

PJM Interconnection Response to the 2016 State of the Market Report

May 12, 2017

PJM Interconnection



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Note:

On May 15, 2017, Figure 6 on page 9 was updated to correct a typographical error.

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Executive Summary

The 2016 State of the Market Report¹ issued by PJM's Independent Market Monitor (IMM) provides an assessment of market performance and recommendations aimed at enhancing PJM's market design or market performance. The Market Monitor performs an important role in providing an independent assessment of market performance and provides valuable insights in its conclusions and recommendations. This report will provide to stakeholders PJM's observations on the market and evaluations of each substantive recommendation offered by the IMM.

In the 2016 State of the Market Report, the IMM concludes that the PJM markets work. The IMM concludes that the results of the PJM Energy, Capacity, Regulation, Synchronized Reserve, Day-Ahead Scheduling Reserve and Financial Transmission Right (FTR) markets were competitive. PJM agrees with the IMM and believes the observed market results support these conclusions.

In this response, PJM begins with a comprehensive view of the state of the PJM electricity markets. This introductory section highlights three topics: 1) setting the stage, 2) understanding price formation, and 3) key developments related to price formation in 2016. Through its discussion of these topics, PJM documents evidence that the PJM competitive electricity markets are delivering on their intended purpose, and highlights the critical importance of price formation, particularly in the energy market, given the evolving nature of the system and the fuel mix of supply resources. The document continues with critical events of 2016 and concludes the introductory section with a discussion of the ways in which PJM believes the markets need to continue to evolve.

Price formation in the energy and reserve markets needs to evolve. Components of the current mechanism by which energy prices are established require reevaluation, in particular the inability of inflexible resources to set locational marginal prices. Additionally, a mechanism is necessary to further incent resource flexibility. Given how the system is evolving, PJM needs to ensure that sufficient incentive exists for resources to provide flexibility to the grid and to establish transparent prices that drive innovation to provide this service. Finally, the incorporation of public policy into wholesale markets needs to be reexamined given recent and potential state actions to maintain specific resources in operation.

The remainder of this report provides PJM's response to each of the IMM recommendations contained in the 2016 State of the Market Report, paralleling the IMM's report structure with respect to each subject area.

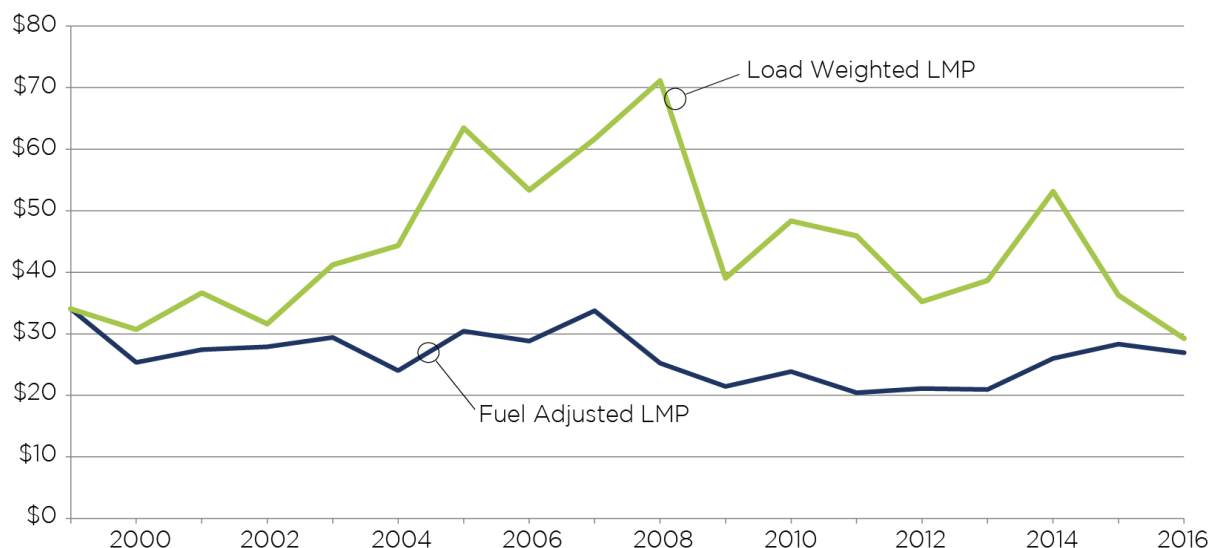
¹ 2016 State of the Market Report for PJM: Volume 2: Detailed Analysis, March 9, 2017 ("2016 SOM Report") at http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2016.shtml
PJM © 2017

Introduction

Setting the Stage

As illustrated in Figure 1, since 1997, the PJM markets have been competitive and producing stable fuel-adjusted energy prices for efficient and reliable operations. During this period, the markets have attracted competitive resource investments to ensure reliability. Most recently, in 2016, PJM experienced historically low energy prices with a load-weighted average locational marginal price (LMP) of \$29.27.

Figure 1. Annual Fuel-Cost Adjusted and Load Weighted LMP



Underneath the success and stability, the PJM markets have been undergoing a significant transition. The markets have seen an unprecedented fuel and technology switch from coal resources to advanced, efficient, natural gas resources. The shift is attributable to the fast growth of low-cost shale gas and efficiency improvements of combined-cycle gas turbines. These developments, combined with the continued increase of renewable energy penetration from wind and solar power and the stagnant growth of electricity demand (partly due to energy efficiency improvements), have resulted in steadily declining energy market prices.

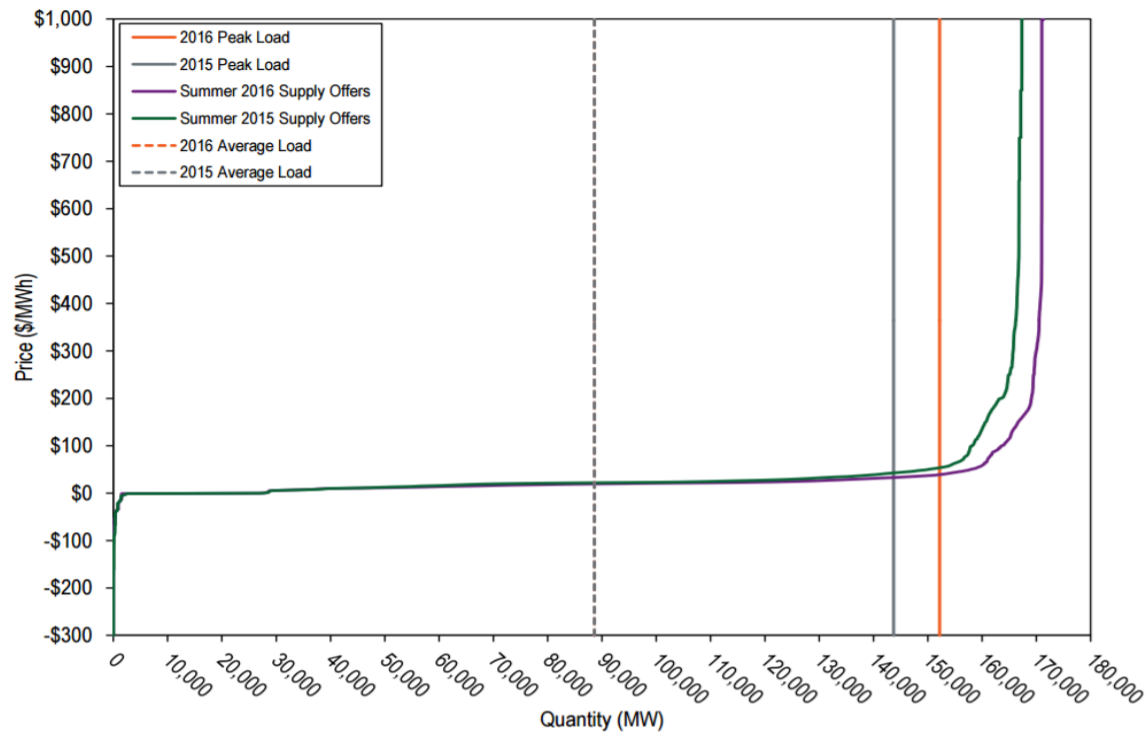
Low prices are consistent with competitive market results. By themselves, low prices should not be a cause for alarm. However, as certain types of generation are economically challenged in the current environment, the trend toward low market prices raises serious concern among some stakeholders. Some argue that, if continued, this trend would make it harder for existing suppliers to continue operation or for new investors to raise capital to enter the market, both of which would create uncertainties for future market evolution. Moreover, government agencies concerned with socioeconomic impacts, such as carbon emissions, local jobs and taxes, have triggered public policy actions in various states to preserve local generation. These developments test market price formation and long-term viability.

Understanding Price Formation

Price formation has grown in importance as the supply curve continues to flatten. Figure 2 illustrates this supply curve trend. Units formerly considered base and mid-merit now are relied on to serve load during peak hours. As the supply curve is becoming so flat, incremental movements in LMP are less effective in incenting units to reduce outputs to follow dispatch. PJM also has noted that resources utilizing natural gas as their primary fuel tend to acquire gas on an inflexible

basis, reducing their economic incentive to follow PJM dispatch signals. In addition, diminishing energy market returns increase the role of the capacity market in resource entry and exit decisions. These effects accumulate over the longer term to create unintended bias toward low capital-cost resources with high operating costs.

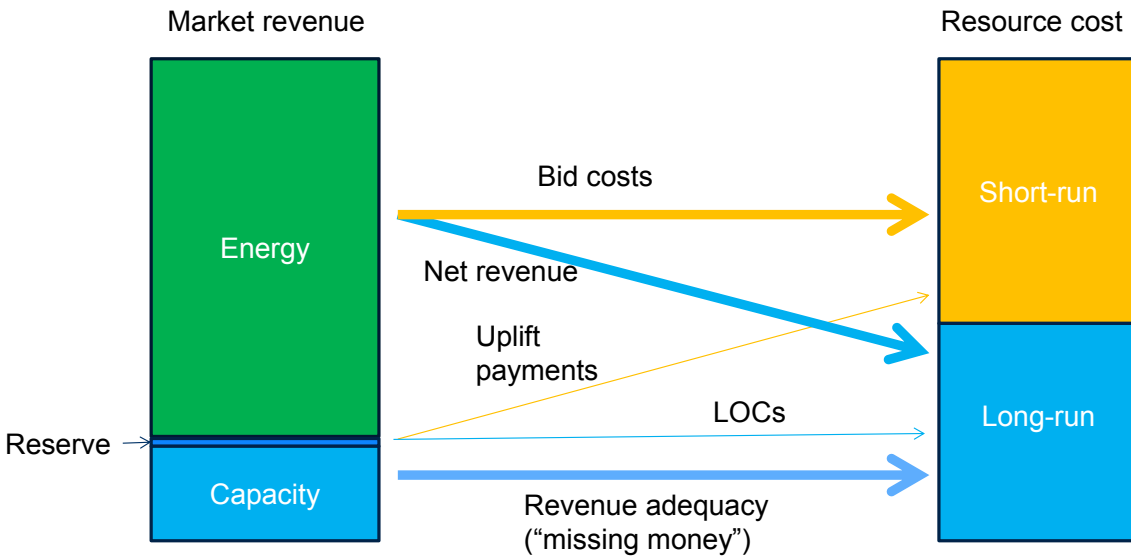
Figure 2. Average PJM Aggregate Real-Time Generation Supply Curves in summer 2015 and 2016²



PJM believes that a sustainable market construct built on a sound foundation of efficient price formation is essential in the long term. As illustrated in Figure 3, in a market design, price formation determines the distribution of the economic rent, which influences operational performance and investment incentives. In the current wholesale electricity market design, the short-run generation costs are covered mostly by the energy and ancillary services market revenues. The capacity market is designed to ensure resource adequacy and revenue sufficiency. In essence, the capacity market is a backstop construct to distribute the economic rent to induce competitive entry and exit decisions when the energy and reserve prices do not yield sufficient net revenue. When the net revenue from energy and ancillary services is adequate to recover the investment costs with competitive returns, the capacity construct becomes less important, and the capacity price drops. On the other hand, when net revenue is expected to be deficient, for example due to declining energy prices, the capacity construct increases in importance.

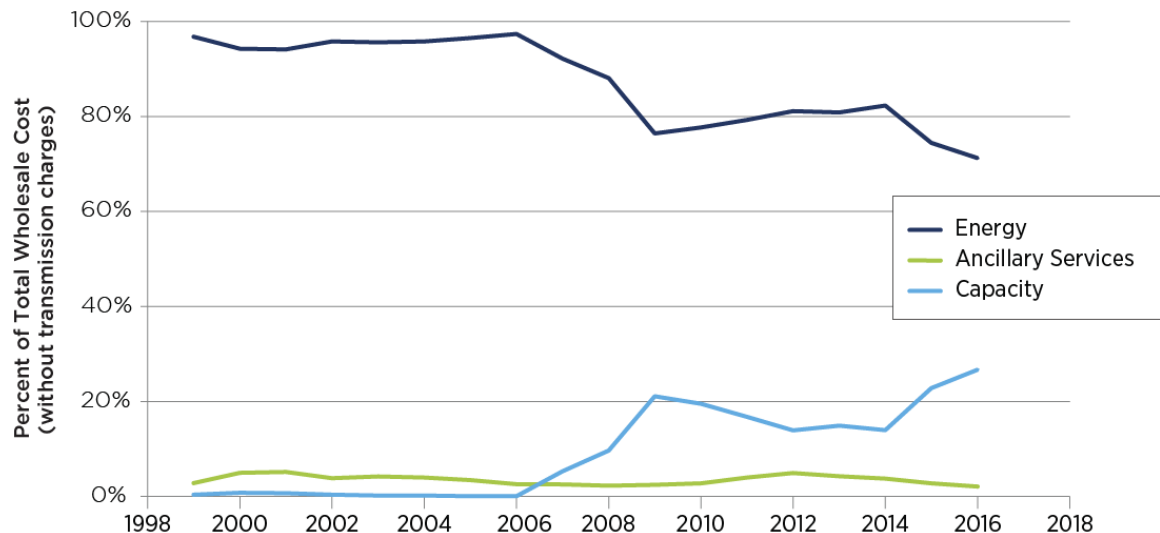
² Monitoring Analytics, LLC. *PJM State of the Market Report – 2016*. Section 3 – Energy Market.

Figure 3. Market Revenues Recovering Resource Costs



In the current PJM market construct, the energy and capacity revenues have contributed the predominant share to the recovery of total resource costs. PJM has observed diminishing energy market returns to supply resources, resulting in a shift to the capacity market for the greater proportion of returns for units' recovery of their total investment costs. Figure 4 shows that this trend has been more pronounced since 2014. According to the *State of the Market Report*, revenues from the energy and capacity markets were 74.3 percent and 22.9 percent, respectively, of the total generation revenue in 2015 and 71.1 percent and 26.6 percent in 2016. The total payments for ancillary services represent 2.8 percent of the total generation revenue in 2015 and 2.3 percent in 2016. To enhance the sustainable performance of the competitive market construct for the long-term, PJM is evaluating opportunities to improve energy price formation and capitalizing on the value of an increasingly diverse resource portfolio with distinctive characteristics. This improvement is necessary in order to ensure that the resources, which are necessary to meet demand efficiently while respecting transmission constraints, are appropriately valued through the market, and the system's needs are made transparent through the market prices.

Figure 4. Shift from Energy and Ancillary Services to Capacity



Key Developments Related to Price Formation in 2016

This subsection highlights key developments in 2016 concerning 1) capacity market with performance requirements, 2) policy and markets, 3) the price formation initiative from the Federal Energy Regulatory Commission (FERC) and 4) Energy, Reserves and Resilience.

Capacity Market with Performance Requirements

In 2016, the reliability pricing model (RPM) completed the second year of transition toward full Capacity Performance construct in the base residual auction for 2020/2021. The uniform, transparent market design addresses a reliability problem evidenced during the polar vortex event while fostering competitive performance incentive and efficient price formation. The base residual auction cleared 167,305.9 megawatts (MW) of unforced capacity (for 2019/2020 planning year), attracting 5,000 MW of new combined-cycle gas resources in the RTO region. This auction was the second in which PJM procured two capacity product types: Capacity Performance and Base Capacity. Capacity Performance resources must be capable of sustained, predictable operation and are expected to be available and capable of providing energy and reserves when needed throughout the entire delivery year. Base Capacity resources may not be capable of sustained, predictable operation and/or may not be expected to provide energy and reserves outside of the summer period. Base Capacity resources include generation resources, as well as base capacity demand resources, which are expected to be available only during the summer months, and base capacity energy efficiency resources, which are expected to provide permanent continuous load reduction only during the summer months.

The 2019/2020 RPM base residual auction cleared 167,305.9 MW of unforced capacity in the PJM region. As shown in Table 1 and Table 2, the resource clearing price was \$100/MW-day for Capacity Performance and \$80/MW-day for base capacity for the Rest of RTO region, attracting 5,373.6 MW of new combined-cycle gas resources. The auction resulted in competitive prices while committing resources to significantly increased performance requirements.

Table 1. Resource Clearing Prices for 2019/2020 Base Residual Auction

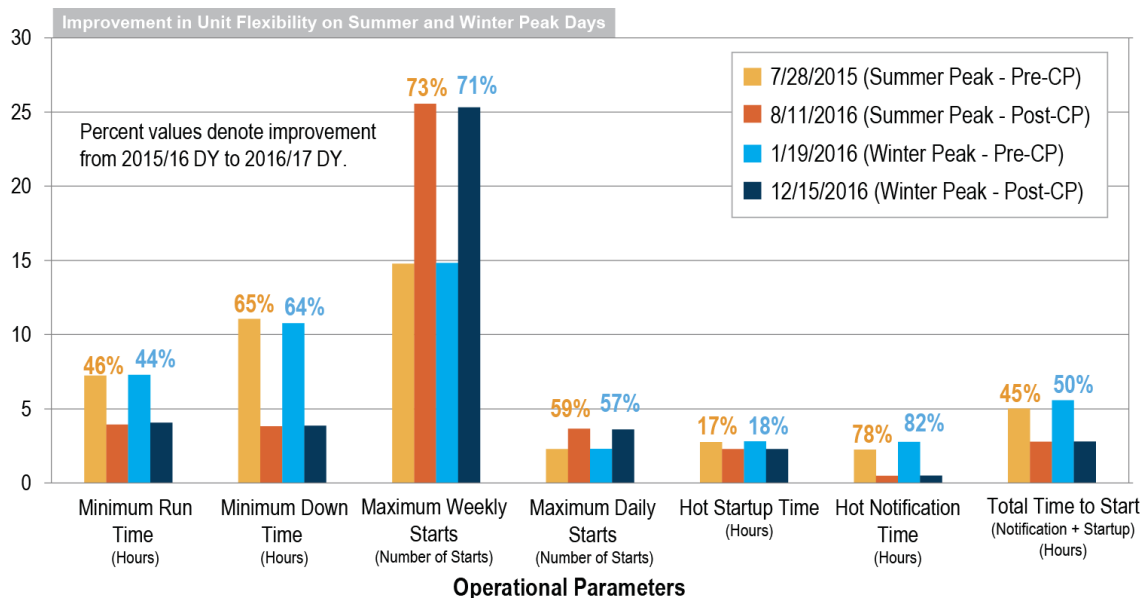
Capacity Type	2019/20 BRA Resource Clearing Prices (\$/MW-day)				
	Rest of RTO	EMAAC	PEPCO	COMED	BGE
Capacity Performance	\$100.00	\$119.77	\$100.00	\$202.77	\$100.30
Base Generation	\$80.00	\$99.77	\$80.00	\$182.77	\$80.30
Base DR/EE	\$80.00	\$99.77	\$0.01	\$182.77	\$80.30

Table 2. New Generation and Generation Updates

BRA Year	BRA Delivery Year	New Generation	Generation Updates
2016	2019/2020	5373.6	155.6
2015	2018/2019	2919.3	587.8
2014	2017/2018	927.4	339.9
2013	2016/2017	4281.6	1181.3
2012	2016/2015	4898.9	447.4

Nearing completion of the first delivery year, PJM evaluated the performance of units under Capacity Performance and noticed improved generator flexibility in the unit-specific parameter requirements for all CP resources. Figure 5 shows the preliminary result in which a comparison was made between the resources' operating parameters for the peak summer and winter days in 2015/16 and 2016/17. The operating parameters examined include notification and start-up time (total time to start), minimum run time, minimum down time, maximum daily and weekly starts. All parameter values experienced significant improvements, ranging from 17 percent to 82 percent, during summer and winter peak hours. A flexible generation fleet enables the system operator with options to dispatch generation during stressed periods of peak demand in ways that reduce operational inefficiencies, reduce uplift and total system cost, and improve system reliability. A more in-depth analysis of the Capacity Performance implementation will be made available in summer 2017.

Figure 5. Improvements in Unit Flexibility



As PJM entered the second year of RPM under the new CP rules, some stakeholders raised concerns about the ability of resources with different seasonal availabilities and demand resources to participate under the new rules. Under these rules that apply uniformly to all resources, certain resources, such as demand resources, energy efficiency and solar that are primarily available in the summer season, may not be able to participate meaningfully in PJM's capacity market in the future. In order to ensure adequate opportunity for seasonal resources to participate in the capacity auctions, PJM and its stakeholders worked through the Seasonal Capacity Resources Senior Task Force and developed an aggregation mechanism that was filed with, and accepted by, the FERC. PJM will implement this mechanism in the 2017 Base Residual Auction for the 2020/2021 Delivery Year.

Public Policy and Markets

As discussed above, the significant penetration of new, efficient, low-cost combined cycle generation due to sustained, low natural gas prices combined with the continued entry of renewable resources and declining load growth has resulted in steadily declining energy prices in the PJM region. As a result, certain coal and nuclear units in PJM have become economically challenged, and their owners have indicated that they will need to retire them before they would have otherwise planned to do so. Certain states have expressed concern with this result for various reasons, including impacts on the environment of retiring resources that do not emit carbon (in the case of nuclear units), loss of jobs and local tax

revenues, and increasing reliance on resources fueled by natural gas. State policy makers have, therefore, either acted already or are considering the possibility of acting to provide subsidies to nuclear and coal resources to ensure they remain in operation.

Although some state subsidies may intend to address the financial problems that some generators face due to declining energy prices, paradoxically, the subsidies actually may make the problem worse because they further depress market prices, causing needs for more subsidies. The effects of subsidies are not benign. If subsidies are limited in scope and magnitude, their economic damages would be mainly due to the substitutional effects, which may not be very significant by themselves. As the 2016 State of the Market Report indicates, however, subsidies are contagious and could spread. If subsidies do become more widespread, they could deter new entry while the suppressed price could artificially raise demand, causing supply shortages in the long term.

Subsidies are generally not the most effective policy instrument to achieve policy goals. For example, carbon pricing, even if implemented on a sub-regional basis by individual states, could be a better alternative than state subsidy programs to achieve the carbon emission goals. It also will not have the same distortionary effects on competitive market price formation. PJM has posted a document presenting an overview of how PJM could facilitate the implementation of a carbon price by some or all of the PJM states.³

PJM also has been working with stakeholders and other wholesale market operators to consider a range of potential market-design solutions to harmonize markets and the interactions of individual state public policy actions. At the August 2016 Grid 20/20 Forum on public policy and markets, PJM put forward a “capacity market repricing” proposal to allow the quantities of those subsidized resources to be recognized as capacity for purposes of meeting the PJM installed reserve margin (so as to avoid the “paying twice” problem associated with expansion of the minimum offer price rule) while insulating the overall market clearing price from the impact of those subsidies. PJM’s capacity market repricing proposal is a work in progress intended to address the impacts of individual state actions on the capacity market, and PJM recently posted an updated document on this proposal.⁴ In January 2017, PJM stakeholders endorsed a problem statement and are engaged in a stakeholder process to address the impact of state policy actions on PJM’s capacity market.

FERC Price Formation Initiative

In June 2014, the FERC initiated “Price Formation Docket” (AD14-14) to evaluate issues regarding price formation and settlement in the energy and ancillary service markets. In 2016, the FERC issued Notices of Proposed Rulemaking (NOPR) and orders to enhance energy price formation:

- Order 825 directs ISOs/RTOs to trigger shortage pricing for any interval that a shortage of energy or operating reserves occurs and settle energy, reserves and interchange transactions at the same interval in which they are dispatched.
- Order 831 directs RTOs/ISOs to set the energy price cap at the higher of \$1,000/MWh or the resource’s verified cost-based offer.

³ <http://www.pjm.com/~media/library/reports-notice/special-reports/20170502-advancing-zero-emission-objectives-through-pjms-energy-markets.ashx>

⁴ <http://www.pjm.com/~media/library/reports-notice/special-reports/20170502-capacity-market-repricing-proposal.ashx>

- In the NOPR on fast-start pricing, the FERC proposes that an RTO/ISO modify its fast-start pricing algorithm to relax the economic minimum operating limit of inflexible fast-start resources and allow them to set price like a flexible dispatchable resource.
- In the NOPR on energy storage and distributed energy resources, the FERC proposes to remove the barriers to the participation of electric storage resources and distributed energy resource aggregations in the organized wholesale electric markets

Fast start pricing: allow both flexible and inflexible resources to set LMP

PJM is supportive of the price-setting aspects of the fast-starting pricing NOPR and believes that this initiative represents a beneficial, fundamental change. Through PJM's process of evaluating the FERC's proposed requirements, it became clear to PJM that some of the concepts should be expanded to all resources, not just fast-start resources. Conceptually, there is no apparent reason that allowing both flexible and inflexible resources to set price should be limited to merely fast-start units. PJM believes it is prudent to begin to address price formation on a larger scale rather than limiting it to the class of fast-start resources.

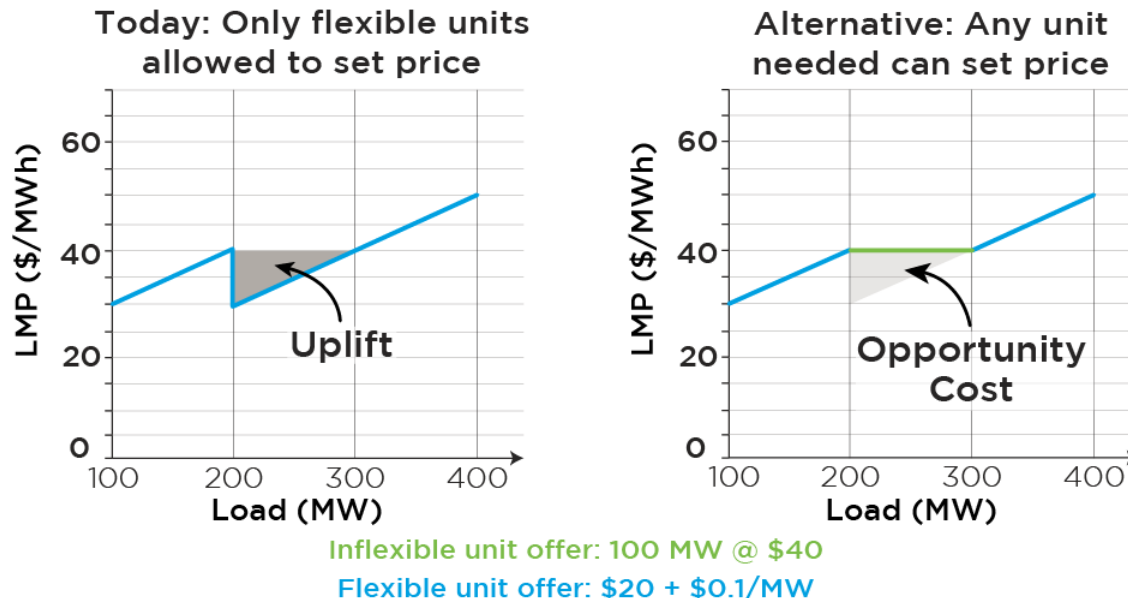
PJM believes that a market-based compensation mechanism is an appropriate way to properly value resource flexibility. Encapsulating these costs in a market clearing price and not out-of-market payments is directly in line with the commission's intention in this NOPR, and the price formation proceeding in general. At a high level, PJM envisions a market structure that could capture those opportunity costs incurred by flexible resources being re-dispatched to accommodate inflexible resources in a uniform clearing price. This clearing price would be paid to all similarly situated resources in a method akin to many existing reserve markets. In other words, all resources deviating from what would be their optimal output given the LMP at their location because they are following PJM dispatch instructions would be paid a uniform clearing price based on the marginal resource's opportunity cost. Compensating these resources on the basis of a marginal clearing price will incentivize resources to provide the capability to provide this service and thereby enhance the efficiency of system operations.

For example, on a typical working day at PJM, the system load usually picks up very rapidly from 4 a.m. to 8 a.m. reaching a rate near 100 MW per minute. This pushes the system's ramping capability to its limit and often taxes the capacity of regulation reserve, in particular Regulation D. During the short ramping period, many inflexible units need to be dispatched. But today, the LMP price-setting logic does not allow these units to set prices, because only additional MWs above a unit's economic minimum are eligible to set price. As a result, the LMP could become erratic and provide inaccurate signals and ineffective incentives for load following and load balancing.

Figure 6 shows the results under the current LMP price-setting logic versus an alternative of allowing all units to set price. Allowing inflexible units to set price would create an outcome in which price increases more consistently as load increases. This price-setting expansion would reduce uplift, if PJM would also institute a load-following product. Calling on resources to vary output at levels below LMP creates an opportunity cost that needs to be compensated. Implementing expansion of price-setting eligibility with a load-following product would decouple LMP and dispatch in a way that would incentivize generators to more closely follow load, instead of chasing price.

Transparently reflecting the value of this flexibility in a uniform clearing price would also incentivize currently inflexible units to become more flexible. This incentive could be further solidified by allocating a portion of the cost of a load-following product to inflexible resources. Including inflexible resources in the cost allocation would reflect the fact that flexible resources are needed, in part to account for the impacts of that inflexibility. Additionally, a transparent price signal would incentivize the development of alternative resources to provide additional flexibility to the system.

Figure 6. Current vs. Alternative LMP Setting Logic



Implementation of a load-following product is timely given the growing diversity of demand and supply as well as distributed energy resources. Implementation of such a product will increase the value of flexibility in system operations. Valuing flexibility in electricity markets will drive innovation with respect to flexibility through the advancement of alternative resources, as well as in the gas procurement and transportation mechanisms, thereby promoting enhanced gas-electric coordination.

Energy storage and DERs: separate retail and wholesale transactions

PJM has a longstanding history of supporting innovation in the electric industry and is supportive of the FERC's NOPR to remove barriers to the participation of electric storage resources (ESRs) and distributed energy resources (DERs) in the organized wholesale electric markets. Currently, approximately 300 MW of battery and flywheel technologies have actively participated in PJM's Regulation Market. In addition, PJM has fully integrated demand response resources into wholesale markets, providing capacity, energy and/or ancillary services. Additionally, many DERs participate in PJM as front-of-the-meter resources. In fact, more than 100 generators and ESRs, totaling over 700 MW of nameplate capacity connected to various distribution systems across 10 states, have rights to sell in PJM's markets.

It is important to note that participation of ESRs and DERs likely will have retail and wholesale market, operational and jurisdictional impacts, particularly those behind-the-meter resources that seek to inject power past the applicable retail meter and onto the transmission or distribution system. PJM believes it is necessary to work carefully with its stakeholders and states to develop technical requirements and methods to separate retail and wholesale transactions in order to ensure that behind-the-meter resources are eligible to provide the full array of retail and wholesale services that they are capable of providing while also guaranteeing that such resources are not "double compensated" or "double charged" for services in

the wholesale and retail markets and further guaranteeing that retail and wholesale market jurisdiction and integrity are respected⁵.

Energy, Reserves and Resilience

In the recent report, “PJM’s Evolving Resource Mix and System Reliability,” PJM highlighted the need to focus on grid resilience, meaning preparing for significant, credible system events, being able to operate through such events, and building the capability to recover quickly, especially as the electric system becomes more dependent natural gas generation and pipeline infrastructure. Part of enhancing resilience involves instituting operational reforms in which PJM would commit additional reserves or operate the system more conservatively. PJM will produce a roadmap for comprehensively addressing resilience issues including operations, planning and IT through the stakeholder process in the near future.

PJM believes that the reserve markets are a critical complement of energy market design and have not received the same focus as the energy and capacity markets. Reserve market designs significantly differ across the United States because they are largely “add-on” markets to the energy market that recognize the operational need for reserves without dedicated focus on the discrete products and price methodologies. In fact, reserve markets were initially ignored in the original design of wholesale power markets in order to implement the markets more quickly.

As such, many reserve markets, including PJM’s, suffer from price formation issues that result in much of the cost of these markets being recovered through uplift payments. As the supply curve is flattening while demand is declining, energy prices are likely to stay low most of the time without the variation and price “spikes,” making it difficult for the energy price to fully capture the economic rent. PJM believes that reserve markets and the method by which PJM co-optimizes reserve products with energy is a significant opportunity to enhance the market design while making the system more resilient through efficient commitment and pricing.

PJM is confident that the market results of 2016 reflect a fundamentally sound market design built on solid economic principles and competitively disciplined market behavior. PJM looks forward to working with the IMM to address the issues and recommendations contained in the *2016 State of the Market Report*. Going forward, PJM anticipates potential opportunities to enhance market price formation in the energy, reserve and capacity markets.

⁵ PJM is engaged with stakeholders on this subject via special meetings of the Market Implementation Committee.

PJM Response to IMM Recommendations from the 2016 State of the Market Report

Some IMM recommendations are repeated from past State of the Market Reports. Some of these recommendations already have been addressed or are being actively discussed within the stakeholder process. Several recommendations have been discussed by stakeholders in the past and have not been adopted or the FERC has decided in a different direction. A more-detailed PJM response to the conclusions and recommendations from the *2016 State of the Market Report* is provided below. PJM has either implemented or is in the process of addressing approximately half of the recommendations. In this section, PJM provides a detailed response to each of the IMM's recommendations, including explanations when the status of a particular recommendation is not agreed on by PJM and the IMM.

Table 3. Summary of PJM Status of IMM Recommendations

PJM Status	Description	Number of Recommendations	Percent
Implemented	These recommendations have been implemented.	57	34%
Stakeholder Process	These recommendations are under active discussion in the PJM stakeholder process or other stakeholder forum.	12	7%
Pending before the FERC	These recommendations are being considered by the FERC.	6	4%
Action Planned	PJM expects to take action or initiate a stakeholder discussion on this recommendation in 2017.	8	5%
No Further Action Planned	PJM has reviewed this recommendation but does not plan to act on this issue in the near future due to No Stakeholder consensus (35%), Rejected by the FERC (20.5%), PJM concerns (36.5%), or this recommendation is outside of PJM control (8%).	63	38%
Low Priority	These issues have low impact to the markets and PJM stakeholders. No action is planned in the near future because there are other issues with more significant potential to impact the markets.	22	13%
Under Review	These recommendations are being reviewed by PJM staff	0	0%

Energy Market Recommendations

IMM Recommendation: The IMM recommends that the market rules should explicitly require that offers into the Day-Ahead Energy Market be competitive, where competitive is defined to be the short-run marginal cost of the units. The short-run marginal cost should reflect opportunity cost when and where appropriate.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns; Low Priority

PJM Response: The IMM stated in the 2016 *State of the Market Report* that market design was evaluated as effective because the analysis shows that the PJM Energy Market resulted in competitive market outcomes. PJM believes the recommendation that short-run marginal cost should reflect opportunity cost is a low-priority issue. If the IMM believes this is a higher-priority issue, PJM recommends the IMM bring a problem statement to the PJM stakeholders so that they may evaluate the priority relative to other on-going initiatives.

IMM Recommendation: The IMM recommends that PJM require every market participant to make available at least one cost schedule with the same fuel type and parameters as that of their offered price schedule.

IMM Status: Not adopted

PJM Status: Action Planned

PJM Response: PJM will bring a problem statement to the Market Implementation Committee or Markets and Reliability Committee to address this.

IMM Recommendation: The IMM recommends that PJM require that the level of incremental costs includable in cost offers not exceed the unit's short-run marginal cost.

IMM Status: Not adopted

PJM Status: No Further Action Planned; Rejected by the FERC

PJM Response: This IMM recommendation was rejected by the FERC in the hourly offers order, Docket ER16-372-002.

IMM Recommendation: The IMM recommends that PJM require that all fuel cost policies be algorithmic, verifiable and systematic.

IMM Status: Not adopted

PJM Status: No Further Action Planned; Rejected by the FERC

PJM Response: This IMM recommendation was rejected by the FERC in the hourly offers order, Docket ER16-372-002.

IMM Recommendation: The IMM recommends that Manual 15: Cost Development Guidelines be replaced with a straightforward description of the components of cost offers based on short run marginal costs and the correct calculation of cost offers.

IMM Status: Not adopted

PJM Status: No Further Action Planned; Rejected by the FERC

PJM Response: This IMM recommendation was rejected by the FERC in the hourly offers order, Docket ER16-372-002.

IMM Recommendation: The IMM recommends removal of all use of the FERC System of Accounts in the cost development guidelines.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: PJM believes this is a low-priority issue. If the IMM believes this is a higher-priority issue, PJM recommends the IMM bring a problem statement to the PJM stakeholders so that they may evaluate the priority, relative to other on-going initiatives.

IMM Recommendation: The IMM recommends the removal of all use of cyclic starting and peaking factors from the cost development guidelines.

IMM Status: Not adopted

PJM Status: Stakeholder Process

PJM Response: PJM brought forth a problem statement and issue charge for Variable Operations and Maintenance Costs, which was approved by the stakeholders at the May 2017 Market and Implementation Committee.

IMM Recommendation: The IMM recommends the removal of all labor costs from the cost development guidelines.

IMM Status: Not adopted

PJM Status: No Further Action Planned; Rejected by the FERC

PJM Response: This IMM recommendation was rejected by the FERC in the hourly offers order, Docket ER16-372-002.

IMM Recommendation: The IMM recommends changing the definition of the start heat input for combined cycles to include only the amount of fuel used from firing each combustion turbine in the combined cycle to the breaker close of each combustion turbine.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: PJM believes this is a low-priority issue. If the IMM believes this is a higher-priority issue, PJM recommends the IMM bring a problem statement to the PJM stakeholders so that they may evaluate the priority relative to other on-going initiatives.

IMM Recommendation: The IMM recommends the removal of nuclear fuel and nonfuel operations and maintenance costs that are not short run marginal costs from the cost development guidelines.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: PJM believes this is a low-priority issue. If the IMM believes this is a higher-priority issue, PJM recommends the IMM bring a problem statement to the PJM stakeholders so that they may evaluate the priority relative to other on-going initiatives.

IMM Recommendation: The IMM recommends revising the pumped hydro fuel cost calculation to include day-ahead and real-time power purchases.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: PJM believes this is a low-priority issue. If the IMM believes this is a higher-priority issue, PJM recommends the IMM bring a problem statement to the PJM stakeholders so that they may evaluate the priority relative to other on-going initiatives.

IMM Recommendation: The IMM 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.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: PJM believes this is a low-priority issue. If the IMM believes this is a higher-priority issue, PJM recommends the IMM bring a problem statement to the PJM stakeholders so that they may evaluate the priority relative to other on-going initiatives.

IMM Recommendation: The IMM recommends removing the catastrophic designation for force majeure fuel supply limitations in Schedule 2.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: PJM believes that the only valid fuel supply limitation for a year should be because of catastrophic force majeure. PJM included this language in the Capacity Performance filing and the FERC accepted it.

IMM Recommendation: The IMM recommends that the rules governing the application of the three pivotal supplier test be clarified and documented.

IMM Status: Not adopted

PJM Status: Implemented

PJM Response: PJM provided the rules governing the application of the three pivotal supplier test in the hourly offers filing (Docket No. ER16-372-002) and FERC indicated that the resulting level of detail in the governing documents is sufficient.

IMM Recommendation: The IMM recommends, in order to ensure effective market power mitigation when a resource fails the three pivotal supplier test, that markup be constant across price and cost offers, that there be at least one cost-based offer using the same fuel as the available price-based offer.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: The FERC considered this out of scope in the hourly offers order. PJM believes this is a low-priority issue. If the IMM believes this is a higher-priority issue, PJM recommends the IMM bring a problem statement to the PJM stakeholders so that they may evaluate the priority relative to other on-going initiatives.

IMM Recommendation: The IMM recommends that in order to ensure effective market power mitigation when a resource fails the three pivotal supplier test, the operating parameters in the cost-based offer and the price-based parameter limited schedule (PLS) offer be at least as flexible as the operating parameters in the available non-PLS price-based offer, and that the price-MW pairs in the price-based PLS offer be exactly equal to the price-based non-PLS offer.

IMM Status: Not adopted

PJM Status: Action Planned

PJM Response: PJM will bring a problem statement to the Market Implementation Committee or the Markets and Reliability Committee to address this. It is encapsulated with the recommendation regarding a requirement to have at least one cost schedule with the same fuel type and parameters as that of their offered price schedule and PJM will address these issues as one problem statement.

IMM Recommendation: The IMM recommends that Capacity Performance resources and Base Capacity resources (during the June through September period) be held to the Original Equipment Manufacturer operating parameters of the capacity market Cost Of New Entry reference resource for performance assessment and energy uplift payments and that this standard be applied to all technologies on a uniform basis.

IMM Status: Not adopted

PJM Status: No Further Action Planned; Rejected by the FERC

PJM Response: This request was rejected by the FERC in the Capacity Performance rehearing. The FERC responded that PJM must honor "actual constraints" for operating parameters.

IMM Recommendation: The IMM recommends that under the Capacity Performance construct, PJM recognize the difference between operational parameters that indicate to PJM dispatchers what a unit is capable of during the operating day and the parameters that are used for Capacity Performance assessment as well as uplift payments. The parameters which determine non-performance charges and the amount of uplift payments to those generators should reflect the flexibility goals of the Capacity Performance construct.

IMM Status: Not adopted

PJM Status: Implemented

PJM Response: In 2016, PJM implemented real-time values, which allow capacity suppliers to submit parameters that reflect the actual, physical operating capabilities of the unit. This was reviewed at the Operating Committee meetings for stakeholder input and the details were added to Manual 11: Energy & Ancillary Services Market Operations, Section 2.3.4.

IMM Recommendation: The IMM recommends that PJM retain the \$1,000 per MWh offer cap in the PJM energy market except when cost-based offers exceed \$1,000 per MWh, and retain other existing rules that limit incentives to exercise market power.

IMM Status: Partially adopted

PJM Status: Implemented

PJM Response: FERC Order 831 caps a resource's incremental energy offer used for purposes of calculating LMPs in Day-Ahead and Real-Time Energy Markets at the higher of \$1,000/MWh or that resource's cost-based incremental energy offer. It also imposes an overall \$2000 offer cap for the purpose of setting LMP. PJM's current rules are consistent with the order and PJM submitted its compliance filing with the FERC on May 8, 2017 to ensure compliance with the remainder of the order. PJM is fully implementing FERC's orders in this and other dockets, with the input and advice of the IMM, in order to ensure market power is appropriately mitigated.

IMM Recommendation: The IMM recommends that PJM not allow nuclear generators which do not respond to prices or which only respond to manual instructions from the dispatcher to set the LMPs in the real-time market.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: Treating nuclear generators in the manner the IMM recommends would be inconsistent with the way other generators are treated with regard to setting price. Currently, if a unit is flexible, meaning it can follow a dispatch instruction to alter its output to follow load and manage transmission constraints, then it can set price. How well a unit follows dispatch is not part of the LMP pricing methodology for any unit class, including nuclear units.

IMM Recommendation: The IMM recommends that PJM explain how LMPs are calculated when demand response is marginal. The LMPs in excess of \$1,800 per MWh on January 7, 2014, were potentially a result of the way in which PJM modeled zonal (not nodal) demand response as a marginal resource

IMM Status: Not adopted

PJM Status: Action Planned

PJM Response: PJM will post an example of the LMP calculation as an informational report under the Market Implementation Committee page on PJM.com by the fourth quarter of 2017.

IMM Recommendation: The IMM recommends 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; the allowed duration of the violation; and when the transmission penalty factors will be used to set the shadow price.

IMM Status: Not adopted

PJM Status: Implemented; Pending before the FERC

PJM Response: PJM posted the Transmission Constraint Control Logic paper⁶, which describes the logic used in PJM's market clearing engines to control transmission constraints and the impact of transmission constraint penalty factors on constraint shadow prices. This paper was presented at the April 2017, Markets Implementation Committee (MIC). This matter is pending before the FERC as part of the uplift allocation (transparency) NOPR.

IMM Recommendation: The IMM recommends that the definition of maximum emergency status in the tariff apply at all times rather than just during maximum emergency events.

IMM Status: Not adopted

⁶ <http://pjm.com/-/media/committees-groups/committees/mic/20170412/20170412-item-25-transmission-constraint-control-logic-in-market-clearing-engines.ashx>

PJM Status: No Further Action Planned; Rejected by the FERC

PJM Response: This recommendation was included as part of PJM's Capacity Performance order but was rejected by the FERC.

IMM Recommendation: The IMM recommends that PJM update the outage impact studies, the reliability analyses used in RPM for capacity deliverability and the reliability analyses used in the Regional Transmission Expansion Plan 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.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: PJM believes this is a low-priority issue. If the IMM believes this is a higher-priority issue, PJM recommends the IMM bring a problem statement to the PJM stakeholders so that they may evaluate the priority relative to other on-going initiatives.

IMM Recommendation: The IMM recommends that the roles of PJM and the transmission owners in the decision-making process to control for local contingencies be clarified, that PJM's role be strengthened and that the process be made transparent.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: PJM feels that Section B.9 of Manual 38: Operations Planning adequately addresses the IMM's concerns.

IMM Recommendation: The IMM recommends that PJM include in the appropriate manual an explanation of the initial creation of hubs, the process for modifying hub definitions and a description of how hub definitions have changed. There is currently no PJM documentation in the tariff or manuals explaining how hubs are created and how their definitions are changed.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: Hubs are created at the suggestion of, and following discussion with, stakeholders. As such, the methodology for creating a particular hub is documented as it is created. Once a hub is created, hub definitions are not changed, and as such, there is no need to document the methodology.

IMM Recommendation: The IMM recommends that during hours when a generation bus shows a net withdrawal, the energy withdrawal be treated as load, not negative, generation, for purposes of calculating load and load-weighted LMP.

The IMM recommends that during hours when a load bus shows a net injection, the energy injection be treated as generation, not negative load, for purposes of calculating generation and load-weighted LMP.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: PJM disagrees with this recommendation and believes that when a generation bus is showing a net withdrawal, the payment should be the responsibility of the generation owner rather than affecting the load-serving entities. While the state estimator solution can occasionally result in injections at certain load buses, by definition, there is no generator modeled at such a bus, and therefore no market seller to which to attribute actual generation injection. As such, the only feasible method by which to include such cases in the market settlements is to treat them as negative load at the particular load bus location.

IMM Recommendation: The IMM recommends that PJM remove non-specific 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.

IMM Status: Partially adopted

PJM Status: Action Planned

PJM Response: PJM is removing fuel type options "other/other" and "co-fire/other" from Markets Gateway, the on-line tool through which market sellers submit their offers into the energy and ancillary service markets. As a result, market participants will be required to indicate the specific fuel type of every resource because "other" will no longer be a valid selection.

IMM Recommendation: The IMM recommends that PJM routinely review all transmission facility ratings and any changes to those ratings to ensure that the normal, emergency and load dump ratings used in modeling the transmission system are accurate and reflect standard ratings practice.

IMM Status: Partially adopted

PJM Status: Implemented

PJM Response: The Transmission Owners Agreement-Administrative Committee (TOA-AC) created a subgroup to address this recommendation. The subgroup developed a detailed presentation on the transmission owner internal compliance process to satisfy the existing FAC-008-3 standard from the North American Electric Reliability Corporation. Transmission owners have demonstrated strict processes and controls are already in place to ensure facility ratings used in PJM operation are determined based on technically sound principles. PJM is satisfied with the current transmission owner facility rating development and update process.

IMM Recommendation: The IMM recommends that PJM identify and collect data on available behind the meter generation resources, including nodal location information and relevant operating parameters.

IMM Status: Partially adopted

PJM Status: Implemented

PJM Response: In 2015, PJM collected information regarding behind-the-meter generation with a capability over two MWs and made this information available to PJM dispatchers. Behind-the-meter generation (Name, MW, and closest substation) is displayed geographically within the Dispatcher Interactive Mapping Application (DIMA). PJM has also drafted changes to Manual 3A: Energy Management System (EMS) Model Updates and Quality Assurance (QA) to incorporate EMS modeling guidelines for available behind-the-meter generation resources.

IMM Recommendation: The IMM recommends that PJM continue to enhance its posting of market data to promote market efficiency.

IMM Status: Partially adopted

PJM Status: Implemented

PJM Response: PJM continues to enhance market data and remains committed to transparency while not posting market sensitive data. In March 2016, PJM stakeholders endorsed several transparency-related enhancements. PJM suggests that the IMM provide specific details on any recommendations for further transparency enhancements.

IMM Recommendation: The IMM recommends the elimination of frequently mitigated unit and associated unit adders. These adders no longer serve the purpose for which they were created and interfere with the efficient operation of PJM markets.

IMM Status: Partially adopted

PJM Status: Implemented

PJM Response: PJM worked closely with the IMM to develop the joint proposal that was filed and accepted at the FERC. The change in the frequently mitigated unit rules was implemented in the fall of 2014. PJM worked closely with the IMM to develop the joint proposal that was filed and accepted at the FERC. The change in the frequently mitigated unit rules was implemented in the fall of 2014. No units have qualified for the frequently mitigated unit status since December of 2014, as noted in *The 2016 State of the Market Report*.

IMM Recommendation: The IMM recommends that PJM require all generating units to identify the fuel type associated with each of their offered schedules.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: PJM implemented this recommendation in 2014 through changes to Markets Gateway.

Energy Uplift Recommendations

IMM Recommendation: The IMM recommends that PJM not use closed loop interface constraints to override artificially the nodal prices that are based on fundamental LMP logic in order to: accommodate rather than resolve the inadequacies of the demand side resource capacity product; address the inability of the power flow model to incorporate the need for reactive power; accommodate rather than resolve the flaws in PJM's approach to scarcity pricing; or for any other reason.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: PJM establishes interfaces such as ATSI to ensure the correct pricing signal is sent to the market and to have the price of the marginal resource properly reflected. PJM believes it is critical for appropriate prices to be reflected in market outcomes. The issue was presented to the Market Implementation Committee and resulted in rule changes documented in the PJM Manuals regarding when closed loop interfaces could be used.

IMM Recommendation: The IMM recommends that PJM not use price-setting logic to artificially override the nodal prices that are based on fundamental LMP logic in order to reduce uplift

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: PJM does not agree with the IMM's position or characterization of this recommendation. PJM does not override nodal prices.

IMM Recommendation: The IMM recommends that if PJM believes it appropriate to modify the price setting logic, PJM initiate a stakeholder process to create transparent and consistent modifications to the rules and incorporate the modifications in the PJM tariff.

IMM Status: Not adopted

PJM Status: Implemented

PJM Response: PJM agrees that changes to the LMP calculation would go through the stakeholder process and be submitted to the FERC.

IMM Recommendation: The IMM recommends that PJM initiate an analysis of the reasons why some combustion turbines and diesels scheduled in the Day-Ahead Energy Market are not called in real time when they are economic.

IMM Status: Not adopted

PJM Status: Implemented

PJM Response: An analysis of combustion turbine lost opportunity cost was completed and statistics were presented to PJM stakeholders at the April 23, 2015, Markets and Reliability Committee meeting. Subsequently, PJM has implemented procedures to closely monitor the long-lead time combustion turbines and diesels, and more consistently commit them in real time. PJM reviews unit commitment choices daily.

IMM Recommendation: The IMM recommends the elimination of the day-ahead operating reserve category to ensure that units receive an energy uplift payment based on their real-time output and not their day-ahead scheduled output.

IMM Status: Not adopted; Stakeholder process

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: This recommendation was considered by the Energy Market Uplift Senior Task Force but stakeholders elected not to adopt this recommendation.

IMM Recommendation: The IMM recommends reincorporating the use of net regulation revenues as an offset in the calculation of balancing operating reserve credits.

IMM Status: Not adopted; Stakeholder process

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: This recommendation was considered by the Energy Market Uplift Senior Task Force but stakeholders elected not to adopt this recommendation.

IMM Recommendation: The IMM recommends not compensating self-scheduled units for their startup cost when the units are scheduled by PJM to start before the self-scheduled hours.

IMM Status: Not adopted; Stakeholder process

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: This recommendation was considered by the Energy Market Uplift Senior Task Force but stakeholders elected not to adopt this recommendation.

IMM Recommendation: The IMM recommends calculating lost opportunity cost based on 24-hour daily periods or multi-hour segments of hours for combustion turbines and diesels scheduled in the Day-Ahead Energy Market, but not committed in real time.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: This recommendation was considered by the Energy Market Uplift Senior Task Force but stakeholders elected not to adopt this recommendation.

IMM Recommendation: The IMM recommends that units scheduled in the Day-Ahead Energy Market and not committed in real time should be compensated for lost opportunity cost based on their real-time desired and achievable output, not their scheduled day-ahead output.

IMM Status: Not adopted

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: This recommendation was considered by the Energy Market Uplift Senior Task Force but stakeholders elected not to adopt this recommendation.

IMM Recommendation: The IMM recommends that units scheduled in the Day-Ahead Energy Market and not committed in real time be compensated for lost opportunity cost incurred within an hour.

IMM Status: Not adopted

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: This recommendation was considered by the Energy Market Uplift Senior Task Force but stakeholders elected not to adopt this recommendation.

IMM Recommendation: The IMM recommends that only flexible fast start units (startup plus notification times of 30 minutes or less) and short minimum run times (one hour or less) be eligible by default for lost opportunity cost compensation to units scheduled Day-Ahead Energy Market and not committed in real time. Other units should be eligible for lost opportunity cost compensation only if PJM explicitly cancels their day-ahead commitment.

IMM Status: Not adopted

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: This recommendation was considered by the Energy Market Uplift Senior Task Force but stakeholders elected not to adopt this recommendation. PJM continues to monitor combustion turbine commitments for units (startup plus notification times of 120 minutes or less) and short minimum run time (two hour or less) to minimize combustion turbine lost opportunity cost payments.

IMM Recommendation: The IMM recommends that up to congestion transactions be required to pay energy uplift charges for both the injection and the withdrawal sides of the up-to congestion.

IMM Status: Not adopted; Stakeholder process

PJM Status: Pending before the FERC

PJM Response: This recommendation was approved/endorsed by the PJM stakeholders. PJM intends to file this package with the FERC once there is a quorum.

IMM Recommendation: The IMM recommends eliminating the use of internal bilateral transactions in the calculation of deviations used to allocate balancing operating reserve charges.

IMM Status: Not adopted; Stakeholder process

PJM Status: Pending before the FERC

PJM Response: This recommendation was approved / endorsed by the PJM stakeholders. PJM intends to file this package with the FERC once there is a quorum.

IMM Recommendation: The IMM recommends allocating the energy uplift payments to units scheduled as must run in the Day-Ahead Energy Market for reasons other than voltage/reactive or black start services as a reliability charge to real-time load, real-time exports and real-time wheels.

IMM Status: Not adopted; Stakeholder process

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: This recommendation was considered by the Energy Market Uplift Senior Task Force but stakeholders elected not to adopt this recommendation.

IMM Recommendation: The IMM recommends reallocating the operating reserve credits paid to units supporting the Con Edison-PJM Transmission Service Agreements.

IMM Status: Not adopted; Stakeholder process

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: The Con Edison-PSEG wheeling contract had converted to firm point-to-point transmission service transaction under the PJM Tariff. As such, PJM did not see how it would be possible to treat the allocation of operating reserve credits differently for this transaction than any other similar transaction in the market. PJM cannot unilaterally alter the terms of the wheeling agreement. Furthermore, this contract expired on April 30, 2017 and therefore this recommendation is now moot.

IMM Recommendation: The IMM 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 operating reserve credits calculation.

IMM Status: Not adopted; Stakeholder process

PJM Status: Low Priority

PJM Response: PJM believes this is a low-priority issue. If the IMM believes this is a higher-priority issue, PJM recommends the IMM bring a problem statement to the PJM stakeholders so that they may evaluate the priority relative to other on-going initiatives.

IMM Recommendation: The IMM recommends including real-time exports and real-time wheels in the allocation of the cost of providing reactive support to the 500-kV system or above, which is currently allocated solely to real-time regional transmission organization load.

IMM Status: Not adopted; Stakeholder process

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: This recommendation was considered by the Energy Market Uplift Senior Task Force but stakeholders elected not to adopt this recommendation.

IMM Recommendation: The IMM recommends enhancing the current energy uplift allocation rules to reflect the elimination of day-ahead operating reserves, the timing of commitment decisions and the commitment reasons.

IMM Status: Not adopted; Stakeholder process

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: This recommendation was considered by the Energy Market Uplift Senior Task Force but stakeholders elected not to adopt this recommendation.

IMM Recommendation: The IMM recommends modifications to the calculation of lost opportunity costs credits paid to wind units. The lost opportunity costs 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. In addition, the IMM recommends PJM allow wind units submit capacity interconnection rights that reflect the maximum output wind units want to inject into the transmission system at any time.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: PJM believes this is a low-priority issue. If the IMM believes this is a higher-priority issue, PJM recommends the IMM bring a problem statement to the PJM stakeholders so that they may evaluate the priority relative to other on-going initiatives.

IMM Recommendation: The IMM recommends that PJM revise Manual 11: Energy & Ancillary Services Market Operations Attachment C, consistent with the tariff to limit compensation to offered costs. The Manual 11 Attachment C procedure should describe the steps market participants should take to change the availability of cost-based energy offers that have been submitted day ahead. The IMM recommends that PJM eliminate the Manual 11 Attachment C procedure with the implementation of hourly offers (ER16-372-000).

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: PJM believes that there are scenarios in which Attachment C in Manual 11 will be needed even after the implementation of hourly offers.

IMM Recommendation: The IMM recommends that PJM clearly identify and classify all reasons for incurring operating reserves in the Day-Ahead and Real-Time Energy Markets and the associated operating reserve charges in order for all market participants to be made aware of the reasons for these costs and to help ensure a long term solution to the issue of how to allocate the costs of operating reserves.

IMM Status: Partially Adopted

PJM Status: Pending before the FERC; Action Planned

PJM Response: Causes and allocation of uplift have been discussed at the Energy Market Uplift Senior Task Force. Additionally, PJM has continued to post additional uplift data upon request of members. PJM filed supportive comments with regard to the FERC's proposed additional granularity on uplift payments (Docket RM17-2) and intends to fully conform with FERC's final rule.

IMM Recommendation: The IMM recommends that PJM revise the current operating reserve confidentiality rules in order to allow the disclosure of complete information about the level of operating reserve charges by unit and the detailed reasons for the level of operating reserve credits by unit in the PJM region.

IMM Status: Partially Adopted

PJM Status: Implemented; Pending before the FERC

PJM Response: In March 2016, stakeholders approved changes to confidentiality rules to allow the disclosure of operating reserve charges at a daily level by zone. Stakeholders were not broadly supportive of unit-level disclosure, as this would have the potential to reveal confidential information. PJM filed supportive comments with regard to the FERC's proposed additional granularity on uplift payments (Docket RM17-2) and intends to fully conform with FERC's final rule.

IMM Recommendation: The IMM recommends that the lost opportunity cost in the energy market be calculated using the schedule on which the unit was scheduled to run in the energy market.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: PJM adopted this recommendation in 2015.

IMM Recommendation: The IMM recommends including no load and startup costs as part of the total avoided costs in the calculation of lost opportunity cost credits paid to combustion turbines and diesels scheduled in the Day-Ahead Energy Market but not committed in real time.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: PJM implemented this recommendation in 2015.

IMM Recommendation: The IMM recommends using the entire offer curve and not a single point on the offer curve to calculate energy lost opportunity cost.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: PJM implemented this recommendation in 2015.

Capacity Market Recommendations

IMM Recommendation: The IMM recommends the extension of minimum offer price rule to all existing and proposed units in order to protect competition in the capacity market from external subsidies.

IMM Status: Not adopted

PJM Status: Stakeholder Process

PJM Response: The Capacity Construct/Public Policy Senior Task Force was recently created to conduct an assessment of the reliability pricing model (RPM) in an effort to ensure potential state public policy initiatives and RPM objectives are not at odds. This group will identify both the objectives of a well-functioning capacity construct, as well as potential public policy initiatives that states could take regarding resource adequacy, fuel diversity, public and environmental policies. Based on the identified factors, the group will discuss whether modifications are required to RPM. The IMM recommendation fits within the scope of this task force.

IMM Recommendation: The IMM recommends the enforcement of a consistent definition of capacity resource. The IMM 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.

IMM Status: Not adopted; pending before FERC

PJM Status: Implemented; Stakeholder Process

PJM Response: PJM agrees with the enforcement of a consistent definition of a capacity resource and this aspect of the recommendation and it was implemented as part of Capacity Performance. A problem statement regarding the physicality of a resource was approved and the topic is currently being considered by the PJM stakeholders in the Incremental Auction Senior Task Force.

IMM Recommendation: The IMM recommends that the test for determining modeled locational deliverability areas (LDA) in RPM be redefined. A detailed reliability analysis of all at-risk units should be included in the redefined model.

IMM Status: Not adopted

PJM Status: Implemented

PJM Response: PJM has studied at-risk units as part of the Regional Transmission Expansion Plan (RTEP) process over the past several years and has provided that information to stakeholders. PJM has also made substantive changes to LDA modeling assumptions to improve coordination between RPM and RTEP process. PJM currently identifies at-risk units and models LDAs where retirement of at-risk units would result in exceeding capacity emergency transfer limit values. PJM will continue working with both the IMM and the stakeholders on refining the models.

IMM Recommendation: The IMM recommends that there be an explicit requirement that capacity resource offers in the Day-Ahead Energy Market be competitive, where competitive is defined to be the short run marginal cost of the units.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: PJM disagrees with this recommendation. In the PJM market, capacity resources that are deemed to present a local market power risk (such as those that fail the three pivotal supplier test) are subject to market power mitigation at short-run marginal cost. PJM believes this recommendation would extend offer mitigation to all operating hours for any capacity resource, even when the resource has passed very conservative market power screens. PJM believes offer capping resources that have been deemed to satisfy market power screens is inconsistent with the FERC's authority and action to grant market-based rates for resources in the energy market. PJM notes the analysis of market-based offers presented in the 2016 State of the Market Report does not appear to support or justify this recommendation.

IMM Recommendation: The IMM recommends that the net revenue calculation used by PJM to calculate the net cost of new entry variable resource requirement parameter reflect the actual flexibility of units in responding to price signals rather than using assumed fixed operating blocks that are not a result of actual unit limitations. The result of reflecting the actual flexibility is higher net revenues, which affect the parameters of the RPM demand curve and market outcomes.

IMM Status: Not adopted

PJM Status: Action Planned

PJM Response: The peak-period dispatch is a tariff-defined method of estimating the net energy and ancillary service revenues for the reference resource. PJM is not convinced that the IMM-proposed method would provide a more accurate estimate of net energy and ancillary service revenues for a new combustion turbine. Changes to this method could be investigated, however, and considered as part of the quadrennial review process. PJM recommends that the IMM present analysis showing their proposed method provides a more accurate estimate than the current method prior to the next quadrennial review so that stakeholders can determine if this should be included as part of the scope of the next quadrennial review.

IMM Recommendation: The IMM recommends that modifications to existing resources not be treated as new resources for purposes of market power-related offer caps or minimum offer price rule floors.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: PJM does not agree with this recommendation. Proposed unit upgrades that increase capability should be treated no differently than a proposed unit for these purposes. Both may require the right price in order to determine whether to move forward with that project. PJM would be interested in learning more details to better understand the basis of this recommendation.

IMM Recommendation: The IMM recommends that, as part of the minimum offer price rule 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.

IMM Status: Not adopted

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: PJM agrees with the goal expressed by the IMM that projects opting to use the unit-specific minimum offer price rule should compete on costs. But as the FERC has recently ordered on rehearing in the MOPR proceeding on unit-specific, self-supply, and competitive entry exemptions and as memorialized in the tariff, new entrants may be able to compete on cost advantages related to financing, cost of equipment, engineering, procurement and construction contracts and the like. New entrants into PJM have found ways to reduce financing through different hedging mechanisms. While some assumptions can be standardized in general (e.g. 20-year unit life), those standards need to be flexible enough to change to reflect realities that exist at the time a resource goes through the unit-specific process (e.g. cost and/or term of financing, actual expectations of inflation reflected in treasury bond prices, differences in equity return hurdle rates, etc.). There was an attempt to standardize assumptions through the stakeholder process in 2013; stakeholders were unable to achieve any consensus on what assumptions to standardize, or at what levels the standards should be set.

IMM Recommendation: The IMM recommends changing the RPM solution methodology to explicitly incorporate the cost of make-whole payments in the objective function.

IMM Status: Not adopted

PJM Status: Implemented

PJM Response: PJM validates that each RPM auction solution is the least-cost bid-based solution, including the cost of make-whole in this validation.

IMM Recommendation: The IMM also recommends changing the RPM solution methodology to define variables for the nesting relationships in the base residual auction optimization model directly rather than employing the current iterative approach, in order to improve the efficiency and stability.

IMM Status: Not adopted

PJM Status: Implemented

PJM Response: The current PJM auction solution methodology provides a robust least-cost solution. The solution is timely, repeatable and verifiable.

IMM Recommendation: The IMM recommends that all capacity imports be required to be deliverable to PJM load prior to the relevant delivery year to ensure that they are as close to full substitutes for internal, physical capacity resources as possible. Pseudo ties alone are not adequate to ensure deliverability.

IMM Status: Not adopted

PJM Status: Pending before the FERC

PJM Response: the external capacity changes associated with the external resource filing should address the IMM recommendations. These changes require external resources to be compatible to internal resources from a planning, market and modeling perspective.

IMM Recommendation: The IMM recommends that all costs incurred as a result of a pseudo-tied unit be borne by the unit itself and included as appropriate in unit offers in the capacity market.

IMM Status: Not adopted

PJM Status: Pending before the FERC

PJM Response: PJM agrees with this recommendation. The issue raised by the IMM is being addressed by the external capacity filing which is currently pending before the FERC in docket ER17-1138-000.

IMM Recommendation: The IMM recommends that a unit which is not capable of supplying energy consistent with its day-ahead offer should reflect an appropriate outage.

IMM Status: Not adopted; Pending before FERC

PJM Status: No Further Action Planned; Rejected by the FERC

PJM Response: As part of the Capacity Performance filing, PJM proposed that Capacity Performance resources should not be allowed to offer in the Day-Ahead Market as emergency only. This aspect of the Capacity Performance filing was rejected by the FERC, however.

IMM Recommendation: The IMM recommends that retroactive replacement capacity transactions not be permitted.

IMM Status: Not adopted

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: This recommendation was presented and discussed at the Under-Performance Risk Management Senior Task Force in 2016. There was no stakeholder support to move forward with this recommendation.

IMM Recommendation: The IMM recommends that treatment of costs in reliability must-run filings be emphasized. Customers should bear all the incremental costs, including incremental investment costs, required by the reliability must-run service that the unit owner would not have incurred if the unit owner had deactivated its unit as it proposed. Generation owners should bear all other costs.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: PJM believes this is a low-priority issue. If the IMM believes this is a higher-priority issue, PJM recommends the IMM bring a problem statement to the PJM stakeholders so that they may evaluate the priority relative to other on-going initiatives.

IMM Recommendation: The IMM recommends that the mitigation rules for demand resource and energy efficiency resource offers be reevaluated and reviewed.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: PJM believes this is a low-priority issue. If the IMM believes this is a higher-priority issue, PJM recommends the IMM bring a problem statement to the PJM stakeholders so that they may evaluate the priority relative to other on-going initiatives.

IMM Recommendation: The IMM 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 but did not when EE was first added to the capacity market. If EE is not included on the supply side, there is no 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.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: PJM believes this is an issue that should be addressed in the longer term, and will be indicating so in the demand response strategy document to be produced later in 2017. If the IMM believes this is a higher-priority issue that should be addressed in the near-term, PJM recommends the IMM bring a problem statement to the PJM stakeholders so that they may evaluate the priority relative to other on-going initiatives.

IMM Recommendation: The IMM recommends that if PJM releases capacity in incremental auctions, PJM should offer the capacity for sale at the base residual auction clearing price in order to avoid suppressing the incremental auctions price below the competitive level. If the PJM sale price is not the base residual auction clearing price, PJM should not reveal its proposed sale price.

IMM Status: Not adopted

PJM Status: Stakeholder Process

PJM Response: PJM agrees that the structure and format of incremental auctions should be reviewed. The Incremental Auction Senior Task Force was created in early 2017 with intention of developing stakeholder supported changes for Incremental Auction format.

IMM Recommendation: The IMM recommends that PJM eliminate the requirement for first and second incremental auctions and hold such auctions only if required based on increases in the reliability requirement above defined thresholds.

IMM Status: Not adopted

PJM Status: Stakeholder Process

PJM Response: PJM agrees that the structure and format of incremental auctions should be reviewed. The Incremental Auction Senior Task Force was created in early 2017 with intention of developing stakeholder supported changes for incremental auction format.

IMM Recommendation: The IMM recommends that the notification requirement for deactivations be extended from 90 days prior to the date of deactivation to 12 months prior to the date of deactivation and that PJM and the IMM be provided 60 days rather than 30 days to complete their reliability and market power analysis.

IMM Status: Not adopted

PJM Status: Implemented

PJM Response: PJM has implemented a requirement that any generation seeking to have its facility excused from participation in an RPM base residual auction make that request by the beginning of December in the year prior to the base residual auction for the future delivery year. PJM would also support an increase in the length of time allowed for the study of requests for deactivation.

IMM Recommendation: The IMM recommends clear, explicit and detailed rules that define the conditions under which PJM will and will not recall energy from PJM capacity resources and prohibit new energy exports from PJM capacity resources. The IMM recommends that those rules define the conditions under which PJM will purchase emergency energy while at the same time not recalling energy exports from PJM capacity resources. PJM has modified these rules, but they need additional clarification and operational details.

IMM Status: Partially adopted

PJM Status: Low Priority

PJM Response: These protocols were developed in 2012 and are established in Manual 11: Energy & Ancillary Services Market Operations. PJM believes these protocols are sufficient and has discussed them with IMM. PJM notes that the new protocols have never been exercised in real-time operations.

IMM Recommendation: The IMM recommends that the use of the 2.5 percent demand adjustment (short-term resource procurement target) be terminated immediately. The 2.5 percent should be added back to the overall market demand curve.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: PJM implemented this recommendation with the introduction of Capacity Performance.

IMM Recommendation: The IMM recommends that the definition of demand-side resources be modified in order to ensure that such resources be fully substitutable for other generation capacity resources. Both the limited and the extended summer demand resource products should be eliminated in order to ensure that the demand resource product has the same unlimited obligation to provide capacity year-round as generation capacity resources.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: PJM implemented this recommendation as part of the Capacity Performance changes.

IMM Recommendation: The IMM recommends that all capacity have firm transmission to the PJM border acquired prior to the offering in an RPM auction.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: PJM implemented this recommendation as part of the Capacity Performance changes.

IMM Recommendation: The IMM recommends that all capacity imports be required to be pseudo-tied prior to the relevant Delivery Year in order to ensure that imports are as close to full substitutes for internal, physical capacity resources as possible.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: PJM implemented this recommendation as part of the Capacity Performance changes.

IMM Recommendation: The IMM recommends that all resources importing capacity into PJM accept a must-offer requirement.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: PJM implemented this recommendation as part of the Capacity Performance changes.

IMM Recommendation: The IMM recommends that generation capacity resources be paid on the basis of whether they produce energy when called upon during any of the hours defined as critical. One hundred percent of capacity market revenue should be at-risk rather than only 50 percent.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: PJM implemented this recommendation as part of the Capacity Performance changes.

IMM Recommendation: The IMM recommends that PJM eliminate all OMC [outside-management-control] outages from the calculation of forced outage rates used for any purpose in the PJM Capacity Market.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: PJM agrees with this recommendation and implemented it as part of Capacity Performance.

IMM Recommendation: The IMM recommends that PJM eliminate the broad exception related to lack of gas during winter period for single-fuel natural gas-fired units.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: PJM agrees with this recommendation and implemented it as part of Capacity Performance.

Demand Response Recommendations

IMM Recommendation: The IMM recommends, as a preferred alternative to having PJM demand-side programs, that demand response be on the demand side of the markets and that customers be able to avoid capacity and energy charges by not using capacity and energy at their discretion and that customer payments be determined only by metered load.

IMM Status: Not adopted

PJM Status: **Action Planned**

PJM Response: PJM believes demand resources are an important part of a successful and efficient wholesale market. PJM will continue to work with our members and the IMM to enhance market rules and operational procedures for demand resources.

IMM Recommendation: The IMM recommends that the option to specify a minimum dispatch price under the emergency and pre-emergency program full option be eliminated and that participating resources receive the hourly real-time LMP, less any generation component of their retail rate.

IMM Status: Not adopted

PJM Status: **No Further Action Planned; PJM Concerns**

PJM Response: As reinforced by the Supreme Court of the United States ruling in the EPSA case, energy market compensation for demand resources at full LMP has been deemed just and reasonable. PJM does not intend to challenge that ruling at this time. PJM believes demand resources should set LMP when the resources are marginal to establish the correct price signal in the market, especially during emergency conditions.

IMM Recommendation: The IMM recommends that the emergency load response program be treated as an economic resource, responding to economic price signals like other capacity resources, and not as an emergency program, responding only after an emergency is called, not triggering either the definition of a PJM emergency or a performance assessment hour under the new PJM Capacity Market rules.

IMM Status: Not adopted

PJM Status: **Implemented; No Further Action Planned; PJM Concerns**

PJM Response: PJM partially agrees with this recommendation and has created the pre-emergency demand response category for any demand response resource that does not require an emergency condition to respond. Pre-emergency demand response resources are dispatched to prevent full emergency conditions, which may include loading maximum emergency generation.

IMM Recommendation: The IMM recommends that the emergency program energy-only option be eliminated because the opportunity to receive the appropriate energy market incentive is already provided in the economic program.

IMM Status: Not adopted

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: This recommendation was discussed with stakeholders and there was no support to eliminate this demand response participation option. This may be reconsidered in the future.

IMM Recommendation: The IMM recommends that a daily energy market must offer requirement apply to demand resources, comparable to the rule applicable to generation capacity resources.

IMM Status: Not adopted

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: PJM does not believe that a day-ahead, economic, must-offer requirement is necessary for demand resources because demand resources do not have the incentive to exert market power through physical withholding, as generation resources do. The vast majority of demand resources only want to be dispatched if needed to prevent system emergencies and, therefore, will have a day-ahead price offer at the energy offer cap. If most demand resources are priced at the cap, it negates any significant benefit from participation in the Day-Ahead Energy Market and could complicate actual use of demand resources by dispatcher's discretion to manage emergency system conditions. Stakeholders discussed this as part of the Capacity Performance changes and determined this change was not necessary.

IMM Recommendation: The IMM recommends that demand resources be required to provide their nodal location, comparable to generation resources.

IMM Status: Not adopted

PJM Status: No Further Action Planned; Rejected by the FERC

PJM Response: Given the FERC's continued and ongoing support of the ability for demand response resources to aggregate across multiple sites, the implementation of nodal dispatch is not likely to be possible. Further, curtailment service providers do not know the nodal location of customers.

IMM Recommendation: The IMM recommends that PJM require nodal dispatch of demand resources with no advance notice required or, if nodal location is not required, sub-zonal dispatch of demand resources with no advance notice required.

IMM Status: Not adopted

PJM Status: Implemented; No Further Action Planned

PJM Response: PJM implemented rules by which it can create a sub-zone with no advance warning but can only assess capacity penalty if a sub-zone is created prior to the operating day. A nodal requirement was discussed with stakeholders during the demand response operational efficiency changes. Stakeholders decided, with PJM agreement, that sub-zonal dispatch for load management resources is adequate for PJM dispatch.

IMM Recommendation: The IMM recommends that PJM eliminate the measurement of compliance across zones within a compliance aggregation area. The multiple-zone approach is less locational than the zonal and sub-zonal approach and creates larger mismatches between the locational need for the resources and the actual response.

IMM Status: Not adopted

PJM Status: **Implemented;** No Further Action Planned

PJM Response: Compliance aggregation areas were eliminated as part of Capacity Performance changes. Capacity Performance changes do still provide for demand response to aggregate performance. PJM does not agree that aggregation should be limited to a zone and that performance aggregation should be limited to an emergency action area, if resources from one part of the grid will not help the issue in another part of the grid.

IMM Recommendation: The IMM recommends that measurement and verification methods for demand resources be modified to reflect compliance more accurately.

IMM Status: Not adopted

PJM Status: **Implemented**

PJM Response: PJM continues to enhance measurement and verification protocols and is considered a world leader in this area. The FERC recently approved the PJM-filed changes to modify the determination of winter load reductions for demand resources in Capacity Performance.

IMM Recommendation: The IMM recommends that compliance rules be revised to include submittal of all necessary hourly load data, and that negative values be included when calculating event compliance across hours and registrations.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: PJM currently requires hourly meter load data be submitted for all participants. PJM does not agree with penalizing demand response participants when consumption is above the amount of capacity allocated, since non-participants may also consume above the amount of capacity allocated. This would discriminate against those customers that participate as a demand response resource, compared to those customers that do not participate. PJM has already implemented measurement and verification changes to only recognize reduction when load is below the amount of capacity allocated in the summer months.

IMM Recommendation: The IMM recommends that PJM adopt the ISO-NE five-minute metering requirements in order to ensure that dispatchers have the necessary information for reliability and that market payments to demand resources be calculated based on interval meter data at the side of the demand reductions.

IMM Status: Not adopted

PJM Status: No Further Action Planned; Rejected by the FERC

PJM Response: As part of the five-minute settlement process, the FERC ordered that demand response is not required to change metering infrastructure to participate in the wholesale market. Accordingly, PJM will not require resources to buy new metering equipment at this time. Retail participants currently do not have five-minute metering and are settled on a one-hour basis. It is not necessary for all resources to deploy new metering and support systems unless there is a clear and quantifiable benefit. Demand response resources currently report their hourly load reduction capability which is used to make dispatch decisions.

IMM Recommendation: The IMM recommends that demand response event compliance be calculated for each hour and the penalty structure reflect hourly compliance for the base and Capacity Performance products.

IMM Status: Not adopted

PJM Status: Implemented

PJM Response: This was implemented as part of the Capacity Performance rule changes adopted by the FERC.

IMM Recommendation: The IMM recommends that load management testing be initiated by PJM with limited warning to CSPs in order to more accurately represent the conditions of an emergency event.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: PJM agrees with the IMM but this is currently a low-priority item. This issue was reviewed at the Capacity Senior Task Force but eventually discontinued due to lack of stakeholder interest in addressing it.

IMM Recommendation: The IMM recommends that a shutdown cost be defined as the cost to curtail load for a given period that does not vary with the measured reduction or, for behind the meter generators, be the start cost defined in Manual 15: Cost Development Guidelines for generators.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: Majority of demand response resources do not have a shutdown cost. The IMM has access to all PJM information and may always contact curtailment service providers to gain more information about shutdown cost if the IMM needs more information to support the values.

IMM Recommendation: The IMM recommends that the Net Benefits Test be eliminated and that demand response resources be paid LMP less any generation component of the applicable retail rate

IMM Status: Not adopted

PJM Status: No Further Action Planned; Rejected by the FERC

PJM Response: The Supreme Court of the United States upheld the FERC's ability to regulate demand response in the wholesale market. The commission has determined that energy market consumption at full LMP is just and reasonable based upon the net benefits test as currently designed. PJM does not expect to challenge this decision in the near term.

IMM Recommendation: The IMM recommends that the tariff rules for demand response clarify that a resource and its curtailment service provider, if any, must notify PJM of material changes affecting the capability of the resource to perform as registered and to terminate registrations that are no longer capable of responding to PJM dispatch directives because load has been reduced or eliminated (such as in the case of bankrupt and/or out of service facilities).

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns; [Stakeholder Process](#)

PJM Response: Curtailment service providers (CSPs) are currently obligated to withdraw registrations if a customer facility no longer has electricity service before the start of the delivery year. If a customer facility has no electricity service during the delivery year, the CSPs may not report load reductions considering there is no electricity service at the facility. CSPs are required to report expected real-time load reductions to PJM so that PJM dispatchers can incorporate that into dispatch decisions. The Demand Response Subcommittee has a proposed solution which includes a provision to require CSP to terminate registration as appropriate, based on IMM suggestion.

IMM Recommendation: The IMM recommends that PJM not remove any defined sub-zone and maintain a public record of all created and removed subzones.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: PJM does not believe it is appropriate to maintain the posting of public sub-zones that are no longer used and are not intended to be used in the future. PJM therefore removes sub-zones that are invalid and have no intention of being used in the future.

IMM Recommendation: The IMM recommends that there only be one demand response product, with an obligation to respond when called for all hours of the year, and that demand response be on the demand side of the capacity market.

IMM Status: Partially adopted

PJM Status: [Implemented](#); Under Review

PJM Response: PJM partially agrees with this recommendation which led to the elimination of seasonal capacity products and 100 percent of the Capacity Performance requirement for 2020/2021 Delivery Year and beyond. PJM is currently working on a long-term demand response strategy which includes demand response's participation in all PJM markets.

IMM Recommendation: The IMM recommends that the lead times for demand resources be shortened to 30 minutes within an hour minimum dispatch for all resources.

IMM Status: Partially adopted

PJM Status: Implemented

PJM Response: PJM has implemented these changes, effective 2014. Demand resources can request an exception from the 30-minute and one-hour requirements for physical reasons.

IMM Recommendation: The IMM recommends capping the baseline for measuring capacity compliance under winter compliance at the customers' PLC [peak load contribution], similar to GLD [guaranteed load drop], to avoid double counting.

IMM Status: Partially adopted

PJM Status: No Further Action Planned; Rejected by the FERC

PJM Response: This recommendation is contrary to what stakeholders adopted under the Capacity Performance changes and is contrary to PJM and FERC arguments to support Capacity Performance changes. This recommendation would be contrary to the rules adopted by the FERC.

IMM Recommendation: The IMM recommends capping the baseline for measuring compliance under GLD, for the limited summer product, at the customers' PLC.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: This recommendation has been implemented.

IMM Recommendation: The IMM recommends that demand resources whose load drop method is designated as "Other" explicitly record the method of load drop.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: This recommendation has been implemented.

Environmental Recommendations

IMM Recommendation: The IMM 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.

IMM Status: Not adopted

PJM Status: No Further Action Planned; Outside of PJM Control

PJM Response: PJM agrees this is an important issue that is part of the larger discussion regarding state-specific out-of-market subsidies. As discussed above in the Introduction section, the recent proliferation of proposals for zero-emission credits and other types of economic support for non-economic generation creates a situation that could undermine appropriate price formation in the wholesale markets. It will be important for state and federal regulators to work together with PJM and all stakeholders to determine appropriate solutions to value important attributes of specific generators. While this specific recommendation focuses on state-level markets that are outside PJM's control, PJM will remain engaged on this topic in an effort to harmonize state actions with the ability for the wholesale markets to continue to perform their vital functions.

Interchange Transactions Recommendations

IMM Recommendation: The IMM recommends that PJM implement rules to prevent sham scheduling. The IMM recommends that PJM apply after-the-fact market settlement adjustments to identified sham scheduling segments to ensure that market participants cannot benefit from sham scheduling.

IMM Status: Not adopted; Stakeholder process

PJM Status: Stakeholder Process

PJM Response: PJM is in discussions with the IMM to identify changes to the contract pricing assignments used in market settlements when sham scheduling segments are identified. Any proposed changes that result from this effort will be further discussed within the stakeholder process.

IMM Recommendation: The IMM recommends that PJM implement a validation method for submitted transactions that would prohibit market participants from breaking transactions into smaller segments to defeat the interface pricing rule by concealing the true source or sink of the transaction

IMM Status: Not adopted

PJM Status: Implemented; No Further Action Planned

PJM Response: In July 2014, PJM and the IMM issued a joint statement on interchange scheduling which addresses partial path scheduling and the belief that this type of scheduling could be subject to referral by the IMM. At this time, PJM does not believe there is a need to implement a validation method that attempts to identify partial path schedules.

IMM Recommendation: The IMM recommends that PJM implement a validation method for submitted transactions that would require market participants to submit transactions on market paths that reflect the expected actual power flow in order to reduce unscheduled loop flows.

IMM Status: Not adopted

PJM Status: Stakeholder Process

PJM Response: PJM and MISO have jointly developed an interface pricing solution at the Joint and Common Market stakeholder process to resolve the misalignment of the pricing of transactions between PJM and MISO and therefore, PJM believes there is no longer a problem with interface pricing. This collaborative solution involves a common interface that will be implemented on June 1, 2017.

IMM Recommendation: The IMM recommends that PJM end the practice of maintaining outdated definitions of interface pricing points, eliminate the NIPSCO, Southeast and Southwest interface pricing points from the Day-Ahead and Real-Time Energy Markets and, with the Virginia – Carolina Region of SERC, assign the transactions created under the reserve sharing agreement to the South import/export pricing point.

IMM Status: Not adopted

PJM Status: Implemented; Low Priority

PJM Response: PJM has removed, or is in the process of removing, all outdated interface pricing points. With regard to the second part of the recommendation, PJM agrees that this is low priority.

IMM Recommendation: The IMM recommends that PJM eliminate the Ontario interface pricing point, and assign the transactions that originate or sink in the Independent Electricity System Operator balancing authority to the MISO interface pricing point.

IMM Status: Not adopted

PJM Status: Implemented; No Further Action Planned

PJM Response: PJM implemented a new IMO (Ontario – Independent Electricity Market Operator) interface price definition and created a new Ontario aggregate pricing point on June 1, 2015, that resolves this concern. The IMM recommendation would result in inconsistent pricing for transactions to/from IMO that do not flow entirely through MISO.

IMM Recommendation: The IMM 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 IMM 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 IMM recommends that this review occur at least annually.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: PJM agrees in concept with both recommendations and does review mappings, as necessary. In addition, PJM and MISO have jointly developed an interface pricing solution at the Joint and Common Market stakeholder process to resolve the misalignment of the pricing of transactions between PJM and MISO. Finally, PJM has removed, or is in the process of removing, all outdated interface pricing points.

IMM Recommendation: The IMM requests that, in order to permit a complete analysis of loop flow, the FERC and NERC ensure that the identified data are made available to market monitors, as well as other industry entities determined appropriate by the FERC.

IMM Status: Not adopted

PJM Status: No Further Action Planned; Outside of PJM Control

PJM Response: PJM supports the IMM's request that all identified data needed to conduct a complete loop flow analysis be made available to the market monitors as well as other industry entities determined appropriate by the FERC.

IMM Recommendation: The IMM 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.

IMM Status: Not adopted

PJM Status: Stakeholder Process

PJM Response: The Joint and Common Market initiative continues to look for opportunities to enhance the operation and coordination of markets across seams. Coordinated transaction scheduling was implemented with NYISO in November 2014, and will be implemented with MISO in October 2017.

IMM Recommendation: The IMM recommends that PJM permit unlimited spot market imports as well as unlimited non-firm point-to-point willing to pay congestion imports and exports at all PJM interfaces in order to improve the efficiency of the market.

IMM Status: Not adopted

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: PJM has reviewed the spot-in transmission service issue in great detail at the Market Implementation Committee, and stakeholders have expressed concern about permitting unlimited and non-firm point-to-point spot-in transmission imports. The proposal that came from the discussions was to move the spot-in transmission commitment time from 9 a.m. to 10 a.m. on all interfaces. Due to stakeholders' concerns that the move to 10 a.m. would adversely impact other seams, the committee deferred voting on this item. Interested

stakeholders have indicated they will work to develop a more comprehensive approach to address market issues across all seams.

IMM Recommendation: The IMM recommends that PJM immediately provide the required 12-month notice to Duke Energy Progress to terminate unilaterally the Joint Operating Agreement.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: PJM does not agree with the recommendation to terminate the joint operating agreement between PJM and Progress Energy Carolinas, Inc., prior to renegotiating a new joint agreement. PJM concurs that updates and improvements to the agreement may be required and will continue to seek opportunities to work with Duke Energy Progress to update the agreement.

IMM Recommendation: The IMM recommends that PJM Settlement Inc. immediately request a credit evaluation from all companies who engaged in up to congestion transactions between September 8, 2014 and December 31, 2015. If PJM has the authority, PJM should ensure that the potential exposure to uplift for that period be included as a contingency in the companies' calculations for credit levels and/or collateral requirements. If PJM does not have the authority to take such steps, PJM should request guidance from the FERC.

IMM Status: Not adopted

PJM Status: Pending before the FERC

PJM Response: PJM does not agree that additional credit evaluations or "contingency" credit requirements are appropriate for this matter before the commission rules on the FERC-initiated docket on potential uplift charges on up-to-congestion transactions. PJM Settlement already performs ongoing credit evaluations of all PJM members participating in the markets PJM administers. PJM's credit policy in Attachment Q of the tariff does not authorize PJM Settlement to include a "contingency" in members' credit requirements. PJM Settlement does have the ability to modify a member's credit requirement to reflect "known and measurable" changes in the activity or expected charges or credits for a member. PJM is monitoring the open FERC docket that may result in additional fees being charged to up-to-congestion transactions, with the potential of retroactive action dating back to the fall of 2014. PJM has filed a joint letter with the IMM requesting action from the FERC in this docket. In the opinion of PJM Settlement, the possible outcomes of this FERC docket are not yet "known and measurable." It is not known when the FERC will rule in this docket, what the FERC ruling might be, what uplift fees might be assigned to up-to-congestion transactions, or whether any such potential fees would be applied retroactively or prospectively. PJM Settlement will continue to monitor this FERC proceeding, review the FERC ruling in this docket when issued, and modify members' credit requirements as appropriate for the implications of the order.

IMM Recommendation: The IMM recommends that the emergency interchange cap be replaced with a market-based solution.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: Although PJM is supportive of this recommendation, this item is currently low priority.

IMM Recommendation: The IMM recommends that the submission deadline for real-time dispatchable transactions be modified from 1800 on the day prior to three hours prior to the requested start time, and that the minimum duration be modified from one hour to 15 minutes. These changes would give PJM a more flexible product that could be used to meet load in the most economic manner.

IMM Status: Partially adopted

PJM Status: Implemented; Stakeholder Process

PJM Response: This topic has been addressed within the Coordinated Transaction Scheduling product and minimum duration has already been modified to 15 minutes as a result of PJM's response to FERC Order 764.

IMM Recommendation: The IMM recommends that PJM and MISO work together to align interface pricing definitions, using the same number of external buses and selecting buses in close proximity on either side of the border with comparable bus weights.

IMM Status: Partially adopted

PJM Status: Implemented

PJM Response: PJM and MISO have jointly developed an interface pricing solution at the Joint and Common Market stakeholder process to resolve the misalignment of the pricing of transactions between PJM and MISO. This collaborative solution involves a common interface that will be implemented on June 1, 2017.

Ancillary Services Recommendations

IMM Recommendation: The IMM recommends that the Regulation Market be modified to incorporate a consistent application of the marginal benefit factor throughout the optimization, assignment and settlement process.

IMM Status: Not adopted

PJM Status: Stakeholder Process

PJM Response: A solution addressing this issue has been proposed by the Regulation Market Issues Senior Task Force. The solution is to develop a regulation rate of technical substitution curve that accurately represents the tradeoff between Reg A and Reg D resources, and calculates the effective MWs as an area under the curve calculation. The regulation marginal rate of technical substitution will then be used in settlement to provide

consistency throughout the full regulation optimization process. This proposal will be presented to the Members and Reliability Committee and Members Committee at the June 2017 meetings for approval.

IMM Recommendation: The IMM recommends that all data necessary to perform the Regulation Market three pivotal supplier test be saved so that the test can be replicated.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: PJM has requested an enhancement from its software vendor to have this additional information saved. Given vendor resource constraints due to several large projects PJM is currently implementing, this enhancement has been categorized as low priority at this time. PJM plans to implement this enhancement within the next year as resources permit.

IMM Recommendation: The IMM recommends that 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, to prevent gaming.

IMM Status: Not adopted

PJM Status: Stakeholder Process

PJM Response: PJM agrees that a reduction in performance score should result from resource owners electing to de-assign their regulation resources within the hour. The proposal put forth by the Regulation Market Issues Senior Task Force contains this enhancement and will seek approval at the June 2017 Markets and Reliability Committee and Members Committee meetings.

IMM Recommendation: The IMM 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.

IMM Status: Not adopted

PJM Status: Stakeholder Process

PJM Response: The proposal put forth by the Regulation Market Issues Senior Task Force will implement this recommendation, pending approval from the Markets and Reliability Committee, Members Committee and the FERC.

IMM Recommendation: The IMM recommends that the rule requiring the payment of Tier 1 synchronized reserve resources when the non-synchronized reserve price is above zero be eliminated immediately and that Tier 1 synchronized reserve resources not be paid the Tier 2 price when they do not respond.

IMM Status: Not adopted

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: This topic was addressed at the Market Implementation Committee. Stakeholders discussed this issue and submitted a proposal to eliminate payment for Tier 1 synchronized reserve resources when the non-synchronized reserve price is above zero. Both the PJM and IMM proposals were not endorsed, as stakeholders opted to remain with the current rules.

IMM Recommendation: The IMM recommends that the Tier 2 synchronized reserve resources must offer requirement be enforced. The IMM recommends that PJM define a set of acceptable reasons why a unit can be made unavailable daily or hourly and require operators to select a reason in Markets Gateway whenever making a unit unavailable or setting the daily offer MW to 0 MW.

IMM Status: Not adopted

PJM Status: Action Planned; Low Priority

PJM Response: PJM will monitor, for compliance purposes, Tier 2 resources that do not meet the must-offer requirement. The second portion of this recommendation is low priority. Currently, acceptable reasons for why a unit is unavailable daily or hourly do not exist, but if defined and built into Markets Gateway or other suitable system, it would be the participant's responsibility to select the reason why the unit is unavailable for synchronized reserve.

IMM Recommendation: The IMM recommends that PJM be explicit about why Tier 1 biasing is used in the Tier 2 Synchronized Reserve Market. The IMM recommends that PJM define explicit rules for the use of Tier 1 biasing during any phase of the market solution and identify the relevant rule for each instance of biasing.

IMM Status: Not adopted

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: PJM continues to improve the calculation of Tier 1 reserves. However, PJM believes that dispatcher discretion and experience are critical tools used in maintaining system reliability and it is impossible to set rigid rules in this area without sacrificing reliability. This item was voted on at the Markets and Reliability Committee and failed to gain consensus.

IMM Recommendation: The IMM recommends that PJM replace the DASR Market with a real-time secondary reserve product that is available and dispatchable in real time.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: PJM believes that the current Day-Ahead Scheduling Reserve Market results in scheduling the required resources to be operating in real time, and that a real-time market for purpose of securing supplemental reserve during the operating day is necessary. Additionally, PJM discussed creating a real-time operating reserve market as part of the energy reserve pricing and interchange volatility discussions in the Market Implementation Committee, but the proposal did not gain sufficient support for the members to vote on it.

IMM Recommendation: The IMM recommends that the three pivotal supplier test and market power mitigation be incorporated in the Day-Ahead Scheduling Reserve Market.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: Given the near-zero clearing prices and minimal impact of the Day-Ahead Scheduling Reserve Market, PJM believes this is a low priority.

IMM Recommendation: The IMM recommends that a reason code be attached to every hour in which PJM market operations adds additional Day-Ahead Scheduling Reserve MW.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: PJM believes this will likely add little value. PJM increases the Day-Ahead Scheduling Reserve Market requirement when a hot weather alert, cold weather alert or escalated emergency conditions, or if dispatchers have scheduled additional resources for reserves in anticipation of such conditions. PJM has only increased the requirement during a hot weather or cold weather alert. These requirements are documented in the Manual 13: Emergency Procedures. In addition, PJM staff reviews occurrences of increased Day-Ahead Scheduling Reserve at the Operating Committee.

IMM Recommendation: The IMM recommends that separate payments for reactive capability be eliminated and the cost of reactive capability be recovered in the capacity market.

IMM Status: Not adopted

PJM Status: Stakeholder Process

PJM Response: This recommendation has been discussed in the PJM stakeholder process at the Day-Ahead Reliability and Reactive Cost Allocation user group that was absorbed into the Energy Market Uplift Senior Task Force charter in May of 2013. Currently, reactive power is a FERC-defined cost-of-service. PJM recommends the IMM bring a problem statement and issue charge for stakeholder consideration and resolution.

IMM Recommendation: The IMM recommends a number of market design changes to improve the performance of the Regulation Market, including use of single clearing price based on actual LMP, modifications to the lost opportunity cost calculation methodology, a software change to save some data elements necessary for verifying market outcomes, and further documentation of the implementation of the market design through synchronized reserve and regulation optimizer (market-clearing software).

IMM Status: Partially adopted

PJM Status: Stakeholder Process; Action Planned

PJM Response: PJM agrees with the market design elements of this recommendation and has worked with the IMM to put together a proposal to redesign the regulation market. This proposal will be voted on at the May 2017 Markets and Reliability Committee meeting. PJM will work with the IMM to identify what data elements the IMM wishes to be saved and to determine what additional documentation is desired.

IMM Recommendation: The IMM recommends that PJM revise the current confidentiality rules in order to allow a more specific and transparent disclosure of information regarding black start resources and their associated payments in PJM

IMM Status: Partially adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: The FERC and NERC rules regarding critical energy infrastructure information will limit the information that may be disclosed on this topic. PJM has repeatedly made the IMM aware of this issue and requested specific clarification on what disclosures the IMM believes would be valuable while still conforming to federal regulations. To date, the IMM has not provided any further detail on this topic.

IMM Recommendation: The IMM recommends that the single clearing price for synchronized reserves be determined based on the actual five-minute LMP and actual lost opportunity cost and not the forecast LMP.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: PJM implemented this recommendation.

IMM Recommendation: The IMM recommends that no payments be made to Tier 1 resources if they are deselected in the PJM market solution. The IMM also recommends that documentation of the Tier 1 synchronized reserve deselection process be published.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: PJM implemented this recommendation.

Planning Recommendations

IMM Recommendation: The IMM recommends that PJM continue to incorporate the principle that the goal of transmission planning should be the incorporation of transmission investment decisions into market-driven processes as much as possible.

IMM Status: Not adopted

PJM Status: Implemented

PJM Response: Planning considers investment decisions made in the market by including generation and merchant transmission investment decisions once Interconnection Service Agreements have been executed. Additionally, PJM is committed to improving the quality and timeliness of available information so that the market can make investment decisions given the uncertainty and long lead times involved in both transmission and resource planning.

IMM Recommendation: The IMM recommends the creation of a mechanism to permit a direct comparison, or competition, between transmission and generation alternatives, including which alternative is less costly and who bears the risk associated with each alternative.

IMM Status: Not adopted

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: PJM agrees and is supportive of direct resource competition. PJM is committed to improving the available information so the market can have the best information to make investment decisions given the uncertainty and long-lead times involved in resource planning. This concept was examined during stakeholder discussions related to FERC Order 1000 but stakeholders declined to take up the matter for further discussion.

IMM Recommendation: The IMM recommends that rules be implemented to permit competition to provide financing for transmission projects. This competition could reduce the cost of capital for transmission projects and significantly reduce total costs to customers.

IMM Status: Not adopted

PJM Status: No Further Action Planned; Outside of PJM Control

PJM Response: Such a construct would require careful consideration to prevent any unintended consequences. A change of this nature is not a short-term fix but instead a long-term effort that will require many years to implement and would have to be undertaken by the FERC. PJM is currently reviewing lessons learned from the

current implementation of FERC Order 1000 including the use of cost containment options. PJM will continue to consider all options to improve the process.

IMM Recommendation: The IMM recommends that rules be implemented to require that project cost caps on new transmission projects be part of the evaluation of competing projects.

IMM Status: Not adopted

PJM Status: Implemented

PJM Response: Project cost caps are part of the evaluation of competing proposals. However, PJM cannot compel an entry to commit to a cost cap. PJM has requested guidance from FERC on appropriate transmission cost caps.

IMM Recommendation: The IMM recommends that barriers to entry be addressed in a timely manner in order to help ensure that the capacity market will result in the entry of new capacity to meet the needs of PJM market participants and reflect the uncertainty and resultant risks in the cost of new entry used to establish the capacity market demand curve in RPM.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: PJM agrees that unjust and unreasonable impediments to entry of new generating resources should be eliminated to the extent possible. However, labeling a market feature as a “barrier” does not specify or provide the analysis to determine if a particular market design feature is unjust and unreasonable. PJM notes the IMM did not provide specific concerns related to this recommendation; specific details and analysis supporting the recommendation would be helpful to PJM and stakeholders seeking to understand the issue. PJM is committed to working with the IMM and PJM membership to reduce any potential barriers to new generation entry.

IMM Recommendation: The IMM recommends that the question of whether capacity injection rights (CIRs) should persist after the retirement of a unit be addressed. Even if the treatment of CIRs remains unchanged, the rules need to ensure that incumbents cannot exploit control of CIRs to block or postpone entry of competitors.

IMM Status: Not adopted

PJM Status: Implemented

PJM Response: The Interconnection Process Senior Task Force implemented several rule modifications that reduced or eliminated issues relating to existing capacity injection rights. The revised CIR transfer rules reduced the period of time that incumbent CIR holders can hold onto them without acting from three years to one year after deactivation. The new CIR transfer rules struck a balance between reducing the time an incumbent can hold their existing rights while still allowing the incumbent CIR holders the ability to continue to use their rights through

timely entering the interconnection queue process to add new generation using those rights, or modifying their existing facility to reuse the CIRs. As a result, PJM does not believe any further changes are warranted at this time.

IMM Recommendation: The IMM recommends outsourcing interconnection studies to an independent party to avoid potential conflicts of interest. Currently, these studies are performed by incumbent transmission owners under PJM's direction. This creates potential conflicts of interest, particularly when transmission owners are vertically integrated and the owner of transmission also owns generation.

IMM Status: Not adopted

PJM Status: Action Planned

PJM Response: PJM disagrees with the IMM's characterization of the responsibilities in this area. These studies are not performed by incumbent transmission owners under PJM's direction. They are performed by PJM with the support of the incumbent transmission owner. Transmission owners are required to provide the upgrades necessary to correct any violations found during the studies which may require some analysis. PJM is currently discussing with some transmission owners the feasibility of contracting this work to a third party.

IMM Recommendation: The IMM recommends that PJM establish fair terms of access to rights-of-way and property, such as substations, in order remove any barriers to entry and permit competition between incumbent transmission providers and merchant transmission providers in the RTEP.

IMM Status: Not adopted

PJM Status: No Further Action Planned; Outside of PJM Control

PJM Response: This recommendation addresses issues of property rights and legal matters beyond PJM's purview. PJM has no ability to compel transmission owners to forgo their legally established property rights. PJM is not aware of any issues in 2016 that this recommendation would have addressed had it been implemented. PJM will continue further discussion with the IMM to understand specific concerns.

IMM Recommendation: The IMM recommends that PJM enhance the transparency and queue management process for merchant transmission investment. Issues related to data access and complete explanations of cost impacts should be addressed. The goal should be to remove barriers to competition from merchant transmission.

IMM Status: Not adopted

PJM Status: Implemented

PJM Response: PJM worked with the IMM on three items to enhance transparency associated with the incremental auction revenue rights (IARR) process.

1. IARR process education
2. IARR process detailed document
3. Annual process deskside reference

IMM Recommendation: The IMM recommends consideration of changing the minimum distribution factor in the allocation from .01 to .00 and adding a threshold minimum usage impact on the load on the line.

IMM Status: Not adopted

PJM Status: No Further Action Planned; Outside of PJM Control

PJM Response: Changing the minimum distribution factor is within the purview of the transmission owners. Generally, PJM does not agree that the distribution factors threshold should be eliminated. There may be some combination of thresholds that could be effective, but PJM cannot implement such changes.

IMM Recommendation: The IMM recommends that PJM reevaluate all transmission outage tickets as on time or late as if they were new requests when an outage is rescheduled and apply the standard rules for late submissions to any such outages.

IMM Status: Not adopted

PJM Status: Implemented

PJM Response: PJM currently reviews rescheduled transmission outages to verify they do not cause congestion or reliability issues or violate on-time submittal rules. PJM re-studies all the rescheduled outage requests during the near-term outage study process, which includes three-day-ahead study, two-day-ahead study and one-day-ahead study. If an outage is rescheduled to a future month, it will also be re-studied during PJM's one-month-ahead study process. PJM only approves "on time" outages if they do not jeopardize the reliability of the PJM system. PJM makes the final outage approval decision two days before the requested start of the outage.

IMM Recommendation: The IMM recommends that PJM draft a clear definition of the congestion analysis required for transmission outage requests to include in Manual 3: Transmission Operations after appropriate review.

IMM Status: Not adopted

PJM Status: Implemented

PJM Response: PJM drafted language describing PJM transmission outage study congestion analysis and added it to Manual 38: Operations Planning, Section B.6, effective February 1, 2017.

IMM Recommendation: The IMM recommends that PJM modify the rules to reduce or eliminate the approval of late outage requests submitted or rescheduled after the financial transmission rights (FTR) auction bidding opening date.

IMM Status: Not adopted

PJM Status: **Implemented**

PJM Response: The current PJM outage submission rules require all long-duration transmission outages (exceeding 30 days during the following planning year) be submitted before February 1. For long-duration outages submitted after February 1, in addition to the normal outage congestion analysis, there is an internal PJM process for Operations Planning to notify Market Simulation to perform further FTR evaluation on those specific outage requests. PJM will not approve any late long-duration outage requests if they have negative impacts on FTR.

IMM Recommendation: The IMM recommends that PJM not permit transmission owners to divide long-duration outages into smaller segments to avoid complying with the requirements for long-duration outages.

IMM Status: Not adopted

PJM Status: **Implemented**

PJM Response: PJM discussed having multiple scheduled outages on the same equipment with PJM stakeholders in 2015. After the discussion, PJM recognized there are legitimate situations when outages on the same equipment cannot be planned in advance as a single outage. In lieu of rule changes, PJM has begun monitoring outage scheduling behavior and applying appropriate outage frequency tests on a periodic basis. If questionable outage scheduling behavior is noticed, PJM will work with the transmission owner and/or IMM to address the issue.

IMM Recommendation: The IMM recommends improvements in queue management including that PJM establish a review process to ensure that projects are removed from the queue if they are not viable, as well as a process to allow commercially viable projects to advance in the queue ahead of projects which have failed to make progress, subject to rules to prevent gaming.

IMM Status: Partially adopted

PJM Status: **No Further Action Planned; No Stakeholder Consensus**

PJM Response: Provided that a project is meeting the financial milestones required, PJM has limited information to know when a project is no longer planned to be completed by the developer. Stakeholders considered changes to the queue process in the Interconnection Process Senior Task Force. While some rule changes resulted from these discussions, stakeholders specifically rejected this idea as it could cause significant disruption to the queue. PJM has made changes to move queue submissions to the next queue when excessive project changes are received. Additionally, PJM will be seeking further changes to move projects to the next queue when submitted requests are incomplete and cannot be resolved by the close of the queue window.

IMM Recommendation: The IMM recommends an analysis of the study phase of PJM's transmission planning to reduce the need for postponements of study results, to decrease study completion times, and to improve the likelihood that a project at a given phase in the study process will successfully go into service.

IMM Status: Partially adopted

PJM Status: Implemented

PJM Response: PJM's stakeholders analyzed the study phase of the interconnection process and found that a good portion of study delays were attributable to large quantities of incomplete interconnection requests received by PJM in the last days of each six-month queue submittal window. One-third-to-one-half of queue requests were being submitted in the waning days of each queue window. Prior efforts to address this with deposit amounts had minimal effectiveness.

An Earlier Queue Submittal Task Force was established by PJM and its stakeholders in August 2015 to address these delays. On May 12, 2016, The task force presented proposed rule changes to the interconnection process. These changes were filed with the FERC, and the FERC approved the changes, and the PJM Open Access Transmission Tariff was modified effective October 31, 2016.

The first queue with the changes in effect, AC2-queue, closed on March 31, 2017. PJM observed about a 70 percent reduction in last day queue submittals. PJM also observed a 70 percent increase in the prior month, which was the intended behavioral change desired. Additional time and queue study processing will be needed to determine the full effectiveness of these changes.

Financial Transmission Rights and Auction Revenue Right Recommendations

IMM Recommendation: The IMM recommends that the ARR/FTR design be modified to ensure that the rights to all congestion revenues are assigned to load.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: The FERC, in its recent compliance order to address long standing FTR market issues, did not suggest that PJM's ARR/FTR design needs to be modified to return all congestion revenues to load.

IMM Recommendation: The IMM recommends that all FTR auction revenue be distributed to ARR holders.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: Auction revenues are distributed to ARR holders up to the amount necessary to fully fund the ARR target allocations. Excess auction revenues are allocated to FTR holders. PJM does not support allocating excess auction revenues to ARR holders because the ARR holders are already fully funded and the excess should be used to fund FTRs.

IMM Recommendation: The IMM recommends that FTR auction revenues not be used to buy counter-flow FTRs for the purpose of improving FTR payout ratios.

IMM Status: Not adopted

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: PJM stakeholders approved the use of FTR auction revenues to buy counter-flow FTRs in 2014 to help improve FTR Revenue adequacy as it gives PJM the ability to reduce or remove infeasible rights by allowing additional counter-flow FTRs to clear in an auction.

IMM Recommendation: The IMM recommends that historical generation to load paths be eliminated as a basis for allocating ARR.

IMM Status: Not adopted

PJM Status: No Further Action Planned; Rejected by the FERC

PJM Response: A recent FERC ruling required PJM to replace inactive generation to load paths. PJM therefore retains all active generation to load paths and replaced inactive generation to load paths.

IMM Recommendation: The IMM recommends that counter-flow FTRs be eliminated.

IMM Status: Not adopted

PJM Status: No Further Action Planned; PJM Concerns

PJM Response: PJM disagrees with this recommendation. Counter-flow FTRs are important to the market as they provide liquidity and an offset to prevailing flow FTRs used by load to hedge congestion. However, rather than sourcing and sinking at individual load locations where load is not settled, PJM believes a beneficial design change would be to align FTR sources and sinks to nodes where generation, load or interchange transactions are settled, or at trading hubs. This change would better align the use of FTRs from non-LSEs with anticipated, physical, transmission system usage in the Day-Ahead Market.

IMM Recommendation: The IMM recommends that PJM eliminate portfolio netting to eliminate cross subsidies among FTR marketplace participants.

IMM Status: Not adopted

PJM Status: No Further Action Planned; Rejected by the FERC

PJM Response: The FERC rejected PJM's proposal to eliminate portfolio netting

IMM Recommendation: The IMM recommends that PJM eliminate subsidies to counter-flow FTRs by applying the payout ratio to counter-flow FTRs in the same way the payout ratio is applied to prevailing flow FTRs.

IMM Status: Not adopted

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: PJM believes that charging negatively valued FTRs more than 100 percent of their negative value would amount to those negatively valued FTRs subsidizing the payments to positively valued FTRs. PJM does not believe such a subsidy is justified.

IMM Recommendation: The IMM recommends that PJM eliminate geographic cross subsidies.

IMM Status: Not adopted

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: PJM disagrees with this recommendation. In recommending the elimination of cross-geographic subsidies, the IMM is suggesting that FTR underfunding be allocated to those FTR holders whose FTRs are across paths where the constraints causing the underfunding occurred. Changing the allocation mechanism for FTR underfunding, such that revenue inadequacy was allocated to participants whose FTRs impacted the transmission constraints that drove the underfunding, would be directly akin to “undoing” the ARR allocation(s) and/or FTR auction(s) through which the ARRs and FTRs were allocated or sold. PJM stakeholders considered this recommendation and did not approve implementing it.

IMM Recommendation: The IMM recommends that PJM implement a seasonal ARR and FTR allocation system to better represent outages.

IMM Status: Not adopted

PJM Status: No Further Action Planned; No Stakeholder Consensus

PJM Response: PJM has discussed this recommendation on multiple occasions with PJM stakeholders. Stakeholders have not expressed an interest in these forums to change from an annual model to a seasonal one. PJM does not believe this will have a significant impact on FTR revenue adequacy.

IMM Recommendation: The IMM recommends that PJM apply the FTR forfeiture rule to up-to-congestion transactions consistent with the application of the FTR forfeiture rule to increment offers and decrement bids.

IMM Status: Not adopted; Pending before FERC

PJM Status: Implemented

PJM Response: The FERC ruled that PJM must calculate FTR forfeitures based on the impact of an entire portfolio of virtual transactions utilizing the load-weighted reference bus as the point of injection/withdrawal to

complete each virtual transaction. This requirement is consistent with the IMM's recommendation. PJM will be implementing this change in the near future and will make the change effective since January 19, 2017.

IMM Recommendation: The IMM recommends that PJM examine the mechanism by which self-scheduled FTRs are allocated when load switching among LSEs occurs throughout the planning period.

IMM Status: Not adopted

PJM Status: Low Priority

PJM Response: Although self-scheduled FTRs do not follow load shifts, ARRs do shift between LSEs when load shifts. Therefore, PJM believes this is low priority with small impact.

IMM Recommendation: The IMM recommends that PJM improve transmission outage modeling in the FTR auction models.

IMM Status: Partially adopted

PJM Status: Implemented

PJM Response: PJM believes it has already addressed this recommendation through auction models and the modeling changes have resulted in improved FTR revenue adequacy. PJM can work with the IMM to better clarify the intent of this recommendation.

IMM Recommendation: The IMM recommends that PJM reduce FTR sales on paths with persistent over-allocation of FTRs, including clear rules for what defines persistent over-allocation and how the reduction will be applied.

IMM Status: Partially adopted

PJM Status: Implemented

PJM Response: The PJM Tariff already provides PJM with the necessary authority to model the transmission system with the reduced capability necessary to minimize underfunding of FTRs. Therefore, PJM already reduces the capability modeled in the FTR auctions on historically constrained and underfunded paths to the greatest extent possible. These modeling changes have resulted in improved FTR revenue adequacy.

IMM Recommendation: The IMM recommends that PJM report correct monthly payout ratios to reduce understatement of payout ratios on a monthly basis.

IMM Status: Adopted

PJM Status: Implemented

PJM Response: This recommendation was implemented in 2016.