PJM Response to the 2020 State of the Market Report

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Contents

PJM Response to the 2020 State of the Market Report

Introduction

The 2020 State of the Market Report (SOM) for PJM contained 236 recommendations that provide the perspective of Monitoring Analytics (MA), the Independent Market Monitor for PJM, regarding changes to the PJM market rules and design intended to enhance the competitiveness, efficiency and durability of PJM's markets. The purpose of this document is to outline four key areas that PJM views as priorities for its market design and to summarize PJM's categorization of the status of each recommendation in the SOM.

After discussing the key focus areas, the following section provides a categorization of the SOM recommendations based upon their actionable status. Finally, the Appendix provides a complete list of the SOM recommendations identified by their section in the SOM report. PJM looks forward to discussion of these topics with members, stakeholders and MA.

Focus Areas from the 2020 State of the Market Report

The grid is in the midst of a major shift toward interconnecting new, renewable technologies that will have an impact on grid operations and market outcomes. The scale of this transition raises a number of questions regarding the operational needs and capability of the system at high levels of penetration, as well as whether the current market design provides sufficient revenues and incentives to deliver the attributes needed to maintain reliability. Specifically:

- Does the current market design clearly and accurately identify the attributes needed to maintain reliability?
- Will market revenues continue to be sufficient to incentivize the new entry of resources with the attributes needed to maintain reliability?
- If the current revenues are sufficient, is the distribution of those revenues optimal, or should it change by introducing new market rules?

These questions, and others, overlay many of the more specific market design opportunities PJM and its stakeholders will take on in the near future. It is important that the markets continue to work together to deliver reliability at low cost to consumers.

In 2021, PJM anticipates working with stakeholders and the Independent Market Monitor (IMM) on many different issues. The four topics described herein and listed below represent opportunities that PJM believes are the most critical at this time.

1 | Capacity Market Enhancements

2 | Price-Capping Provisions in the Energy and Reserve Markets

3 | Enhancements to the Auction Revenue Rights and Financial Transmission Rights Process

4 | Compliance With FERC Order 2222

Each of these areas is either linked to a recommendation in the 2020 SOM or is a key area of interest for PJM. Some of MA's recommendations in these areas propose solutions that may require additional analysis by PJM and MA, necessitate further stakeholder discussion and vetting, or are recommendations on which PJM and MA have not yet agreed. The following discussion provides some background on each of these issues, including where they stand within the stakeholder or regulatory process, as well as PJM's position on the topic, if one exists, or on a path forward.

Topic #1 – Capacity Market Enhancements

Background

In late 2019, the Federal Energy Regulatory Commission (FERC) ordered PJM to vastly expand its capacity market buyer-side market power mitigation provision called the Minimum Offer Price Rule (MOPR). The rule was originally put in place to identify and mitigate buyer-side market power in a narrow and well-defined set of circumstances – specifically, offering a new natural gas resource below its cost under the presumption that it could be used to deliberately lower market prices for load. The FERC ruling in 2019 expanded and repurposed the MOPR to apply more broadly to all resources receiving out-of-market support or subsidies (excepting federal subsidies) in an attempt to restore market prices to the level that would occur absent those subsidies. The consequence of this change was to require policy-supported resources to offer at higher prices in the capacity market, potentially leading to the failure to clear the capacity market and earn capacity market revenues to offset load obligations.

Beginning in February 2021, PJM held a series of workshops with stakeholders to identify areas where enhancements could be made to the capacity market. From this discussion, and pursuant to direction from the PJM Board,[1] an expedited stakeholder process was initiated to develop changes to the market rules for the MOPR. The stakeholder process has a target of making a filing with FERC in July 2021 and implementing those changes to the MOPR for the 2023/2024 Base Residual Auction to be held in December 2021.

In addition to the direction on the MOPR, the PJM Board, with input from PJM and stakeholders, also requested that following the resolution of the MOPR, PJM and stakeholders initiate discussion on other facets of the capacity market to "…ensure that the capacity market continues to function appropriately to drive reliability in a cost-effective manner." Those areas include but are not limited to:

1 | Capacity Resource Qualification and Performance Requirements

2 | Capacity Procurement Levels

3 | Competitive Procurement of Policy Resources

4 | Procurement of Additional Reliability-Based Services

[1] https://www.pjm.com/-/media/about-pjm/who-we-are/public-disclosures/20210406-board-letter-regarding-capacity-market-minimum-offer-price-rule-and-initiation-of-the-critical-issue-fast-path-process.ashx

PJM is currently engaging with stakeholders to identify the scope and timing of specific reforms to be considered in the latter phase of capacity market enhancement.

PJM Perspective

PJM believes that discussion in all of these areas is warranted to either affirm the current rules or make necessary enhancements so that the capacity market can continue meeting its objectives. While the Board directed action on the MOPR first, that prioritization was based on the need for relatively quick action, not an indication that the remaining items are less important. In anticipation of discussion on these remaining four topics, PJM offers the following interests.

1 | *Capacity Resource Qualification and Performance Requirements*

In this area, PJM is interested in working with stakeholders to determine whether there should be minimum physical qualifications for capacity resources and how to clarify and simplify performance incentives.

(a) Regarding resource qualifications, the current capacity market rules provide financial incentives to perform, but there are no bright-line physical limitations or requirements. PJM is interested in discussing whether such qualifications would be beneficial, and, if so, what they should be.

(b) PJM believes that the current performance assessment structure and rules are overly complex and can result in unclear incentives to capacity resources. Exploring ways to simplify and clarify this is of interest to PJM.

2 | *Capacity Procurement Levels*

Historically, PJM has bought capacity in excess of its Installed Reserve Margin (IRM). Stakeholders have different views on the benefits and drawbacks of this result. In this area, PJM is interested in discussing the drivers of over-procurement, what the "right" amount of capacity to procure is, and how to design the market with that objective in mind.

3 | *Competitive Procurement of Policy Resources*

Several stakeholders presented proposals during the capacity market workshop sessions that focused on competitively procuring resources with renewable attributes. PJM believes exploring this area is important to facilitate state and consumer decarbonization goals cost-effectively and likely requires interest from states and consumers that prefer renewable energy. PJM is interested in discussing whether clean capacity or clean energy is the relevant product and will consider a range of market mechanisms to accommodate state and customer interests within the wholesale markets.

4 | *Procurement of Additional Reliability-Based Services*

As the shift to renewable assets on the PJM system continues, it is important to ensure sufficient reliability/ancillary services are available to maintain system security and reliability. Today, PJM has ancillary services markets that operate in real time and day ahead for reserves and regulation and also compensate for other services, including black start and reactive capability. PJM is interested in discussing whether other services, such as quick start, load following, ramping and/or others, should be compensated in PJM's markets, and whether there may be a system or locational need to procure "flexible" capacity that can offer those products.

As stated, substantive discussion on these remaining items will commence following the resolution of the MOPR. PJM looks forward to discussing these issues with stakeholders and developing the necessary market enhancements.

In addition to these items, PJM also notes the importance of ensuring that reliability value of capacity resources is appropriately and accurately determined. To this end, PJM has refiled its Effective Load Carrying Capability (ELCC) methodology for intermittent resources for approval by FERC. Establishing the ELCC methodology for intermittent resources is critical given the anticipated increase in the penetration of these resources on the PJM system. Accurate determination of the reliability value of these resources will be absolutely necessary to ensure that appropriate quantities of other resources are committed, such that reliability is maintained given the evolving resource mix. As part of the ongoing development of the ELCC methodology, PJM has committed to enhancing the transparency and replicability of the ELCC model, examining the applicability of the ELCC methodology to all resources, and reviewing the ELCC model following its implementation for several RPM auctions. Assuming FERC's approval of PJM's filing, PJM plans to implement the ELCC methodology in time for the RPM Base Residual Auction for the 2023/2024 Delivery Year.

Finally, PJM also notes the importance of needing to resolve the open complaint at FERC regarding the Default Market Seller Offer Cap (MSOC) in the capacity market. The MSOC was originally designed to provide capacity market sellers the flexibility to articulate their opportunity cost of accepting a capacity commitment in their capacity market offer up to a pre-defined level without a demonstration of their methodology or underlying resource costs. On March 18, 2021, FERC granted a complaint that found that the current level of the Default MSOC is too high and allows for the exertion of market power. In early May 2021, PJM, the Independent Market Monitor and many stakeholders filed briefs into this proceeding stating their views on what would constitute a reasonable methodology to determine a Default MSOC. At this time, PJM and stakeholders are awaiting a decision from FERC on a replacement rule for the Default MSOC. It is imperative that the resolution of this item does not result in further auction delay.

Topic #2 – Price-Capping Provisions in the Energy and Reserve Markets

Background

In March 2019, PJM filed a set of market rule changes to enhance its reserve market design. The objective of these changes was to more appropriately model and value reserves in the markets by altering the shape of the Operating Reserve Demand Curves (ORDC) used to set the demand and willingness to pay for certain levels of reserves. FERC approved these changes in May 2020, and PJM is targeting their implementation in May 2022. A likely outcome of these changes is higher energy and reserve prices under the new proposal than exist under the current rules for the same operating conditions.

In February 2021, the Electric Reliability Council of Texas (ERCOT) experienced extreme weather conditions that resulted in very high energy prices, approximately $9,000/MWh, for over three days. Given this event, and the context of the aforementioned changes to the reserve market design, PJM and certain stakeholders question whether provisions should exist in PJM that cap energy and reserve market prices during a sustained operational emergency event. The market design following the May 2022 implementation could result in prices that expose market participants to extreme financial risk during such periods.

PJM Perspective

PJM believes that provisions to administratively limit prices under sustained extreme price conditions could be helpful to limit unnecessary risk to market participants and consumers. PJM also supports implementation of these provisions coincident with the May 2022 implementation of the reserve market enhancements. PJM believes the following questions are important areas for stakeholder discussion on this topic.

1 | What should be the objectives of any such administrative pricing provisions?

2 | What are the appropriate thresholds for triggering the administrative pricing provisions?

3 | Are there additional operational authorities that PJM should have to maintain reliability in such circumstances given that market signals will be muted?

Topic #3 – Enhancements to the ARR Allocation and FTR Markets

Background

The Auction Revenue Rights (ARR) and Financial Transmission Rights (FTR) Market Senior Task Force (AFMSTF)[2] was initiated in January 2020 pursuant to a recommendation in the report issued by independent consultants[3] on the credit default in PJM in 2018. The recommendation suggested that PJM "conduct a general review of the FTR market … to evaluate the risks and rewards of potential structural reforms."

[2] https://pjm.com/-/media/committees-groups/task-forces/afmtf/postings/afmtf-issue-charge.ashx

[3] https://www.pjm.com/-/media/library/reports-notices/special-reports/2019/report-of-the-independent-consultants-on-the-greenhat-default.pdf

The AFMSTF began meeting in January 2020 and met monthly through July of the same year. In mid-2020, PJM worked with stakeholders to develop the scope for an independent review of the ARR-FTR market that was performed by London Economics (LEI). The scope of the report was to determine the purpose of ARRs and FTRs, evaluate the performance of the current construct, and review other mechanisms used to allocate congestion revenues. Between July and December 2020, the group went on a hiatus to await the delivery of the report and presentation to stakeholders. Those both occurred in December 2020, and since that time, the group has met monthly to prioritize its work.

PJM Perspective

PJM is supportive of LEI's conclusions in the report. Specifically, LEI's conclusions regarding:

1 | The purpose of FTRs being both a congestion hedge and a mechanism to return congestion revenues to load.

2 | The opportunity to improve the ARR allocation process to give firm transmission customers greater access to congestion revenues.

3 | The more general conclusion that the FTR auctions are functioning efficiently, and that there is no need for major changes to this mechanism.

In March 2021, the stakeholders participating in the AFMSTF voted to prioritize the recommendations from the LEI report. That prioritization showed that topics such as bidding points for ARRs, model transparency, ARR allocation enhancements, and additional ARR or FTR products that could provide more hedging options are all of high interest to stakeholders in the AFMSTF. PJM supports the prioritization of these topics and looks forward to developing enhancements in these areas with stakeholders in 2021.

Topic #4 – Compliance with FERC Order 2222

Background

In September 2020, FERC issued Order 2222. This landmark order seeks to integrate distributed energy resources (DER) of all types into the wholesale markets via the use of a new market participant called a DER aggregator (DERA). The scope of this order is extremely broad and includes new market rules for both homogenous and heterogeneous DER aggregations and coordination procedures between PJM and electric distribution companies (EDCs) in its footprint on the interconnection and operation DER.

The order itself required a compliance filing by PJM in July 2021; however, earlier this year, PJM filed for, and FERC accepted, an extension of time on its obligation to make a compliance filing on Order 2222. Based on the extension, PJM is now required to make a compliance filing by Feb. 1, 2022.

PJM has been working with stakeholders on developing its compliance filing at the DER and Inverter-Based Resources Subcommittee (DIRS) since October 2020. The standard group meeting has been gathering monthly since the issuance of the order. Additionally, PJM has scheduled a second set of monthly meetings of the DIRS to address EDC-specific issues related to Order 2222. The meetings focused on EDC-specific issues are also open to all market participants.

PJM Perspective

PJM appreciates the significant collaboration between stakeholders on the issues to be resolved in Order 2222. The order touches on many complex market and jurisdictional areas that require dedicated focus and coordination between various groups.

On March 31, 2021, PJM put forward its initial thinking for its compliance filing on Order 2222. The proposal was intended to balance PJM's operational need for granular modeling of DER to accurately measure injections and flows with the desire in Order 2222 for aggregation of DER resources across a region. PJM invites stakeholder input on the appropriate balance between the competing objectives of aggregation and granularity. Successful implementation of Order 2222 aligns with PJM's strategic pillars of facilitating reliable and cost effective decarbonization, driving an efficient transition to the grid of the future, and fostering innovation across the PJM footprint. Enabling new technologies and new ways of integrating distributed technologies into the wholesale markets and broader grid can improve reliability and lower costs during the system transformation.

Given that the compliance filing for this order is not due until February 2022, PJM anticipates continued discussion and collaboration with stakeholders throughout the remainder of the year.

PJM Categorization of Recommendations from the 2020 State of the Market Report (SOM)

This section categorizes the recommendations contained within the 2020 State of the Market Report (2020 SOM). In 2020, the IMM introduced **25** new recommendations and marked three recommendations as adopted. Many of the IMM recommendations are repeated from past annual and quarterly State of the Market reports. PJM has conducted a review of all **236** recommendations and concluded the following:

- Adopted Recommendations: **13** recommendations are considered by the IMM and PJM as adopted. Therefore, PJM believes these recommendations could be removed from future SOM reports.
- Active Recommendations: **99** recommendations are considered by PJM to be active. These are recommendations that are categorized as actionable, assessment or archived.

Actionable – PJM considers these recommendations to be the highest priority. PJM plans to take action to address these recommendations in the coming year.	**Assessment** – PJM believes that these recommendations are of medium importance but need further investigation and analysis prior to determining if they are actionable.	**Archived** – PJM believes that these recommendations are low in priority and are therefore currently archived.

- Inactive Recommendations: **124** recommendations are considered by PJM to be inactive. PJM does not plan to take any further action (in the near future) for these recommendations due to one or more of the following reasons: the recommendation has not gained stakeholder consensus, the recommendation is rejected by FERC, the recommendation is addressed or the recommendation is out of PJM's purview (recommendation is raised to other regulatory bodies such as NERC, state PUC, etc.).

In an attempt to be concise and focused, PJM will limit its response to the adopted and active recommendations. The following table provides summary statistics for active recommendations.

ADOPTED & ACTIVE RECOMMENDATIONS

Section	ADOPTED	ACTIONABLE	ASSESSMENT	ARCHIVED	Section Percentage
Ancillary Services	1	11	8	6	23%
Capacity Market	0	8	3	3	13%
Demand Response	0	0	1	2	3%
Energy Market	4	2	2	17	22%
Energy Uplift	1	0	6	4	10%
Environmental	0	0	1	1	2%
FTRs & ARRs	2	14	0	0	14%
Interchange Transactions	2	2	1	3	7%
Net Revenue	1	0	0	0	1%
Planning	2	1	3	0	5%
Total Recommendations	**13**	**38**	**25**	**36**	**112**
Status Percentage	12%	34%	22%	32%	

The tables below list active recommendations by category of Adopted, Actionable, Assessment and Archived.

Appendix – Complete List of Adopted and Active Recommendations

ADOPTED				
Section	2020 Recommendation	Priority	Year Reported	IMM Status
Ancillary Services	The MMU recommends that PJM be more explicit and transparent about why tier 1 biasing is used in defining demand in the tier 2 synchronized reserve market. The MMU recommends that PJM define rules for estimating tier 1 MW, define rules for the use and amount of tier 1 biasing and identify the rule based reasons for each instance of biasing.	Medium	2012	Adopted 2019
Energy Market	The MMU recommends that the tariff be changed to allow units to have Fuel Cost Policies that do not include fuel procurement practices, including fuel contracts. Fuel procurement practices, including fuel contracts, may be used for the basis for Fuel Cost Policies but should not be required.	Low	2018	Adopted 2020
	The MMU recommends that PJM change the Fuel Cost Policy requirement to apply only to units that will be offered with non-zero cost-based offers. The PJM market rules should require that the cost-based offers of units without an approved Fuel Cost Policy be set to zero.	Low	2018	Adopted 2020
	The MMU recommends revisions to the calculation of energy market opportunity costs to incorporate all time based offer parameters and all limitations that impact the opportunity cost of generating unit output.	Medium	2016	Adopted 2020
	The MMU recommends that PJM market rules require the fuel type be identified for every price and cost schedule and PJM market rules remove nonspecific fuel types such as other or co-fire other from the list of fuel types available for market participants to identify the fuel type associated with their price and cost schedules.	Medium	2015	Adopted 2019
Energy Uplift	The MMU recommends eliminating the use of internal bilateral transactions (IBTs) in the calculation of deviations used to allocate balancing operating reserve charges.	High	2013	Adopted 2018
FTRs & ARRs	The MMU recommends that PJM enforce the FTR auction bid limits at the parent company level starting immediately.	High	Q3 2020	Adopted 2021
	The MMU recommends that the 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.	High	2018	Adopted 2019
Interchange Transactions	The MMU recommends changing the assignment of the Saskatchewan Power Company and Manitoba Hydro balancing authorities from the Northwest interface pricing point to the MISO interface pricing point and eliminating the Northwest interface pricing point from the day-ahead and real-time energy markets.	High	Q1 2020	Adopted Q4 2020

ADOPTED

Section	2020 Recommendation	Priority	Year Reported	IMM Status
Interchange Transactions	The MMU recommends that PJM eliminate the NCMPAIMP and NCMPAEXP interface pricing points. It is not appropriate to have special pricing agreements between PJM and any external entity. The same market pricing should apply to all transactions.	High	Q2 2020	Adopted Q4 2020
Net Revenue	The MMU recommends that the net revenue calculation used by PJM to calculate the net Cost of New Entry (CONE) and net ACR be based on a forward looking estimate of expected energy and ancillary services net revenues using forward prices for energy and fuel.	Medium	2019	Adopted 2020
Planning	The MMU recommends that rules be implemented to ensure that CIRs are terminated within one year if units cannot qualify to be capacity resources and, if requested, after one CP must offer exception to permit the issue of CP status to be addressed.	Low	2018	Adopted 2019
	The MMU recommends that rules be implemented to require that project cost caps on new transmission projects be part of the evaluation of competing projects.	Medium	2015	Adopted 2020

ACTIONABLE

Section	2020 Recommendation	Priority	Year Reported	IMM Status
Ancillary Services	The MMU recommends 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.	High	2010	Not Adopted, FERC Rejected
	The MMU recommends that PJM replace the static MidAtlantic/Dominion Reserve Subzone with a reserve zone structure consistent with the actual deliverability of reserves based on current transmission constraints.	High	2019	Not Adopted
	The MMU recommends that the $7.50 margin be eliminated from the definition of the cost of tier 2 synchronized reserve because it is a markup and not a cost.	Medium	2018	Not Adopted
	The MMU recommends that the variable operating and maintenance cost be eliminated from the definition of the cost of tier 2 synchronized reserve and that the calculation of synchronized reserve variable operations and maintenance costs be removed from Manual 15.	Medium	2019	Not Adopted
	The MMU recommends that the rule requiring that tier 1 synchronized reserve resources are paid the tier 2 price when the non-synchronized reserve price is above zero be eliminated immediately and that, under the current rule, tier 1 synchronized reserve resources not be paid the tier 2 price when they do not respond.	High	2013	Not Adopted

ACTIONABLE				
Section	2020 Recommendation	Priority	Year Reported	IMM Status
Ancillary Services	The MMU recommends that PJM eliminate the use of Degree of Generator Performance (DGP) in the synchronized reserve market solution and improve the actual tier 1 estimate. If PJM continues to use DGP, DGP should be documented in PJM's manuals.	Medium	2018	Not Adopted
	The MMU recommends that a reason code be attached to every hour in which PJM market operations adds additional DASR MW.	Medium	2015	Not Adopted
	The MMU recommends that PJM modify the DASR Market to ensure that all resources cleared incur a real-time performance obligation.	Low	2013	Not Adopted
	The MMU recommends that offers in the DASR Market be based on opportunity cost only in order to mitigate market power.	Low	2018	Not Adopted
	The MMU recommends that new CRF rates for black start units, incorporating current tax code changes, be implemented immediately. The new CRF rates should apply to all black start units. The CRF rates for units going into service since the change in the tax code should incorporate applicable changes to depreciation treatment and tax rates. The CRF rates for units constructed prior to the new tax law and to which the new tax law depreciation rules did not apply should incorporate only the applicable changes to the tax rate. The black start units should be required to commit to providing black start service for the life of the unit.	High	Q2 2020	Not Adopted
	The MMU recommends for oil tanks shared with other resources that only a proportionate share of the minimum tank suction level (MTSL) be allocated to black start service. The MMU further recommends that the PJM tariff be updated to clearly state how the MTSL will be calculated for black start units sharing oil tanks.	Medium	2017	Not Adopted
Capacity Market	The MMU recommends that the maximum price on the VRR curve be defined as net CONE.	Medium	2019	Not Adopted
	The MMU recommends that, as part of the MOPR unit specific standard of review, all projects be required to use the same basic modeling assumptions. That is the only way to ensure that projects compete on the basis of actual costs rather than on the basis of modeling assumptions.	High	2013	Not Adopted
	The MMU recommends that modifications to existing resource not be treated as new resources for purposes of market power related offer caps or MOPR offer floors.	Low	2012	Not Adopted
	The MMU recommends that the offer cap for capacity resources be defined as the net avoidable cost rate (ACR) of each unit so that the clearing prices are a result of such net ACR offers, consistent with the fundamental economic logic for a competitive offer of a CP resource.	High	2017	Not Adopted

ACTIONABLE

Section	2020 Recommendation	Priority	Year Reported	IMM Status
Capacity Market	The MMU recommends that PJM develop a process for calculating a forward looking estimate for the expected number of Performance Assessment Intervals (H) to use in calculating the Market Seller Offer Cap (MSOC). The MMU recommends that the Nonperformance Charge Rate be left at its current level. The MMU recommends that PJM develop a forward looking estimate for the Balancing Ratio (B) during Performance Assessment Intervals (PAIs) to use in calculating the MSOC. Both H and B parameters should be included in the annual review of planning parameters for the Base Residual Auction, and should incorporate the actual observed reserve margins, and other assumptions consistent with the annual IRM study.	High	2017	Not Adopted
	The MMU recommends that PJM update the values in the CRF table in the tariff when the components change.	High	2020	Not Adopted
	The MMU recommends that Capacity Performance resources be required to perform without excuses. Resources that do not perform should not be paid regardless of the reason for nonperformance.	High	2019	Not Adopted
	The MMU recommends that the market data posting rules be modified to allow the disclosure of expected performance, actual performance, shortfall and bonus MW during a PAI by area without the requirement that more than three market participants' data be aggregated for posting.	Low	2019	Not Adopted
Energy Market	The MMU recommends that Manual 15 (Cost Development Guidelines) be replaced with a straightforward description of the components of cost-based offers based on short run marginal costs and the correct calculation of cost-based offers.	Medium	2016	Not Adopted
	The MMU recommends that PJM approve one RT SCED case for each five minute interval to dispatch resources during that interval using a five minute ramp time, and that PJM calculate prices using LPC for that five minute interval using the same approved RT SCED case.	High	2019	Not Adopted
FTRs & ARRs	The MMU recommends that the ARR/FTR design be modified to ensure that the rights to all congestion revenues are assigned to load.	High	2015	Not Adopted
	The MMU recommends that all historical generation to load paths be eliminated as a basis for assigning ARRs. The MMU recommends that the current design be replaced with a network design in which the rights to actual congestion are assigned directly to load by node.	High	2015	Partially Adopted
	The MMU recommends that, under the current FTR design, the rights to all congestion revenue 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.	High	2017	Not Adopted
	The MMU recommends that IARRs be eliminated from PJM's tariff, but that if IARRs are not eliminated, IARRs should be subject to the same proration rules that apply to all other ARR rights.	Low	2018	Not Adopted

ACTIONABLE				
Section	2020 Recommendation	Priority	Year Reported	IMM Status
FTRs & ARRs	The MMU recommends that FTR funding be based on total congestion, including day-ahead and balancing congestion	High	2017	Not Adopted
	The MMU recommends a requirement that the details of all bilateral FTR transactions be reported to PJM.	High	Q2 2020	Not Adopted
	The MMU recommends that PJM continue to evaluate the bilateral indemnification rules and any asymmetries they may create.	Low	2018	Not Adopted
	The MMU recommends that PJM reduce FTR sales on paths with persistent over allocation of FTRs, including a clear definition of persistent over allocation and how the reduction will be applied.	High	2013	Partially Adopted
	The MMU recommends that PJM eliminate generation to generation paths and all other paths that do not represent the delivery of power to load	High	2018	Not Adopted
	The MMU recommends that the Long Term FTR product be eliminated. If the Long Term FTR product is not eliminated, 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.	High	2017	Not Adopted
	The MMU recommends that PJM improve transmission outage modeling in the FTR auction models, including the use of probabilistic outage modeling.	Low	2013	Not Adopted
	The MMU recommends that all FTR auction revenue be distributed to ARR holders monthly, regardless of FTR funding levels.	High	2015	Not Adopted
	The MMU recommends that, under current FTR design, all congestion revenue in excess of FTR target allocations be distributed to ARR holders on a monthly basis.	High	2018	Not Adopted
	The MMU recommends that PJM examine the mechanism by which self-scheduled FTRs are allocated when load switching among LSEs occurs throughout the planning period.	Low	2011	Not Adopted
Interchange Transactions	The MMU recommends that PJM end the practice of maintaining outdated definitions of interface pricing points, eliminate the NIPSCO, Southeast and Southwest interface pricing points from Day-Ahead and Real-Time Energy Markets and, with VACAR, assign the transactions created under the reserve sharing agreement to the SouthIMP/EXP pricing point.	High	2013	Partially Adopted, Q2 2020
	The MMU recommends modifications to the FFE calculation to ensure that FEE calculations reflect the current capability of the transmission system as it evolves. The MMU recommends that the Commission set a deadline for PJM and MISO to resolve the FEE freeze date and related issues.	Medium	2019	Not Adopted

ACTIONABLE

Section	2020 Recommendation	Priority	Year Reported	IMM Status
Planning	The MMU recommends that, if the market efficiency process is retained, PJM modify the rules governing benefit/cost analysis, the evaluation process for selecting among competing market efficiency projects and cost allocation for economic projects in order to ensure that all costs, including increased congestion costs and the risk of project cost increases, in all zones are included in order to ensure that the correct metrics are used for determining benefits.	Medium	2018	Not Adopted

ASSESSMENT

Section	2020 Recommendation	Priority	Year Reported	IMM Status
Ancillary Services	The MMU recommends 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.	High	2012	Not Adopted, FERC Rejected
	The MMU recommends that the lost opportunity cost calculation used in the Regulation Market be based on the resource's dispatched energy offer schedule, not the lower of its price or cost schedule.	Medium	2010	Not Adopted, FERC Rejected
	The MMU recommends that, to prevent gaming, there be a penalty enforced in the regulation market as a reduction in performance score and/or a forfeiture of revenues when resource owners elect to de-assign assigned regulation resources within the hour.	Medium	2016	Not Adopted, FERC Rejected
	The MMU recommends that the details of VACAR Reserve Sharing Agreement (VRSA) be made public, including any responsibilities assigned to PJM and including the amount of reserves that Dominion commits to meet its obligations under the VRSA.	Medium	2020	Not Adopted
	The MMU recommends that the VRSA be terminated and, if necessary, replaced by a reserve sharing agreement between PJM and VACAR South, similar to agreements between PJM and other bordering areas.	Medium	2020	Not Adopted
	The MMU recommends that all resources, new and existing, have a requirement to include and maintain equipment for primary frequency response capability as a condition of interconnection service. The PJM capacity and energy markets already compensate resources for frequency response capability and any marginal costs.	Medium	2018	Not Adopted
	The MMU recommends that, if payments for reactive are continued, fleet wide cost of service rates used to compensate resources for reactive capability be eliminated and replaced with compensation based on unit specific costs.	Low	2019	Partially Adopted

ASSESSMENT				
Section	2020 Recommendation	Priority	Year Reported	IMM Status
Ancillary Services	The MMU recommends that Schedule 2 to OATT be revised to state explicitly that only generators that provide reactive capability to the transmission system that provide PJM operates and has responsibility for are eligible for reactive capability compensation. Specifically, such eligibility should be determined based on whether a generation facility's point of interconnection is on a transmission line that is a Monitored Transmission Facility as defined by PJM and is on a Reportable Transmission Facility as defined by PJM	Medium	2020	Not Adopted
Capacity Market	The MMU recommends the enforcement of a consistent definition of capacity resource. The MMU recommends that the requirement to be a physical resource be enforced and enhanced. The requirement to be a physical resource should apply at the time of auctions and should also constitute a commitment to be physical in the relevant delivery year. The requirement to be a physical resource should be applied to all resource types, including planned generation, demand resources and imports.	High	2013	Not Adopted
	The MMU recommends that energy efficiency resources (EE) not be included on the supply side of the capacity market, because PJM's load forecasts now account for future EE, unlike the situation when EE was first added to the capacity market. However, the MMU recommends that the PJM load forecast method should be modified so that EE impacts immediately affect the forecast without the long lag times incorporated in the current forecast method. If EE is not included on the supply side, there is not reason to have an add back mechanism. If EE remains on the supply side, the implementation of the EE add back mechanism should be modified to ensure that market clearing prices are not affected.	Medium	2016	Not Adopted
	The MMU recommends use of the Sustainable Market Rule (SMR) in order to protect competition in the capacity market from nonmarket revenues.	High	2016	Not Adopted
Demand Response	The MMU recommends that energy efficiency MW not be included in the PJM Capacity Market and that PJM should ensure that the impact of EE measures on the load forecast is incorporated immediately rather than with the existing lag.	Medium	2018	Not Adopted
Energy Market	The MMU recommends explicitly accounting for soak costs and changing the definition of the start heat input for combined cycles to include only the amount of fuel used from first fire to the first breaker close in the Cost Development Guidelines.	Medium	2016	Not Adopted
	The MMU recommends that PJM clarify, modify, and document its process for dispatching reserves and energy when SCED indicates that supply is less than total demand including forecasted load and reserve requirements. The modifications should define: a SCED process to economically convert reserves to energy; a process for the recall of energy from capacity resources; and the minimum level of synchronized reserves that would trigger load shedding.	Medium	Q1 2020	Not Adopted
Energy Uplift	The MMU recommends that PJM initiate an analysis of the reasons why a significant number of combustion turbines and diesels scheduled in the Day-Ahead Energy Market are not called in real time when they are economic.	Medium	2012	Partially Adopted, 2019

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Section	2020 Recommendation	Priority	Year Reported	IMM Status
Energy Uplift	The MMU recommends that PJM develop and implement an accurate metric to define when a unit is following dispatch to determine eligibility to receive balancing operating reserve credits and for assessing generator deviations.	Medium	2018	Not Adopted
	The MMU recommends that PJM designate units whose offers are flagged for fixed generation in Markets Gateway as not eligible for uplift. Units that are flagged for fixed generation are not dispatchable. Following dispatch is an eligibility requirement for uplift compensation.	Medium	Q3 2020	Not Adopted
	The MMU recommends that up to congestion transactions be required to pay energy uplift charges for both the injection and the withdrawal sides of the UTC.	High	2011	Partially Adopted
	The MMU recommends modifications to the calculation of lost opportunity costs credits paid to wind units. The lost opportunity cost credits paid to wind units should be based on the lesser of the desired output, the estimated output based on actual wind conditions and the capacity interconnection rights (CIRs). The MMU recommends that PJM allow wind units to request CIRs that reflect the maximum output wind units want to inject into the transmission system at any time.	Low	2012	Not Adopted
	The MMU recommends that PJM eliminate the exemption for fast start resources (CTs and diesels) from the requirement to follow dispatch. The performance of these resources should be evaluated in a manner consistent with all other resources.	Medium	2018	Not Adopted
Environmental	The MMU recommends that PJM provide a full analysis of the impact of carbon pricing on PJM generating units and carbon pricing revenues to the PJM states in order to permit the states to consider a potential agreement on the development of a multistate framework for carbon pricing and the distribution of carbon revenues.	High	2018	Not Adopted
Interchange Transactions	The MMU recommends that PJM monitor, and adjust as necessary, the weights applied to the components of the interfaces to ensure that the interface prices reflect ongoing changes in system conditions. The MMU also recommends that PJM review the mappings of external balancing authorities to individual interface pricing points to reflect changes to the impact of the external power source on PJM tie lines as a result of system topology changes. The MMU recommends that this review occur at least annually.	Low	2009	Not Adopted
Planning	The MMU recommends that PJM modify the project proposal templates to include data necessary to perform a detailed project lifetime financial analysis. The required data includes, but is not limited to: capital expenditure; capital structure; return on equity; cost of debt; tax assumptions; ongoing capital expenditures; ongoing maintenance; and expected life.	Medium	2020	Not Adopted
	The MMU recommends that storage resources not be includable as transmission assets for any reason.	High	Q3 2020	Not Adopted

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Section	2020 Recommendation	Priority	Year Reported	IMM Status
Planning	The MMU recommends a comprehensive review of the ways in which the solution-based dfax is implemented. The goal for such a process would be to ensure that the most rational and efficient approach to implementing the solution-based dfax method is used in PJM. Such an approach should allocate costs consistent with benefits and appropriately calibrate the incentives for investment in new transmission capability. No replacement approach should be approved until all potential alternatives, including the status quo, are thoroughly reviewed.	Medium	2020	Not Adopted

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Section	2020 Recommendation	Priority	Year Reported	IMM Status
Ancillary Services	The MMU recommends that the total regulation (TReg) signal sent on a fleet wide basis be eliminated and replaced with individual regulation signals for each unit.	Low	2019	Not Adopted
	The MMU recommends that the ability to make dual offers (to make offers as both a RegA and a RegD resource in the same market hour) be removed from the regulation market.	High	2019	Not Adopted
	The MMU recommends that the components of the cost-based offers from providing regulation and synchronous condensing be defined in Schedule 2 of the Operating Agreement.	Low	2019	Not Adopted
	The MMU recommends that, for calculating the penalty for a tier 2 resource failing to meet its scheduled obligation during a spinning event, the definition of the IPI be changed from the average number of days between events to the actual number of days since the last event greater than 10 minutes.	Medium	2018	Not Adopted
	The MMU recommends that aggregation not be permitted to offset unit specific penalties for failure to respond to a synchronized reserve event.	Medium	2018	Not Adopted
	The MMU recommends that payments for reactive capability, if continued, be based on the 0.90 power factor that PJM has determined is necessary.	Medium	2018	Not Adopted
Capacity Market	The MMU recommends that capacity market sellers be required to request the use of minimum MW quantities greater than 0 MW (inflexible sell offer segments) and that the requests should only be permitted for defined physical reasons.	Medium	2018	Not Adopted
	The MMU recommends that RMR units recover all and only the incremental costs, including incremental investment costs, required by the RMR service that the unit owner would not have incurred if the unit owner had deactivated its unit as it proposed. Customers should bear no responsibility for paying previously incurred costs, including a return on or of prior investments.	Low	2010	Not Adopted

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Section	2020 Recommendation	Priority	Year Reported	IMM Status
Capacity Market	The MMU recommends elimination of the cost of service recovery rate in OATT Section 119, and that RMR service should be provided under the deactivation avoidable cost rate in Part V. The MMU also recommends specific improvements to the DACR provisions.	Medium	2017	Not Adopted
Demand Response	The MMU recommends that 30 minute pre-emergency and emergency demand response be considered to be 30-minute reserves.	Medium	2018	Not Adopted
	The MMU recommends that demand reductions based entirely on behind the meter generation be capped at the lower of economic maximum or actual generation output.	High	2019	Not Adopted
Energy Market	The MMU recommends that market participants be required to document the amount and cost of consumables used when operating in order to verify that the total operating cost is consistent with the total quantity used and the unit characteristics.	Medium	Q3 2020	Not Adopted
	The MMU recommends, given that maintenance costs are currently allowed in cost-based offers, that market participants be permitted to include only variable maintenance costs, linked to verifiable operational events and that can be supported by clear and unambiguous documentation of the operational data (e.g. run hours, MWh, MMBtu) that support the maintenance cycle of the equipment being serviced/replaced.	Medium	Q3 2020	Not Adopted
	The MMU recommends the removal of nuclear fuel and nonfuel operations and maintenance costs that are not short run marginal costs from the Cost Development Guidelines.	Medium	2016	Not Adopted
	The MMU recommends revising the pumped hydro fuel cost calculation to include day-ahead and real-time power purchases.	Low	2016	Not Adopted
	The MMU recommends, in order to ensure effective market power mitigation when the TPS test is failed, that markup be constant across the full MWh range of price and cost-based offers.	High	2015	Not Adopted
	The MMU recommends, in order to ensure effective market power mitigation when the TPS test is failed, that offer capping be applied to units that fail the TPS test in the real-time market that were not offer capped at the time of commitment in the day-ahead market or at a prior time in the real-time market.	High	Q3 2020	Not Adopted
	The MMU recommends, in order to ensure effective market power mitigation, PJM always enforce parameter limited values by committing units only on parameter limited schedules, when the TPS test is failed or during high load conditions such as cold and hot weather alerts or more severe emergencies.	High	2019	Not Adopted
	The MMU recommends the elimination of FMU and AU adders. FMU and AU adders no longer serve the purpose for which they were created and interfere with the efficient operation of PJM markets.	Medium	2012	Partially Adopted, 2014

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Section	2020 Recommendation	Priority	Year Reported	IMM Status
Energy Market	The MMU recommends that resources are not allowed to violate the ICAP must offer requirement. The MMU recommends that PJM enforce the ICAP must offer requirement by assigning a forced outage to any unit that is derated in the energy market below its committed ICAP without an outage that reflects the derate.	Medium	2020	Not Adopted
	The MMU recommends that storage and intermittent resources be subject to an ICAP must offer rule that reflects the limitations of these resources.	Medium	2020	Not Adopted
	The MMU recommends that PJM not include the balancing ratios calculated for localized Performance Assessment Intervals (PAIs) in the capacity market default offer cap, and only include those events that trigger emergencies at a defined zonal or higher level.	Medium	2018	Not Adopted
	The MMU recommends that PJM clearly define the business rules that apply to the unit specific parameter adjustment process, including PJM's implementation of the tariff rules in the PJM manuals to ensure market sellers know the requirements for their resources.	Low	2018	Not Adopted
	The MMU recommends that PJM not approve temporary exceptions that are based on pipeline tariff terms that are not routinely enforced, and based on inferior transportation service procured by the generator.	Medium	2019	Not Adopted
	The MMU recommends that PJM update the outage impact studies, the reliability analyses used in RPM for capacity deliverability, and the reliability analyses used in RTEP for transmission upgrades to be consistent with the more conservative emergency operations (post contingency load dump limit exceedance analysis) in the energy market that were implemented in June 2013.	Low	2013	Not Adopted
	The MMU recommends that PJM clearly define the criteria for operator approval of RT SCED cases used to send dispatch signals to resources and for pricing, to minimize operator discretion and implement a rule based, scheduled approach.	High	2018	Not Adopted
	The MMU recommends eliminating up to congestion (UTC) bidding at pricing nodes that aggregate only small sections of transmission zones with few physical assets.	Medium	Q3 2020	Not Adopted
	The MMU recommends eliminating INC, DEC, and UTC bidding at pricing nodes that allow market participants to profit from modeling issues.	Medium	Q3 2020	Not Adopted
Energy Uplift	The MMU recommends that uplift be paid only based on operating parameters that reflect the flexibility of the benchmark new entrant unit (CONE unit) in the PJM Capacity Market.	High	2018	Not Adopted
	The MMU recommends eliminating intraday segments from the calculation of uplift payments and returning to calculating the need for uplift based on the entire 24 hour operating day.	High	2018	Not Adopted
	The MMU recommends that the total cost of providing reactive support be categorized and allocated as reactive services. Reactive services credits should be calculated consistent with the balancing operating reserve credit calculation.	Medium	2012	Not Adopted, Stakeholder Process

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Energy Uplift	The MMU recommends that PJM pay uplift based on the offer at the lower of the actual unit output or the dispatch signal MW.	Medium	2018	Not Adopted
Environmental	The MMU recommends that renewable energy credit markets based on state renewable portfolio standards be brought into PJM markets as they are an increasingly important component of the wholesale energy market.	Medium	2010	Not Adopted
Interchange Transactions	The MMU recommends that transactions sourcing in the Western Interconnection be priced at either the MISO interface pricing point or the SouthIMP/EXP interface pricing point based on the locational price impact of flows between the DC tie line point of connection with the Eastern Interconnection and PJM.	High	Q1 2020	Not Adopted
	The MMU recommends that PJM explore an interchange optimization solution with its neighboring balancing authorities that would remove the need for market participants to schedule physical transactions across seams. Such a solution would include an optimized, but limited, joint dispatch approach that uses supply curves and treats seams between balancing authorities as constraints, similar to other constraints within an LMP market.	Medium	2014	Not Adopted
	The MMU recommends that the emergency interchange cap be replaced with a market based solution.	Low	2015	Not Adopted