018 Quarterly State of the Market Report for PJM: January through September (November 8, 2018).
- Members Committee Letter – 2018 Quarterly State of the Market Report for PJM: January through September (November 8, 2018).
- Generation Capacity Resources in PJM Region Subject to RPM Must Offer Obligation for 2019/2020, 2020/2021 and 2021/2022 Delivery Years (December 31, 2018).

The MMU issued the following state reports in 2018:

- Report to the North Carolina Utilities Commission - Congestion in the Dominion Service Territory in North Carolina (July 16, 2018).

## ***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 2018, 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.

- Speaker. EUCI. Washington, D.C. (January 30, 2018).

- Speaker. Electric Power Supply Associations (EPSA).Board Meeting. Houston, TX (January 24, 2018).
- Speaker. Harvard Electric Policy Group. Palm Beach, FL (January 26, 2018).
- Speaker. Practising Law Institute, FERC Enforcement Panel. WebEx. (February 12, 2018).
- Speaker. Power Markets Today. Webinar (February 21, 2018).
- Speaker. Massachusetts Institute of Technology, Boston, MA (March 16, 2018).
- Speaker. Ohio General Assembly. Columbus, OH (March 20, 2018).
- Participant. OPSI Spring Meeting. Jersey City, NJ (April 9, 2018).
- Speaker. Gulf Coast Power Association Spring Conference. Houston, TX (April 17, 2018).
- Speaker. Energy Regulation & Litigation Group’s 13<sup>th</sup> Annual Energy Conference, Skadden, Arps, Slate, Meagher & Flom LLP. Washington, DC (April 25, 2018).
- Speaker. Expert Stakeholder Workshop: Energy & Environmental Developments in the PJM Region. Washington, D.C. (May 3, 2018).
- Speaker. PJM Annual Meeting of Members. National Harbor, MD (May 14 – 16, 2018).
- Speaker. RFF/R-Street Conference. Washington, D.C. (May 30, 2018).
- Speaker. Platts 13<sup>th</sup> Annual Northeast Power and Gas Markets. New York, New York (May 31-June 1, 2018).
- Speaker. FERC Market Monitors Meeting. Washington, D.C. (June 19-20, 2018).
- Speaker. FSR Summer School. Florence, Italy. (June 28-29, 2018).
- Speaker. Energypath 2018: Grid Integration. DeSales University, PA (July 26, 2018).
- Speaker. Pennsylvania Public Utilities Commission. Harrisburg, PA (August 21, 2018).
- Speaker. Houston Energy Compliance Group. Houston, TX (September 20, 2018).
- Speaker. Department of Energy. Webinar (October 17, 2018)
- Speaker. Platts Nodal Trader Conference. New York, New York (October 25-26, 2018).
- Speaker. OPSI Annual Meeting. Chicago, IL (October 29 – 30, 2018).
- Speaker. Pennsylvania State University. State College, PA (October 30, 2018).
- Speaker. Nicholas Institute and Great Plains Institute. Washington, D.C. (December 13, 2018).

## **Market Design**

Attachment M, Section IV.D provides “if the Market Monitoring Unit detects a design flaw or other problem with the PJM Markets, the Market Monitoring Unit may initiate and propose, through the appropriate stakeholder processes, changes to the design of such market. In support of this function, the Market Monitoring Unit may engage in

discussions with stakeholders, State Commissions, PJM Management, or the PJM Board; participate in PJM stakeholder meetings or working groups regarding market design matters; publish proposals, reports or studies on such market design issues; and make filings with the Commission on market design issues.”<sup>23</sup> In FERC Order No. 719 and its order on compliance for PJM, the Commission has emphasized this MMU core function.<sup>24</sup>

In 2018, the MMU and PJM developed market design changes for the synchronized reserve market. The changes would strengthen must offer requirement for reserves, remove the cost-based offer margin, and require penalties for failure of resources to perform during spinning reserve events.

In 2018, the MMU also developed an alternative to PJM’s proposal for a downward sloping Operating Reserve Demand Curve (ORDC). The MMU’s proposal would limit expansions of the ORDC to defined operator actions that have the potential to suppress prices.

In 2018, the MMU continued to recommend that PJM implement mitigation for aggregate market power in the energy market. The MMU included its recommendation

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<sup>23</sup> OATT Attachment M § IV.D.

<sup>24</sup> See Order No. 719 at P 357 (“[W]e do expect the MMU to advise the Commission, the RTO or ISO, and other interested entities of its views regarding any needed rule and tariff changes. Likewise, in the event an RTO or ISO files for a proposed tariff change with which the MMU disagrees, we expect the RTO or ISO to inform the Commission of that disagreement, although not necessarily to include a written proposal with its filing.”), codified at 18 C.F.R. § 35.28 (g)(3)(ii)(A) (“The Market Monitoring Unit must perform the following core functions: (A) Evaluate existing and proposed market rules, tariff provisions and market design elements and recommend proposed rule and tariff changes to the Commission-Approved independent system operator or regional transmission organizations, to the Commission’s Office of Energy Market Regulation staff and to other interested entities such as state commissions and market participants”). In its order of December 18, 2009, on PJM’s filing in compliance with Order No. 719, the Commission required additional changes to ensure that the PJM Market Monitoring Plan fully conforms to Order No. 719’s requirements concerning the role of MMUs in market design. 125 FERC ¶61,250 at P 113 (2009) (“PJM’s OATT fails to specify the MMU’s responsibility for evaluating existing and proposed market rules, tariff provisions and market design elements, and for recommending proposed rule and tariff changes to PJM, the Commission’s Office of Energy Market Regulation and to other interested entities (i.e., state commissions and market participants). Attachment M, section IV.C, in this regard, provides only that, if the MMU “detects a design flaw or other problem with the PJM Markets,” it may initiate and propose changes to such market design. This language, however, is limited to “design” issues relating to existing provisions and thus does not address the full scope of the core MMU function addressed by the Commission in Order No. 719”).

in the State of the Market report and presented its findings to the Market Monitoring Unit Advisory Committee in 2017.

In 2018, the MMU continued to recommend that PJM clarify that cost-based offers should be equal to short run marginal costs. The only reason for cost-based offers is to prevent the exercise of market power. The competitive offer level is equal to short run marginal cost.

At the direction of the PJM Board, on April 9, 2018, PJM filed with FERC two alternatives for restructuring the PJM capacity market, PJM's Capacity Repricing proposal and the MMU's MOPR-Ex proposal.<sup>25</sup> The MMU filed in support of the MOPR-Ex proposal two times in May 2018.<sup>26</sup> <sup>27</sup> In June 2018, FERC rejected both proposals while finding that PJM's existing Tariff is unjust and unreasonable and unduly discriminatory.<sup>28</sup> FERC instituted a 206 proceeding and preliminarily found that a reasonable replacement rate may be obtained by expanding the MOPR rules to cover out of market payments for new and existing capacity resources, and incorporating a resource specific FRR option that would allow resources receiving out of market payments to continue as PJM resources. Resources participating in the resource specific FRR option would not receive capacity market payments but would contribute toward meeting the PJM reliability requirement and participate in the energy and ancillary service markets.

In September 2018, the MMU published a report on the impacts of the resource specific FRR option.<sup>29</sup> The report included sensitivity analyses on various levels of participation in the resource specific FRR option. The MMU concluded that resource specific FRR would result in significant price suppression. The report also showed that PJM's proposed repricing approach to resource specific FRR would significantly increase

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<sup>25</sup> "Capacity Repricing or in the Alternative MOPR-Ex Proposal: Tariff Revisions to Address Impacts of State Public Policies on the PJM Capacity Market," PJM, ER18-1314-000, April 9, 2018.

<sup>26</sup> "Comments of the Independent Market Monitor for PJM," Monitoring Analytics, LLC, ER18-1314-000, May 7, 2018.

<sup>27</sup> "Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM," Monitoring Analytics, LLC, ER18-1314-000, May 25, 2018.

<sup>28</sup> 163 FERC ¶61,236 at 150.

<sup>29</sup> "MOPR/FRR Sensitivity Analyses of the 2021/2022 RPM Base Residual Auction," Monitoring Analytics, LLC, September 26, 2018 <<http://www.monitoringanalytics.com/reports/Reports/2018.shtml>>.

capacity prices and the cost of capacity. The MMU included the MOPR/FRR report as an attachment to a brief filed with FERC in October 2018.<sup>30</sup>

In the October 2018, brief, the MMU presented a new capacity market design proposal called the Sustainable Market Rule (SMR). The SMR design would provide the appropriate incentives to competitive market participants to retire units and to invest in new units over time such that reliability is ensured as a result of the functioning of the market. The SMR design is fully consistent with the renewables targets of many states in the PJM footprint and is also consistent with incorporating economic nuclear power plants in the capacity market. In November 2018, the MMU filed a second brief with additional details and clarifications regarding the SMR.<sup>31</sup>

In 2015, the MMU pointed out that PJM's policy governing the use of transmission penalty factors in the day-ahead and real-time market clearing was inadequate. The MMU recommended that PJM explicitly state its policy on the use of transmission penalty factors including: the level of the penalty factors; the triggers for the use of the penalty factors; the appropriate line ratings to trigger the use of penalty factors; and the allowed duration of the violation. In 2018, the MMU continued to work with PJM to develop market rules aimed at aligning penalty factors with broader scarcity pricing parameters and to incorporate consistent and transparent application across all transmission constraints and market conditions. In 2018, these rules received stakeholder approval and were submitted to FERC. The rules were approved on January 18, 2019.<sup>32</sup>

In 2018, the MMU continued to recommend that the Long Term FTR product be eliminated. Barring elimination, the MMU recommended that the Long Term FTR Market be modified so that the supply of prevailing flow FTRs in the Long Term FTR Market is based solely on counter flow offers in the Long Term FTR Market. Barring this fix, the MMU recommended that the full capability of the transmission system be allocated as ARRs prior to sale as FTRs. In January 2018, the proposal to reserve system capability from reductions for outages and increased system capability for ARRs rather than sold in the Long Term FTR Auction was approved.

In 2018, the MMU recommended that PJM retain the FTR forfeiture rule that was put in place on January 19, 2017. In 2018, the MMU also recommended that forfeiture amount from the FTR forfeiture rule be based on the correct hourly cost of an FTR, rather than a simple daily price divided by 24.

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<sup>30</sup> "Brief of the Independent market Monitor for PJM," Monitoring Analytics, LLC, EL16-49-000, October 2, 2018.

<sup>31</sup> "Brief of the Independent Market Monitor for PJM," Monitoring Analytics, LLC, EL16-49-000, November 6, 2018.

<sup>32</sup> 166 FERC ¶ 61,040.



In 2018, the MMU recommended that PJM examine the source and sink node combinations available in the FTR market and eliminate generation to generation paths and all other paths that do not represent the delivery of power to load. The current use of historic resources to determine source and sink combinations is inconsistent with actual system use and causes cross subsidies between and among ARR and FTR holders.

In 2018, the MMU recommended that, under the current FTR design, the full capability of the transmission system be allocated as ARRs prior to sale as FTRs. Reductions for outages and increased system capability should be reserved for ARRs rather than sold in the Long Term FTR Auction. The current method for the allocation of congestion rights is inconsistent with actual system use and system capability and causes cross subsidies between and among ARR and FTR holders.

In 2018, the MMU continued to recommend that all FTR auction revenue be distributed to ARR holders monthly, regardless of FTR funding levels. ARR revenue comes from the sale of congestion rights (FTRs) that belong to ARR holders. The surplus from the sale of these rights should go to the seller of the rights (ARR holders), not to supporting FTR funding levels.

In 2018, the MMU recommended that, under the current FTR design, all congestion revenue in excess of FTR target allocations be distributed to ARR holders on a monthly basis. Congestion revenue in excess of FTR target allocations comes from system capability that belongs to ARR holders, but was not made available to ARR holders during the allocation process.

In 2018, the MMU recommended that PJM evaluate the FTR bilateral indemnification rules and any asymmetries they may create in risk exposure and credits requirements.

In 2018, the MMU recommended that PJM examine the source and sink node combinations available in the FTR market and eliminate generation to generation paths and all other paths that do not represent the delivery of power to load. Paths that do not represent delivery of power to load are not available to ARR holders directly and represent paths that are inconsistent with the collection of congestion related to the serving of physical load.

In 2018, the MMU recommended that the direct customer request approach for creating and allocating IARRs be eliminated from PJM's tariff.

In 2018, the MMU continued to recommend that the Regulation Market be modified to incorporate a consistent application of the marginal benefit factor (MBF) throughout the optimization, assignment and settlement process. The MBF should be defined as the Marginal Rate of Technical Substitution (MRTS) between RegA and RegD.

In 2018, the MMU continued to recommend that the lost opportunity cost in the ancillary services markets be calculated using the schedule on which the unit was scheduled to run in the energy market.

## ***FERC Proceedings***

In 2018, the MMU intervened in proceedings at FERC, filed substantive pleadings, most of which addressed market design issues 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.

- **Order No. 831 (Docket No. ER17-1567-001).** Comments of the Independent Market Monitor for PJM (January 4, 2018).
- **IMM Complaint re AEP Cost-Based Offers (Docket No. EL17-22).** Answer of the Independent Market Monitor for PJM (January 4, 2018). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 8, 2018).
- **OVEC Integration (Docket No. ER18-459 and ER18-460).** Comments of the Independent Market Monitor for PJM (January 5, 2018).
- **Virtual Scheduling Points (Docket No. ER18-88).** Comments of the Independent Market Monitor for PJM (January 12, 2018). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (January 12, 2018).
- **Uplift Allocation (Docket No. ER18-86).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (February 16, 2018).
- **Storage NOPR (Docket Nos. RM16-23 and AD16-20).** Comments of the Independent Market Monitor for PJM (March 29, 2018).
- **Fast Start Pricing (Docket No. EL18-34).** Reply Brief and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 7, 2018). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (March 28, 2018). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (May 4, 2018).
- **Electric Storage (Docket No. RM16-23).** Answer of the Independent Market Monitor for PJM (April 2, 2018).
- **Base Capacity Complaint (EL17-32 and EL17-36).** Comments of the Independent Market Monitor for PJM (April 11, 2018).
- **PJM IA Reform (Docket No. ER18-988).** Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (April 18, 2018).
- **FTR Surplus Allocation (Docket No. ER18-1245).** Comments of the Independent Market Monitor for PJM (April 20, 2018). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (May 7, 2018).
- **Panda Stonewall Reactive (Docket No. ER17-1821-002).** Answer of the Independent Market Monitor for PJM (April 20, 2018). Answer of the Independent Market Monitor for PJM (July 20, 2018). Notice of Intent to Respond (August 29, 2018). Updated Notice of Intent to Respond (August 31, 2018). Answer of the Independent Market Monitor for PJM (September 9, 2018). Testimony of the Independent Market Monitor for PJM (October 4, 2018). Brief of the Independent Market Monitor for PJM



(December 6, 2018). Reply Brief of the Independent Market Monitor for PJM (December 21, 2018).

- **Regulation Market Reform (Docket No. ER18-87)**. Request for Rehearing of the Independent Market Monitor for PJM (April 27, 2018). Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (June 18, 2018).
- **PJM MOPR-Ex (Docket No. ER18-1314-000, -001)**. Comments of the Independent Market Monitor for PJM (May 25, 2018). Brief of the Independent Market Monitor for PJM (October 2, 2018). (EL18-178, ER18-1344-001, EL16-49) Brief of the Independent Market Monitor for PJM (November 6, 2018).
- **Clean MOPR-Ex (Docket No. EL18-169)**. Comments of the Independent Market Monitor for PJM (June 20, 2018).
- **IMM Filing Rights (ER16-372-004)**. Response to PJM (June 26, 2018).
- Fairless MOPR (Docket No. EL17-82). Response to PJM (June 26, 2018).
- MISO IMM Pseudo Tie Complaint (Docket No. EL17-62). Response to PJM (June 26, 2018).
- **PA Solar Park Reactive (Docket No. ER18-1226)**. Motion for Reconsideration or, in the Alternative, to Permit Appeal (July 20, 2018).
- **Tilton Complaint (Docket No. EL18-145)**. Answer of the Independent Market Monitor for PJM (August 10, 2018).
- **Greenhat Liquidations (Docket No. ER18-2068)**. Comments of the Independent Market Monitor for PJM (August 16, 2018).
- **IPPNY Complaint (Docket No. EL18-189)**. Comment of the Independent Market Monitor for PJM (August 20, 2018).
- **DC Energy (Docket No. ER18-1968)**. Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (August 24, 2018).
- **Order No. 844 (Docket No. ER18-2401)**. Comments of the Independent Market Monitor for PJM (October 1, 2018).
- **Proposed Amendment to Winter Peak Load (Docket ER19-142)**. Comments of the Independent Market Monitor for PJM (November 8, 2018).
- **Quadrennial Review (Docket No. ER19-105)**. Protest of the Independent Market Monitor for PJM (November 19, 2018).
- **VOM Complaint (Docket No. EL19-8)**. Protest of the Independent Market Monitor for PJM (November 19, 2018).
- **Maintenance Adders (Docket No. ER19-210)**. Protest of the Independent Market Monitor for PJM (November 19, 2018). Answer of the Independent Market Monitor for PJM (December 4, 2018). Answer and motion for Leave to Answer of the Independent Market Monitor for PJM (December 21, 2018).
- **Proposed Amendment to Demand Resource Aggregation Rules (Docket ER19-244)**. Comments of the Independent Market Monitor for PJM (November 21, 2018).

Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM (December 20, 2018).

- **FTR Liquidations Docket No. ER19-19, ER19-24.** Answer of the Independent Market Monitor for PJM (November 27, 2018).
- **Transmission Penalty Factor (Docket No. ER19-323, ER18-2401).** Comments of the Independent Market Monitor for PJM (November 27, 2018).
- **RMCP Calculation Changes (Docket No. ER19-383).** Comments of the Independent Market Monitor for PJM (December 12, 2018).
- **IMM FCP Complaint (Docket No. EL19-27).** Complaint of the Independent Market Monitor for PJM (December 28, 2018).

### ***Technical Conferences***

- **Distributed Energy Resources (Docket No. RM18-9 and AD18-10). Speaker** (April 10, 2018). Post Technical Conference Comments of the Independent Market Monitor for PJM (June 26, 2018).
- **PJM Seasonal Capacity (Docket Nos. EL17-32 and EL17-36). Speaker** (April 24, 2018). Post Technical Conference Comments of the Independent Market Monitor for PJM (July 13, 2018).

### ***Settlement Proceedings***

In 2018, the MMU participated in settlement proceedings in numerous dockets, including, for reactive capability rates: docket nos. EL18-8, ER17-2515, ER18-89, ER17-801, EL18-25, EL17-91, NJ18-9, ER17-2415, ER17-1821, ER18-734, ER17-262, EL18-130, EL18-121, ER18-90, EL18-134, ER17-259, ER18-144, EL18-136, EL18-148, ER18-1222, EL18-145, ER18-1688, EL18-190, ER18-2085, ER18-2270, EL19-7; and EL17-90 (Linden VFT complaint against PJM re transmission withdrawal rights); EL17-64 and -65 (Complaints against PJM Regulation Market); and EL18-184, EL18-185 (Complaint re Tilton pseudo tie).

### ***Court and State Proceedings***

In 2018, the MMU addressed market topics in proceedings in federal courts and at state public utility commissions and hearings at state legislatures:

#### **U.S. Courts of Appeals**

- Engaged in oral argument supporting the IMM et al. appeal of FERC's decision that it is unjust and unreasonable to include balancing congestion in the calculation of congestion revenue (IMM v FERC et al, D.C. Circuit No. 17-1106) (April 23, 2019).

#### **New Jersey Senate Environment and Energy Committee**

- Revised Statement re Establishing Nuclear Diversity Certificate Program Bill No. S-877 (January 25, 2018).

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

- Comments re Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants (October 22, 2018).

#### **Public Service Commission of the District of Columbia**

- PJM's Price Formation Proposal (February 21, 2018).

### ***Federal***

#### ***Recommendations Regarding PJM Market Rules***

During 2018, the MMU presented information, analysis and recommendations to PJM Committees.<sup>33</sup>

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

- MOPR-Ex Main Motion (January 25, 2018).
- MOPR-Ex Memo (January 25, 2018).
- MOPR-Ex Alternate Proposal (January 25, 2018).
- Long Term FTRs Proposal First Read (May 24, 2018).
- VOM Examples (May 24, 2018).
- System Offer Cap Implementation (May 24, 2018).
- Variable Operations and Maintenance Cost Proposals (July 26, 2018).
- Transmission Penalty Factors (October 25, 2018).
- Energy Price Formation (December 20, 2018).

#### ***MRC Special Session – PJM Response to FERC on Capacity Market Reforms***

- Capacity Market Reforms (August 2, 2018).
- Capacity Auction Clearing with Resource Specific FRR (August 15, September 11, 2018).

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

- Market Monitor Report (January 22, 2018).
- Market Monitor Report (February 20, 2018).
- Market Monitor Report (March 19, 2018).
- Market Monitor Report (April 16, 2018).
- Market Monitor Report (June 18, 2018).
- Market Monitor Report (July 23, 2018).
- Market Monitor Report (October 22, 2018).
- Market Monitor Report (December 3, 2018).

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<sup>33</sup> OATT Attachment M § IV.D.

## **MC Special Session**

- 2017 State of the Market Report for PJM (March 22, 2018).

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

- Long Term FTRs in PJM (January 10, 2018).
- LTFTR Market Issues (March 7, 2018).
- FTR Forfeiture Problem Statement (March 7, 2018).
- MIC VOM Proposal (April 4, 2018, June 6, 2018).
- FTR Forfeiture Rule Education (April 4, 2018).
- MIC Balancing Ratio (April 4, 2018).
- System Offer Cap Implementation (April 4, 2018, May 2, 2018)
- Long Term FTRs Proposal First Read (June 6, 2018).
- VOM Examples (June 6, 2018).
- Variable Operations and Maintenance Cost Proposals (July 11, 2018).
- CP Balancing Ratio and Offer Cap (August 8, 2018).
- Must Offer Exception Process Issues (November 7, 2018).
- FTR Mitigation (November 7, 2018).

## ***MIC Special Session - Quadrennial Review***

- IMM CONE CT Study Results (June 1, 2018, June 22, 2018).
- SOM Net Revenue (June 22, 2018).

## ***MIC Special Session – Transmission Constraint Penalty Factors***

- Impact on Energy Market if Transmission Penalty Factors Set Prices (June 27, 2018).
- Impact on Energy Market Results: Additional Data (August 8, 2018).

## ***MIC Special Session – Electric Storage Participation***

- Storage Participation (June 27, 2018).

## ***MIC Special Session – Opportunity Cost Calculator***

- Opportunity Cost Issues (September 25, 2018).

## ***MIC Special Session – Fuel Cost Policies***

- Fuel Cost Policies (November 2, 2018).

## **FC**

- MA 2017 Updated Financial Results (March 29, 2018).
- No Presentation, AFS Available (May 14, 2018).
- Preliminary Budget for 2019 (August 22, 2018).
- Proposed Budget for 2019 (September 18, 2018).
- No Presentation (October 16, 2018).

- No Presentation (November 28, 2018).

### **Demand Response Subcommittee (DRS)**

In 2018, the MMU discussed with PJM and stakeholders and submitted FERC filings for the definition of a winter peak (ER19-142) and seasonal DR aggregation rules (ER19-244).

### **Distributed Energy Resources Subcommittee (DERS)**

In 2018 the MMU discussed with PJM and stakeholders distributed energy resource definitions, DER participation in the wholesale and retail markets and co-located demand response and generation resources.

- Demand Response Offers (January 5, 2018).
- Co-Located Demand Response and Generation (October 31, 2018).

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

- System Offer Cap Implementation (February 18, 2018).
- Recommendations for PJM Reserve Markets (March 29, 2018).
- Synchronized Reserve Offers and Prices (March 29, 2018, May 4, 2018).
- Synchronized Reserve Margin (May 23, 2018).
- Reserve Subzones (May 23, 2018).
- Revised Synchronized Reserve Offer Margins (June 25, 2018).
- ORDC Shape Options (June 25, 2018).
- Synchronized Reserve Must Offer (August 21, 2018).
- Intertemporal ORDC (September 26, 2018).
- Reserve Market Design and Energy Price Formation (November 1, 2018).
- ORDC Discussion (November 28, 2018).
- Intertemporal ORDC Slope Determinants (November 28, 2018).
- Synchronized Reserve Penalties and Offer Margins (November 28, 2018).

### **Incremental Auction Senior Task Force (IASTF)**

In 2018, the MMU engaged in discussions with PJM and stakeholders concerning the RPM Incremental Auction process and replacement capacity rules.

- Analysis of Replacement Capacity for RPM Commitments (January 19, 2018).

### **MISO-PJM Joint and Common Market (JCM)**

The MMU participated in discussions concerning PJM/MISO seams issues including cross boarder transmission planning, pseudo ties and revisions to the firm flow entitlement freeze date.

### **PJM-NYISO Joint Initiative**

The MMU participated in discussions concerning Ramapo PAR cost allocations.

## **Primary Frequency Response Senior Task Force (PFRSTF)**

On February 15, 2018, the Commission issued Order No. 842, which modified the pro forma large and small generator interconnection agreements and procedures to require newly interconnecting generating facilities, both synchronous and nonsynchronous, to include equipment for primary frequency response capability as a condition to receive interconnection service. The MMU participated in discussions at the PFRSTF but did not come to agreement with PJM about mandatory provision of primary frequency response. PJM filed OATT revisions that substantively incorporated the pro forma agreements into its market rules.

PJM and the MMU started an ongoing study of individual unit responses to NERC identified frequency events to evaluate compliance and to determine if additional changes to the tariff are necessary.

- Primary Frequency Response Senior Task Force (January 24, 2018).
- Primary Frequency Response Senior Task Force (February 28, 2018).
- Primary Frequency Response Senior Task Force (March 21, 2018).
- Primary Frequency Response Senior Task Force (April 26, 2018).
- Primary Frequency Response Senior Task Force (May 23, 2018).
- Primary Frequency Response Senior Task Force (June 19, 2018).
- Primary Frequency Response Senior Task Force (July 25, 2018).
- Primary Frequency Response Senior Task Force (September 26, 2018).
- Primary Frequency Response Senior Task Force (October 28, 2018).
- Primary Frequency Response Senior Task Force (November 27, 2018).
- Primary Frequency Response Senior Task Force (December 5, 2018).

## **Planning Committee (PC)**

The MMU participated in discussions concerning capacity valuation for intermittent resources.

- Wind and Solar Hourly Analysis (November 26, 2018).

## **Summer-Only Demand Response Senior Task Force (SODRSTF)**

The Summer-Only Demand Response Senior Task Force is an ongoing subcommittee established by the Markets and Reliability Committee on August 24, 2017. Its purpose is to provide a solution for Demand Response resources unable to make annual commitments. The MMU presented a proposed solution option at the June 29 meeting.

- Performance Rating Calculation (August 2, 2018).
- Market Monitoring Unit Proposal Presentation (August 15, 2018).
- Market Monitoring Unit Proposal Presentation (August 29, 2018).
- Dual Participation Examples (August 29, 2018).

## **Data Postings**

### ***Marginal Fuel Posting***

- 201711\_Marginal\_Fuel\_Postings.csv (January 3, 2018).
- 201712\_Marginal\_Fuel\_Postings.csv (February 14, 2018).
- 201801\_Marginal\_Fuel\_Postings.csv (March 1, 2018).
- 201802\_Marginal\_Fuel\_Postings.csv (April 3, 2018).
- 201803\_Marginal\_Fuel\_Postings.csv (May 10, 2018).
- 201804\_Marginal\_Fuel\_Postings.csv (June 1, 2018).
- 201805\_Marginal\_Fuel\_Postings.csv (July 16, 2018).
- 201806\_Marginal\_Fuel\_Postings.csv (August 30, 2018).
- 201807\_Marginal\_Fuel\_Postings.csv (September 19, 2018).
- 201808\_Marginal\_Fuel\_Postings.csv (October 1, 2018).
- 201809\_Marginal\_Fuel\_Postings.csv (November 8, 2018).
- 201810\_Marginal\_Fuel\_Postings.csv (December 5, 2018).

### ***PJM Load by State***

- PJM Load by State - 2017 (XLS) (March 19, 2018).

## **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.”

In 2018, the MMU met with the OPSI Advisory Committee on Tuesday, October 30, 2018.



## ***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 7, 2018. The MMU requested comments from stakeholders concerning the MMU's implementation of the PJM Market Monitoring Plan. The MMU discussed the MMU's position on: capacity market issues; energy price formation; FTR forfeitures; reactive capability rates; and storage. The MMU also explained the MMU's constraint based congestion allocation logic and the MMU's review of fuel cost policies.