Federal Energy Regulatory Commission

Technical Conference on Resource Adequacy in the Evolving Electricity Sector

Statement of PJM Interconnection

March 23, 2021

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Contents

Executive Summary

PJM is pleased to provide these comments for Commission consideration as part of its March 23 Technical Conference entitled "Resource Adequacy in the Evolving Electricity Sector."[1]

The purpose of competitive wholesale electricity markets is to achieve a reliable power system at the lowest possible cost. As public policies to address climate change grow in importance, the imperative to harmonize the competitive wholesale markets with these policies while continuing to ensure grid reliability is abundantly clear.

The PJM capacity market – known as the Reliability Pricing Model (RPM) – in conjunction with PJM's other markets, has achieved great benefits for customers since it began, including reliability, affordability, reduced emissions, investment in innovative demand response and energy efficiency resources, and facilitating a smooth transition during the time of a dramatic fuel switch from coal to natural gas and renewables.

But the energy landscape is shifting again, with renewable resources and batteries making up more than 90 percent of the planned projects being studied in PJM's interconnection process. With 13 states and the District of Colombia in our footprint, many with decarbonization goals and state policies aimed at choosing cleaner resources, we believe that some elements of our capacity market must evolve.

Administrative market rules, such as Minimum Price Offer Price Rules (MOPR), were historically implemented to address (buyer-side) market power in capacity markets – yet today are increasingly viewed as costly to consumers and an impediment to states' development of these non-emitting resources. These costs stem from the potential for consumers to pay for resources to meet public policy objectives but not receiving a monetary credit for those resources' contributions to wholesale capacity markets.

Maintaining wide participation in regional, competitive wholesale markets benefits consumers greatly by procuring and dispatching resources in the most efficient manner. As a result, continuing to apply these (buyer-side) market power rules to resources needed to achieve states' climate policy goals is not sustainable and will not fully serve the region's needs.

Any changes to our capacity market must accommodate these state policies and support the reliability, operational and cost impacts of operating a future grid with a significantly increased level of renewables.

While we believe that certain changes in our markets are warranted, we want to explicitly state our view that capacity markets, in combination with robust energy and ancillary services markets, are a more desirable market design for our region than an energy and ancillary services-only market regime. Capacity markets are targeted toward achieving desired levels of reliability ahead of time, and they are structured to do so using significantly less-volatile price signals than an energy and ancillary services-only market regime.

[1] PJM is accompanying this Statement with the attached "Foundational Market Objectives for a Reliable Future Grid," submitted jointly by ISO New England, New York ISO and PJM.

Our testimony is informed by three stakeholder workshop sessions that PJM held on potential capacity market reforms in February and March, helpful input from the Organization of PJM States (OPSI), as well as ongoing dialogue with stakeholders. The comments and proposals provided by stakeholders at these workshops were all thoughtful, and PJM recognizes and appreciates the commitment that went into them.

From these discussions and stakeholder presentations, as outlined in greater detail in the testimony below, there emerged a set of principles that we believe should govern consideration of future changes to the capacity market.

Specifically, PJM believes that any changes to the capacity market should:

- Function to help support reliability
- Respect and accommodate state resource preferences and facilitate competitive, least-cost procurement of these policy choices
- Be flexible in design, thus ensuring the long-term viability of the market
- Be limited to and targeted toward the specific problems we're trying to solve
- Embrace competitive principles and send appropriate price signals for efficient entry and exit of resources
- Ensure appropriate mitigation of market power

Of course, within these broad principles, stakeholders have shared a wide variety of proposals, ranging from surgical fixes to address the Minimum Offer Price Rule (MOPR), to a complete market redesign. Although multiple areas of improvement have been identified, there appears to be a growing consensus that – as a first priority – the MOPR in its present form is not sustainable in the long run.

At the same time, there are other pressing issues regarding the capacity market that PJM and a significant number of its stakeholders have indicated a desire to pursue. These proposed reforms are in line with the principles articulated above and include:

- Examining the need to strengthen the qualification and performance requirements on capacity resources
- Evaluating all aspects surrounding the appropriate level of capacity procurement
- Considering clean capacity/energy auctions as an option to allow states and customers to procure clean resources
- Evaluating the need for PJM's procurement of additional reliability-based services, with a particular focus on reliability needs in the face of the changing resource portfolio and increased penetration of intermittent resource technologies

PJM is committed to working alongside our stakeholders toward solutions to these issues. And, as stakeholders recognized during the workshop, it is important to ensure that whatever reforms are adopted, they must enhance rather than subtract from the underlying purpose of the capacity market – namely to ensure that a portfolio of resources exists that can efficiently provide the reliability that the region needs, not just under normal conditions, but under the extreme conditions – similar to those we have increasingly witnessed occurring across the country, as well as those yet to occur. This portfolio of resources must accommodate state policy choices related to generation

resource mix. While we and our stakeholders work on developing thoughtful and deliberate solutions to these issues, we believe our capacity auctions must continue being run to provide critical price signals to generators, demand response and energy efficiency providers, retail market participants and others.

For these reasons, Commission guidance through this Technical Conference and otherwise will be extremely helpful to us and our stakeholder community, both to identify the particular issues of Commission concern and to learn the Commission's views on the prioritization of those issues given the mix of reliability and market reforms being considered. PJM sets forth below its preliminary recommendations on a path forward, informed by the excellent input we have received from our states and stakeholders. PJM appreciates this opportunity for open and frank discussion with the Commission and with stakeholders on these important issues.

Capacity Market Background

PJM's Reliability Pricing Model was implemented in 2007. Although many changes have been made over the last 14 years, PJM believes that at its core, the capacity market has served as an effective, competitive, market-based tool for ensuring resource adequacy in the PJM region at a reasonable cost to customers.

Specifically, one of the key functions of RPM is to establish a forward investment and retirement price signal to ensure that the generation fleet, three years ahead, reflects the most efficient selection of resources developed through a competitive auction. The value of that investment signal was demonstrated through the rapid but efficient changeover of a significant portion of the generation fleet in response to the imposition of the U.S. EPA's Mercury and Air Toxics Standards rule in 2012, without impact to the reliability of the grid.

Since its inception in 2007, more than 33,000 MW of coal generation has retired in PJM. At the same time, the capacity market has sent an investment signal for the entry into the region of 40,000 MW of new natural gas generation resources in total; 13,700 MW of wind and solar; 10,000 MW of demand response; and 2,800 MW of energy efficiency resources. Moreover, after the reforms brought about in 2016 through our capacity performance enhancements, we have seen significant improvements in unit performance during extreme weather. During the 2014 Polar Vortex, we saw generator forced outage rates as high as 22 percent; in severe winter weather in 2018 and 2019, we saw generator forced outage rates peak at 12 percent and 11 percent, respectively.

PJM's capacity market has procured resources (at a lesser unit cost to the customer) above PJM's Installed Reserve Margin. We believe it is important to examine the desired level of procurement – taking into account a broad range of factors, including further potential improvement in generator availability, further improvements in load and DER forecasts, and the potential for correlated extreme events beyond what our system has experienced in the past – all the while considering total cost to consumers.

The capacity market is a core element of a comprehensive market design that has attracted investment in new, more efficient, cleaner technologies, which in turn have contributed to a nearly 40 percent decline in CO2 emissions rates in the PJM region since 2005. Also notable, the costs of the capacity market make up approximately 20 percent of total wholesale costs, and total wholesale costs are down 38 percent since 2014 and are essentially flat since the market was founded two decades ago.

Figure 1. PJM System Average Emission Rates

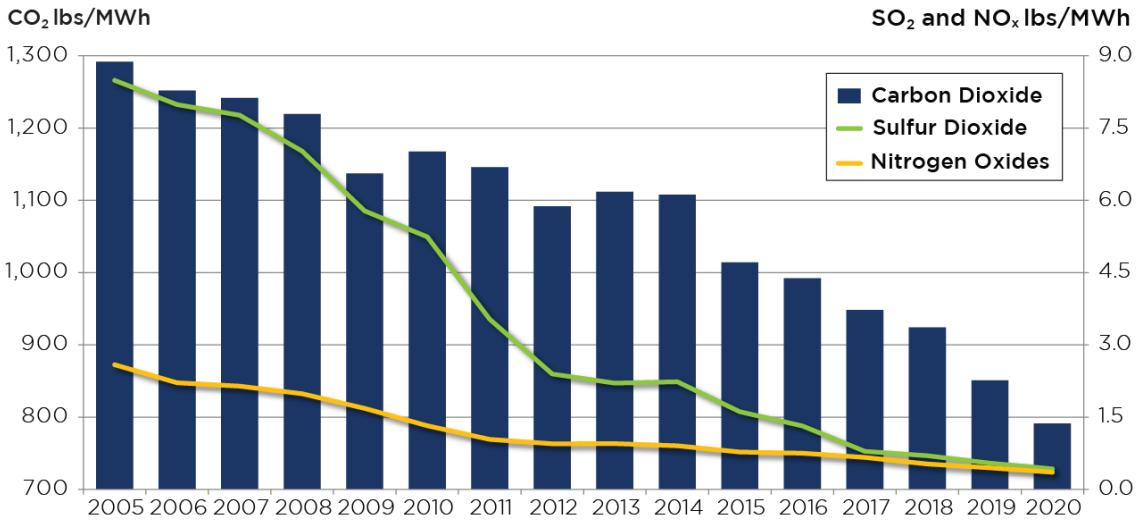


Figure 2. Total Wholesale Costs

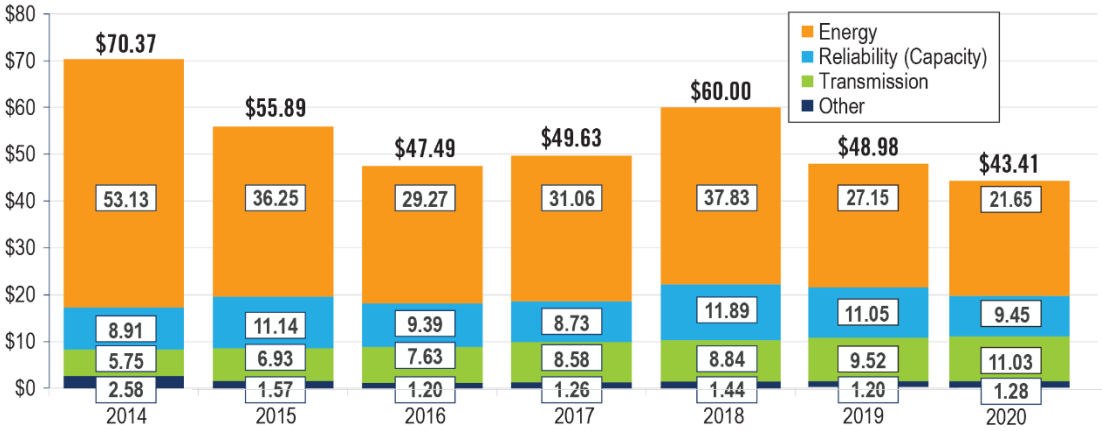
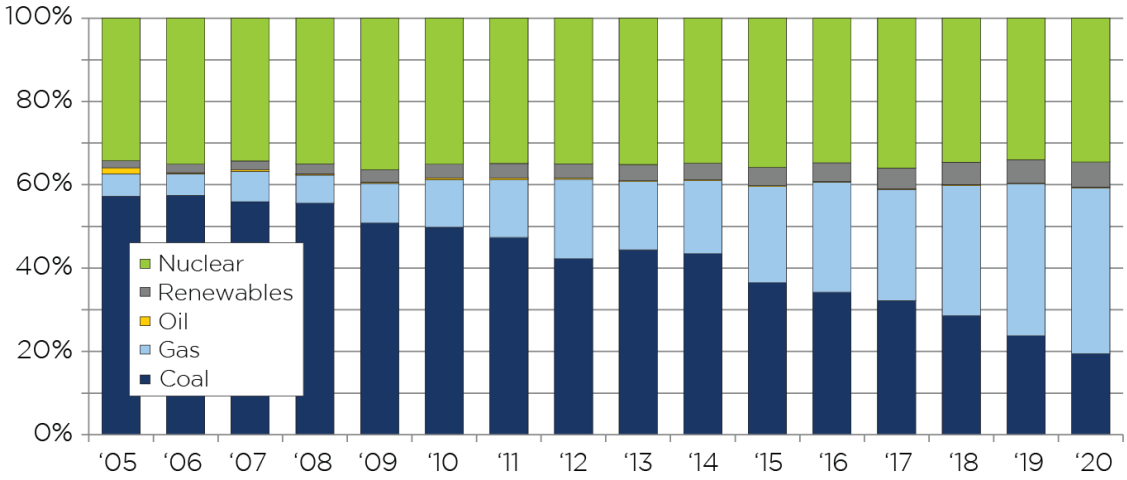


Figure 3. 2005–2020 Annual Fuel Mix



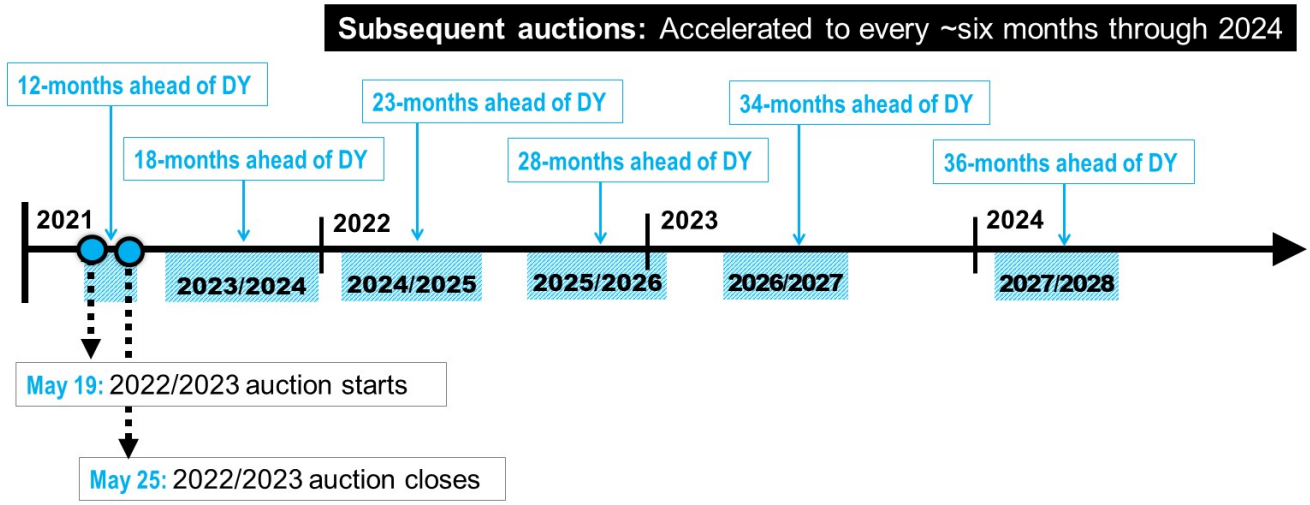
The Importance of Maintaining Timely Auctions Going Forward

The three-year-forward nature of the RPM Base Residual Auction is a fundamental component of the capacity market. It was designed to provide a forward signal that corresponds to the approximate time to build a new combustion turbine.

Since capacity is a reliability-based product, this forward signal is a key component. For example, if the region were to be short of capacity, that shortfall could not be remedied overnight. Investors need to know that if they invest in new resources, they can expect at least the first year's recovery of their capital if their resource clears in the capacity market. By the same token, if the region is long on capacity, the three-year-forward signal is designed to limit investor expectations and also send an appropriate retirement signal to otherwise uneconomic units.[2]

We raise this point since the present schedule for auctions is well behind in meeting the three-year-forward goal, due to the delays that have occurred while the Commission considered MOPR issues in Docket No. ER18-1314. PJM plans to hold two annual capacity auctions this year. We plan to hold the first auction in May for the 2022/2023 Delivery Year, and are scheduled to hold a second auction in December for the 2023/2024 Delivery Year. PJM will need to hold auctions on an accelerated schedule through 2024 to return to a full, 36-month-forward auction. Any delay in any of the auctions scheduled for this year would further hinder our ability to come close to meeting that original design component.

Figure 4. Upcoming RPM Auction Schedule



[2] Although PJM's capacity today is notably above our Installed Reserve Margin (IRM), as the preliminary indications from Texas reveal, the IRM calculation is not the sole measurement of the reliability of the system, and importantly, is not a complete indicator of the resilience of the system to withstand extreme conditions. For example, ERCOT announced at the start of this winter that it had a 43 percent reserve margin. See Report on the Capacity, Reserves and Demand in the ERCOT Region, 2021–2030.

As a result, any reforms that are to be considered, as well as the aggressiveness of timelines, should be tempered by the need to avoid additional auction delays and the market uncertainty that is attendant to such delays. PJM raises this issue **not** to argue that some of the more challenging reforms should not be undertaken. Rather, given the reliability and financial stakes at issue, PJM urges a deliberative approach that allows for careful consideration and thought before we simply "flash-cut" various untested changes with unclear and perhaps unintended consequences. It is for this reason that PJM suggests a phased and structured approach below.

PJM Workshops on Capacity Market Reforms

Through its workshop sessions, PJM has sought to engage stakeholders in exploring potential enhancements to the capacity market:

- Session 1: PJM provided a historical backdrop and offered its perspectives on the framing of the issues to be addressed, along with timing.
- Session 2: PJM gathered stakeholder input on framing of the issue.
- Session 3: Stakeholders provided input on potential market design solutions.
- Session 4 (scheduled for March 26): PJM will provide its feedback around stakeholder input and facilitate a discussion around next steps.

It is important that PJM gather stakeholder input in stating the problems to be solved, and in developing potential solutions, because stakeholder consensus is key to a durable solution. As mentioned above, our thinking – specific to what reforms are needed to address state policy choices – has been informed by the principles detailed in OPSI's Jan. 8, 2021 letter to PJM.

The Future of the Minimum Offer Price Rule (MOPR)

PJM believes that the current MOPR is not a durable solution and needs reform. This reform is time sensitive and needs to be tackled expeditiously. Issues created by the current MOPR include:

- It creates the potential for consumers to have to pay for resources to meet public policy objectives but not to receive a credit for those resources' contributions to wholesale capacity markets. This is also known as the "double-procurement problem."
- It results in PJM procuring more capacity than is needed, as it does not recognize actions already being taken by the states. This leads to a higher level of capacity prices but a downward pressure on energy prices.
- It doesn't accommodate state policy goals.
- State policy goals are accelerating, including in the area of offshore wind, which will likely make the double-procurement problem worse over time.
- States have been presented with a "blunt-instrument" choice between living with a market mechanism that doesn't accommodate their resource choices and exiting the capacity market. Maintaining wide participation in regional, competitive wholesale markets benefits consumers greatly by procuring resources in the most

efficient manner. As a result, continuing to apply these (buyer-side) market power rules to resources needed to achieve state' climate policy goals is not sustainable and will not fully serve the regions' needs.

- The current iteration of the MOPR works against long established public power business models and long-established state traditional regulatory models. Specifically, limitations on self-supply and limitations on generation being built under a traditional state regulatory model frustrate these entities' fulfilling the needs of their customers under these long-accepted models.

In short, PJM believes that MOPR reform needs to be a high priority and, for the reasons noted below, must be accompanied by a phased but well-thought-out comprehensive plan for tackling some of the additional overarching reliability and market-design issues that stakeholders have raised.

Key Reliability and Market Issues That Need to Be Considered Holistically

Evaluating Capacity Procurement Levels

PJM believes that the various components of the "over-procurement" topic raised by stakeholders warrant further exploration, including:

1. Examining the demand curve shape and choice of reference unit to ensure an appropriate level of procurement – including above the reliability target – where there is reliability value to additional levels of capacity, and it can be obtained at a lower per-unit cost to customers.
2. Further refining PJM's load forecasting so as to reflect the changing uses of electricity, including – among other things – the impact, over time, of greater energy efficiency and further electrification of the transportation sector.
3. Evaluating whether additional requirements for capacity resources, such as start times, winterization specifications, and fuel supply, should be a part of the qualification of capacity resources. In addition, it would, in PJM's view, be appropriate to re-examine RPM's performance penalties – including the triggers for performance assessments and the exemptions for non-performance – such that the performance expectations are more transparent and predictable. If changes are made here, how should unit availability improvements be reflected in determining the resource adequacy target.
4. Examining whether the calculation of the resource adequacy target should be modified to ensure that the correlated risks of extreme weather beyond what we have previously experienced, loss of fuel, equipment failures and other factors are all considered as PJM determines the appropriate level of resource adequacy, including an evaluation of seasonal capacity needs.
5. Examining whether an expectation of an amount of "uncleared capacity" should be incorporated into the capacity auctions, and, if so, whether this capacity should have any must-offer requirements.

Competitive Auctions for Policy Resources

Given several state programs driving toward decarbonization and customer preferences, proposals have been put forward to develop auctions for state-mandated and consumer-preferred clean energy and/or capacity so that such preferences can then be accounted for in capacity procurement. PJM believes that if states and stakeholders are willing to consider such regional competitive solutions, work in this area could prove fruitful.

Evaluating the Need for Additional Reliability Products

Given the ongoing evolution of the markets, we believe that we and our stakeholders should evaluate the need for procurement of additional reliability attributes, such as ramping, flexibility and inertia that may be required for a system with increased intermittent and distributed energy resources. Resource adequacy in the future should no longer be measured based solely on the characteristics of the peak day; it must evolve to include the ability to serve load in all hours of the year.

A Proposed Path Forward and Sequencing

As noted above, there have been a great number of thoughtful proposals raised in our workshop sessions and helpful principles laid out by OPSI and others at the start of this process.[3]

PJM has been informed by these recommendations in addition to the recent reliability challenges experienced by the citizens of Texas.

Of course, stakeholder and PJM resources, just like Commission resources, are not unlimited. With that in mind, PJM sets forth below its initial thoughts on which issues realistically can be addressed and resolved by stakeholders in the short term, versus those issues which, as a practical matter, will require longer-term development.

MOPR Reform

At its initial workshop, PJM identified MOPR reform as a priority issue it would like to see addressed. Depending on the complexity of the solution advanced, this could be either a straightforward or complicated process. Suggestions have ranged from returning to the original MOPR embodied in the 2007 settlement to devising a new "intent-based" MOPR. Any such effort will need to be informed by the Commission's past precedent concerning the need for clear *ex ante* standards governing what would constitute an extension of buyer-side market power.

Additional Issues for Consideration

PJM agrees with the need to address the MOPR. Simply changing or even eliminating the MOPR by itself, however, will not ensure that the capacity market continues to meet the fundamental design goal of ensuring the procurement of reliable supplies and providing accurate investment and retirement signals to ensure that the fleet meets that design objective. In short, reform to the MOPR is, in PJM's view, a necessary and high-priority reform, but not one that is fully dispositive of the issues that appropriately need to be considered, given the myriad of other issues identified by stakeholders. Consistent with the key reliability and market issues that need comprehensive reform explained above, these additional issues include:

a. Considering the potential correlation of adverse effects in determining the resource adequacy target, and the potential shift in focus from the capability to serve load on the peak day to the ability

[3] However, the extent to which PJM and its stakeholders wish to engage in these larger issues is not solely in our control or theirs. It is also affected, in part, by the Commission's own expectations of priorities and timing.

to serve load in all hours of the year. This could lead to the development of a different approach to the determination of the resource adequacy target, including seasonal capacity requirements.

b. Considering whether to:

   i. Establish a minimum set of physical performance attributes, such as winterization and fuel supply requirements for capacity resources, to supplement the incentive/penalty system that is embodied in Capacity Performance

   ii. Require greater rigor on start-up time and minimum run times for capacity resources based upon their resource class

   iii. Enhance and simplify the penalty structure for non-performance

c. Addressing the various components of the procurement issue including:

   - The overall level of procurement as determined through the resource adequacy target
   - The level of reliability procured over and above today's resource adequacy target so as to reflect the value of additional reliability resources available for contingencies at a steadily lower per-unit cost to customers
   - Additional refinements to the PJM load forecast to reflect additional uncertainties and the greater electrification of the transportation sector along with increasing energy efficiency

d. Working with stakeholders over the longer term to develop products to ensure that PJM is able to procure and compensate for the needed flexible products and services PJM will need to maintain reliability given a fleet with an increasing level of intermittent and distributed resources. These products could be procured on a forward basis in the capacity market or separately as new products to be procured through PJM's ancillary service markets.

e. Considering clean capacity/energy auctions as an option to allow states and customers to procure clean resources.

Timing Considerations and the Role of the Commission

PJM recognizes that this "package" includes a number of items that require significant work from PJM and its stakeholders and states. It is certainly appropriate that a portion or portions of this package could move forward individually.

MOPR Reform Effort: PJM offers that it would work intensively with its stakeholders to attempt to file reforms to the MOPR as early as July to be implemented for the December auction if the Commission were to make clear that this is its desire. Under normal conditions, this time frame would be extremely aggressive and potentially at odds with the drive toward stakeholder consensus. However, given the overwhelming stakeholder sentiment on reforming the MOPR, PJM believes that, in this instance, a July consensus filing may be achievable. PJM intends to use its best efforts working with its stakeholders in this time frame on MOPR reform.

Addressing the Broader Issues Outlined Above: Many aspects of the procurement issue, as outlined above, can and should be addressed in the upcoming Quadrennial Review, which is scheduled to commence in the spring of this year. Issues such as considering clean capacity/energy auctions, as well as further refining the requirements of capacity resources, can also be considered in this time frame. Accordingly, PJM respectfully requests that the Commission indicate, through its public statements at this Technical Conference or otherwise, that reform of the MOPR should not be the end of efforts aimed at improving the capacity market.

PJM recognizes that the Commission is usually in a more reactive mode in response to particular Section 205 filings. Given the Commission's focus on the PJM capacity market as exemplified by its hosting of this Technical Conference, however, this framing of additional issues beyond the MOPR issue is, in PJM's view, appropriate for Commission consideration. The Commission need not define exactly what the solution is to these issues. However, direction from the Commission to PJM and its stakeholders that timely work on this larger set of issues, moving toward Section 205 filings with stakeholder support, would be helpful to PJM and its large and diverse stakeholder community.

PJM thanks the Commission and its states and stakeholders for their continued focus on these important issues so critical to the economic, environmental and social well-being of the PJM region.

Attachment

"Foundational Market Objectives for a Reliable Future Grid"

Submitted jointly by ISO New England, New York ISO and PJM

Foundational Market Objectives for a Reliable Future Grid

The purpose of competitive wholesale electricity markets is to achieve a reliable power system at the lowest possible cost. As public policies to address climate change grow in importance, the imperative to harmonize the competitive wholesale markets with these policies while continuing to ensure grid reliability is abundantly clear.

The three Eastern RTOs/ISOs share similar objectives – and face fundamentally similar challenges – in harmonizing their markets with states' climate policy goals. A number of states are facilitating the development and retention of non-emitting generation resources through out-of-market payments in the form of Renewable Energy Credits (RECs), Zero Energy Credits (ZECs), or contracts. Administrative market rules, such as Minimum Price Offer Price Rules (MOPR), were historically implemented to address (buyer-side) market power in capacity markets – yet today are increasingly viewed as costly to consumers and an impediment to states' development of these non-emitting resources. These costs stem from the potential for consumers to pay for resources to meet public policy objectives but to not receive a credit for those resources' contributions to wholesale capacity markets. Maintaining wide participation in regional, competitive wholesale markets benefits consumers greatly by procuring resources in the most efficient manner. As a result, continuing to apply these (buyer-side) market power rules to resources needed to achieve states' climate policy goals is not sustainable and will not fully serve the regions' needs. A fresh approach is warranted.

In considering a path forward, the three Eastern RTOs/ISOs remain committed to capacity markets. Capacity markets, in combination with robust energy and ancillary services markets, provide significantly less volatile investment price signals than an Energy and Ancillary Services (EAS)-only market. As the competitive wholesale markets transition to recognize states' policy goals, we believe five foundational market objectives should stand as guideposts to ensure a reliable, efficient, and increasingly clean power system in the regions we serve. Some are new, some are simply of renewed importance, and all are consistent with time-tested principles of sound markets. They are:

1 | **New Services to Ensure Continued Reliability.** New market products and services will be needed to ensure the power system can meet current and emerging reliability needs. These may include new ancillary services or forward products, to be developed in tandem with and to support the integration of greater renewable energy, storage, and distributed energy technologies. These new services may be static or vary dynamically with changes in system conditions, and must be sufficiently granular and in the right quantities to manage a wide range of operating conditions. Identifying and developing these new products and services, which may address reliability needs as varied as inertia, reserves, ramping, load following or duration capability, will be an ongoing process as technologies continue to evolve. These needs should be identified proactively to ensure a reliable transition to a clean grid. All resources capable of providing these services should be able to compete to provide these products and services in order to drive innovation and minimize cost to consumers.

2 | **Continued Efficient Integration of Demand-Side Resources into Competitive Wholesale Markets.** The transition to the future grid requires a wholesale market structure that allows for new and existing technologies to compete on equal footing. This includes the capability for wholesale price-responsive demand to play an active role in the wholesale markets, and the integration of a wide array of emerging load-shifting and distributed-resource technologies.

3 | **A Focus on Sound Pricing in the Energy Market.** Efficient, transparent prices are the foundation of all successful markets. We must continue to ensure energy and reserve prices accurately reflect these markets' supply and demand fundamentals, every minute of every day. Sound, transparent, actionable and reasonable pricing of all products and services in the day-ahead and real-time markets provides proper incentives for resources to offer flexibly and to be responsive to real-time changes in the system, particularly as conditions transition between when supply is ample and when it is scarce.

4 | **Accurate Assessment of Resource Capacity Contributions to Resource Adequacy.** It is imperative to value capacity resources accurately based on their contributions to reliability, using methodologies such as determining Effective Load Carrying Capability (ELCC). This allows capacity market accreditation and compensation to be properly aligned with individual resources' expected reliability benefit to consumers.

5 | **Capacity Markets Calibrated to Induce Reliable New Entry and Efficient Exit.** As the resource mix transitions with increasing renewable and limited-energy resources, capacity market incentives must be sufficient to encourage resource entry when needed. Such entry may be caused by retirement of existing, higher-cost generation, reduction in resource capabilities, or other factors or by the expected sustained increase in regional load with electrification of the transportation and heating sectors. Changes will be required over time to properly calibrate capacity demand curves, the benchmark net cost of new entry for generation technologies, capacity zones, and other concepts that support efficient price signals for exit and entry decisions by resource owners. Continued focus on the requirement for resources to perform when needed will also be required.

The five objectives summarized above – some new and others re-calibrated to the evolving grid – will help to harmonize the wholesale electricity markets with environmental policy goals and consumer preferences, ensuring a reliable, competitive, and efficient power system for the future. We believe that by adhering to these principles we can work to facilitate states' ability to pursue their policy objectives in concert with the ISO/RTO-administered, competitive wholesale electricity markets.