



FEDERAL ENERGY REGULATORY COMMISSION

AD23-7-000 | PJM Capacity Market Forum

**Pre-filed Statement of Manu Asthana on Behalf of
PJM Interconnection, LLC**

June 15, 2023

For Public Use

EXECUTIVE SUMMARY

PJM welcomes this opportunity for a public discussion of the role of PJM's capacity market as a tool to provide for resource adequacy in the 13-state plus the District of Columbia region we serve. As we are undertaking our own process with stakeholders to examine and discuss potential enhancements to that market, the Commission's focus on soliciting input on future challenges and potential solutions is welcomed and represents an important part of this discussion.

Before addressing the specific Commission questions, it will be helpful to step back and examine the original goals of PJM's capacity market design (known as Reliability Pricing Model or RPM) and the record to date of the market's achievement of those goals. Those goals were memorialized succinctly in testimony that PJM presented at a Commission technical conference in February of 2006,¹ and restated by PJM to the Commission at a technical conference in 2013. At that time, PJM and its stakeholders sought a market design which would provide for resource adequacy and produce outcomes that:

1. Inform economically rational retirement decisions;
2. Signal infrastructure investment when and where needed; and,
3. Promote innovation.

Moreover, through supply-side competition among resources (including demand response and energy efficiency resources), the goal was to ensure that customers could receive the most efficient and competitive outcomes consistent with the goal of affordability. These goals remain as relevant today as they were at the time of that first conference seventeen years ago.

In its Order affirming the need for the features of the RPM structure outlined above, the Commission stated:

*"[The construct before the existing centralized capacity construct] does not enable market participants to see the reliability problems in particular locations, does not provide price signals that would elicit solutions to reliability problems in enough time before the problems occur, and does not allow transmission and demand response to compete on a level playing field with generation to solve reliability problems."*²

¹ *PJM Interconnection, L.L.C.*, Statements of Audrey A. Zibelman and Andrew Ott For Technical Conference re: Reliability Pricing Model Filed by PJM Interconnection, L.L.C., Docket Nos. ER05-1410-000 and EL05-148-000 (Feb. 2, 2006), <https://elibrary.ferc.gov/eLibrary/filedownload?fileid=00DFDBBE-66E2-5005-8110-C31FAFC91712>.

² *PJM Interconnection, L.L.C.*, 115 FERC ¶ 61,079, at P 29 (2006) (April 2006 Order).

As will be detailed below, the overall structure of the capacity market in PJM is sound and has produced efficient outcomes and significant savings for customers. Specifically and as further detailed in this Statement, PJM's capacity market has:

- Procured sufficient resources to meet demand;
- Helped facilitate the orderly entry and exit of resources in a cost effective manner; and
- Fostered innovative technologies through competitive markets.

As a key data point, since its inception the capacity market has attracted close to 50,000 MW of new investment including approximately 4,100 MW of renewable generation and, approximately 15,000 MW of demand response and energy efficiency resources.

The PJM Capacity Market is Flexible to Meet Different State and Load Serving Entity Needs.

Contrary to some beliefs, the structure of PJM's capacity market accommodates diverse business models. By way of example, the Fixed Resource Requirement (FRR) option allows states and load serving entities (LSEs) within a transmission zone to elect to meet their resource adequacy needs based upon their own resources, subject to meeting the reliability needs of the RTO as a whole. Thus, RPM serves as an alternative mechanism to procure capacity for states and LSEs that do not pursue self-supply or bilateral procurement. And in non-Fixed Resource Requirement regions, wholesale customers and states still retain the option to self-supply their preferred resources (subject to accreditation by PJM to ensure that the reliability needs of the system are met) or through longer term bilateral arrangements to procure capacity resources or the option to self-supply their own generation resources. In short, the market provides a transparent price signal as to the value of capacity on a forward basis that LSEs, end use customers, states and investors can use as a data point in structuring their capacity and energy arrangements.³

Although some commenters have asserted that the obligation to maintain resource adequacy should be assigned solely to LSEs, there is a significant complication to this approach that relates to state restructuring laws rather than any particular RPM market rule. In PJM, nearly **70 percent** of demand is located within a state that has restructured its retail electricity market.

Due to retail customer shopping, the LSEs supplying retail customers within this 70 percent of the PJM footprint do not necessarily know today who their customers will be in three years and therefore exactly how much capacity they should purchase on a forward basis. As such, LSEs of retail choice load are not incented to enter into long-term supply

³ LSEs may enter into bilateral contracts outside of PJM for all or some of their capacity obligation. Generally, those contracts are arranged at a brokered price between the parties and settle against the PJM capacity price (e.g., contract for differences). LSEs that own generation, whether regulated or merchant models, may offer their capacity into the capacity market. This offsets their load's capacity obligation in the market by netting the entity's capacity credit/charge. Finally, the spot market represents the residual procurement of capacity by PJM for LSEs that do not: elect FRR, engage in bilateral contracts or self-supply capacity.

arrangements with capacity resources for their projected requirements, resulting in no direct signal to capacity suppliers of the needs of consumers.

The Commission has acknowledged the value of a centralized procurement option to address this dynamic. In PJM, load is forecasted by PJM, and the appropriate resources are procured. The forward price signal then incents investment without requiring each particular LSE in retail choice states to commit to a particular capacity purchase in a manner that is inconsistent with the realities of customer choice.

Our Proposed Steps Forward

Below I will address the Commission's specific questions which ask about the role of the capacity market looking forward. My statement will note that there are considerable external headwinds facing some capacity resources today, whether those resources are located within an organized market or not. These factors have been detailed in our PJM's Energy Transition: Resource Retirements, Replacements and Risks report ("4R's Report") which I outline.

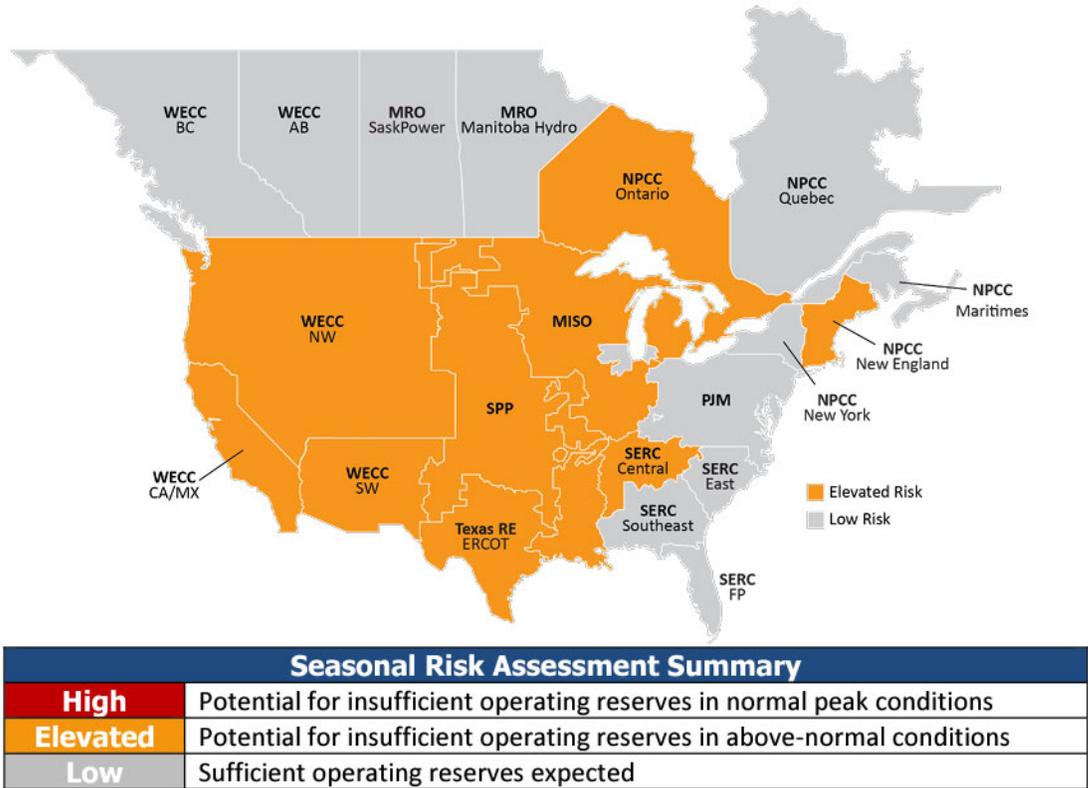
To adapt to these external factors and help mitigate the risk of future resource adequacy challenges, as well as to address nearer term issues such as increased winter risk, we are committed to working with stakeholders on targeted enhancements to the RPM construct to be filed with the Commission in the fall. But the focus on enhancements that I discuss below and my colleague Adam Keech outlines in more detail, should not take us away from the larger conclusion that the RPM construct has met the goals that the Commission embraced back in 2007 and that those goals are as relevant and important today to ensuring reliability and efficiency as they were then. The capacity market, together with the other markets PJM operates may be enhanced to overcome this set of headwinds just as they did back in 2007 when we were facing significant retirements as well as a host of other external events since that time.

Finally, the headwind issues discussed today are not faced by PJM alone, but are rather national in scope both in organized wholesale market regions and non-market regions of the country. In fact, there is ample indication that the PJM region is dealing with these issues better than most. **Figure 1** represents the North American Electric Reliability Corporation's Summer 2023 Reliability Risk Area Assessment Summary.⁴ The areas facing elevated risk are grappling with the same issues being discussed today, but with a much more severe set of near term circumstances.

⁴ North American Electric Reliability Corporation, *2023 Summer Reliability Assessment*, at P 6 (2023), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_SRA_2023.pdf.

Figure 1 reflects that both market and non-market regions find themselves in each the elevated and low risk assessment categories.⁵

Figure 1. Seasonal Risk Assessment



I welcome this dialogue and look forward to elaborating on these issues in the discussion phase of this forum.

⁵ *Id.*

Response to Commission Inquiries from May 23 Supplemental Notice of Forum

Below, I address each of the questions set forth in the Commission's June 15 agenda:

1. Is the PJM capacity market fulfilling its objectives? If not, why not?
2. Do changes to the resource mix and load, including wide-spread electrification and increased risks due to extreme weather, require changes to the structure of the capacity market?
3. Are there other drivers that may be preventing the PJM capacity market from achieving its objectives?

Is the PJM capacity market fulfilling its objectives? If not, why not?

PJM's capacity market secures enough power supplies three years in the future to ensure that sufficient supply will be available to meet peak consumer demand. Capacity resources include generators that produce electricity and other resources, such as demand response, that can reduce consumer use and help operators keep the supply and demand in balance. Both supply and demand-side resources are procured in PJM's capacity market (also known as the Reliability Pricing Model or RPM).

The essential elements of the capacity market were outlined back in 2007. They are:

- Procurement of capacity three years before it is needed through a competitive auction. Payments are made to the resources in the delivery year when the resources have agreed to be available.
- Locational pricing that works to identify specific capacity needs throughout the region and
- A sloped demand curve that works to reduce volatility and investor risk while procuring additional reliability at a steadily reduced price for customers.

Over the years, PJM's capacity market has procured adequate resources to meet the reliability requirements of the PJM region, while also helping to facilitate the energy transition. The table below shows the various resources that have been procured in PJM's capacity market since the inception of the Reliability Pricing Model. This table demonstrates that PJM's capacity market has not only procured sufficient resources to meet loads, but also has helped to facilitate needed diversity in the resource mix. Although we have seen significant declines in coal-fired resources, the PJM market contains more diversity in supply than ever in the past. This diversity (which includes significant increases in demand response and energy efficiency participation) has proven to be a valuable benefit that has allowed PJM to weather reliability challenges.



Table 1. Cleared Unforced Capacity Megawatts in PJM Base Residual Auctions & Fixed Resource Requirement

Delivery Year	Coal	Distillate Oil (No.2)	Gas	Nuclear	Oil	Solar	Hydro	Wind	Battery	Demand Response	Energy Efficiency	Other	Total
2007/2008	60,025	4,170	40,448	30,024	7,842	-	7,114	*	-	573	-	2,106	152,302
2008/2009	59,070	4,306	40,932	29,949	8,287	-	7,180	95	-	989	-	2,051	152,859
2009/2010	60,584	4,193	41,623	29,265	8,277	-	7,755	139	-	1,317	-	2,230	155,382
2010/2011	60,854	4,280	40,828	29,144	8,192	-	7,699	273	-	1,392	-	2,307	154,970
2011/2012	67,267	4,412	43,676	33,346	6,923	*	7,868	435	-	3,097	*	2,293	169,317
2012/2013	67,952	4,452	46,146	34,210	7,051	*	7,892	457	-	8,192	580	2,273	179,205
2013/2014	70,603	3,925	50,519	32,590	5,211	*	7,907	777	-	10,039	679	1,895	184,145
2014/2015	62,991	3,687	50,475	32,548	5,490	46	8,055	885	-	14,573	822	1,658	181,228
2015/2016	57,093	3,495	54,890	32,768	5,469	56	8,294	910	-	15,549	923	1,420	180,867
2016/2017	54,244	3,500	63,008	32,766	4,670	91	8,359	987	-	12,806	1,117	1,468	183,016
2017/2018	54,841	3,353	65,586	28,495	5,522	116	8,437	804	-	11,433	1,339	1,425	181,351
2018/2019	53,455	2,815	66,725	29,534	5,025	191	8,131	1,008	-	11,558	1,247	1,362	181,049
2019/2020	50,863	2,688	71,535	27,997	4,444	335	8,145	969	-	10,768	1,515	1,394	180,653
2020/2021	47,606	2,631	75,263	29,141	5,000	125	6,289	996	-	7,841	1,710	1,407	178,009
2021/2022	47,531	3,155	76,164	21,898	3,955	589	6,760	1,526	-	11,353	2,832	1,318	177,081
2022/2023	39,230	2,897	79,329	26,140	2,527	2,096	6,749	1,839	-	8,903	4,811	1,554	176,073
2023/2024	31,811	2,855	81,643	31,960	2,269	2,935	6,375	1,416	*	8,631	5,471	1,696	177,062
2024/2025	31,532	2,674	83,243	31,629	2,242	4,232	6,137	1,396	*	8,173	7,667	1,667	180,592

* Represents not enough market participants to disclose.

The figures below provide further evidence of the capacity market incenting the development of demand response and energy efficiency as well as facilitating the changeover of the fleet in light of various state and federal environmental rules.

Figure 2. RPM Creates One of the World’s Largest Centralized Markets for Demand Response and Energy Efficiency to Compete against Traditional Capacity,

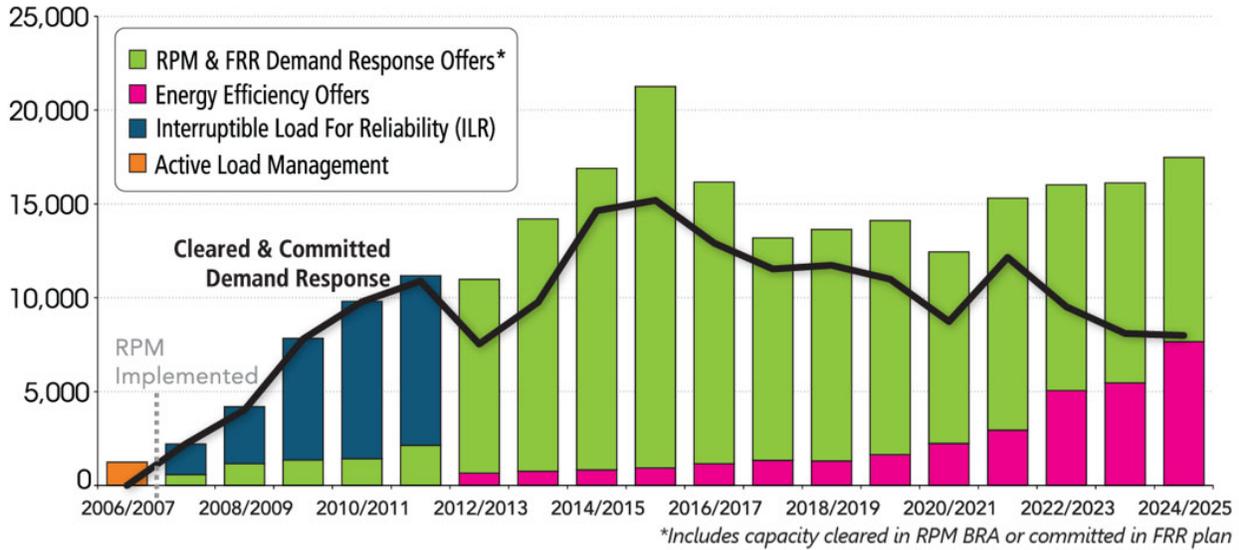
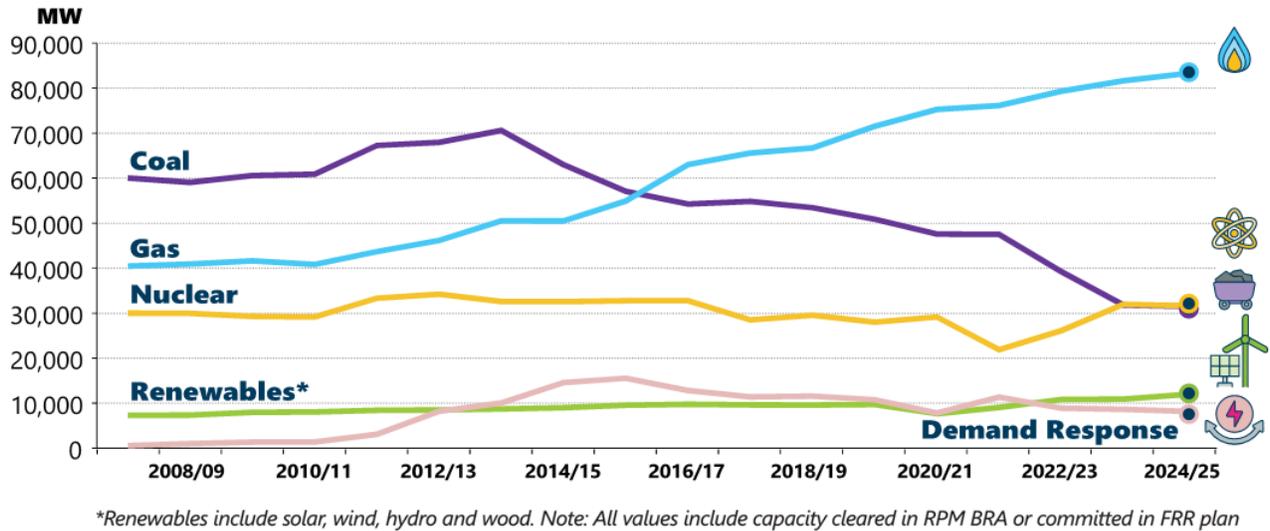
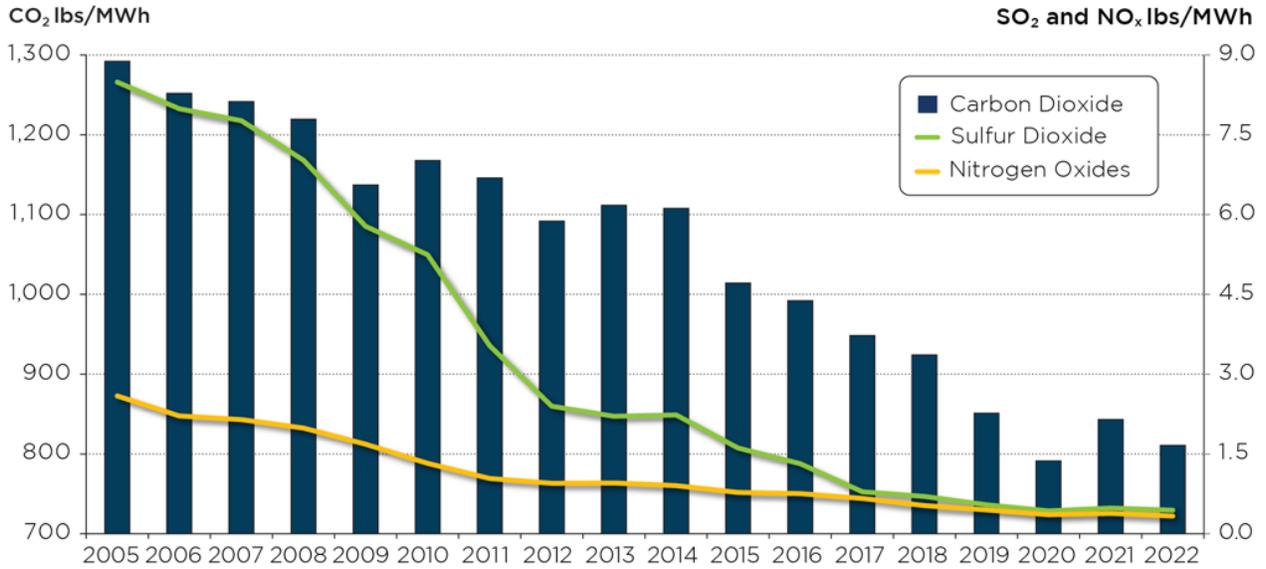


Figure 3. RPM Facilitates the Orderly Transition of Technologies Ensuring Reliability and Placing Downward Pressure on the Market,



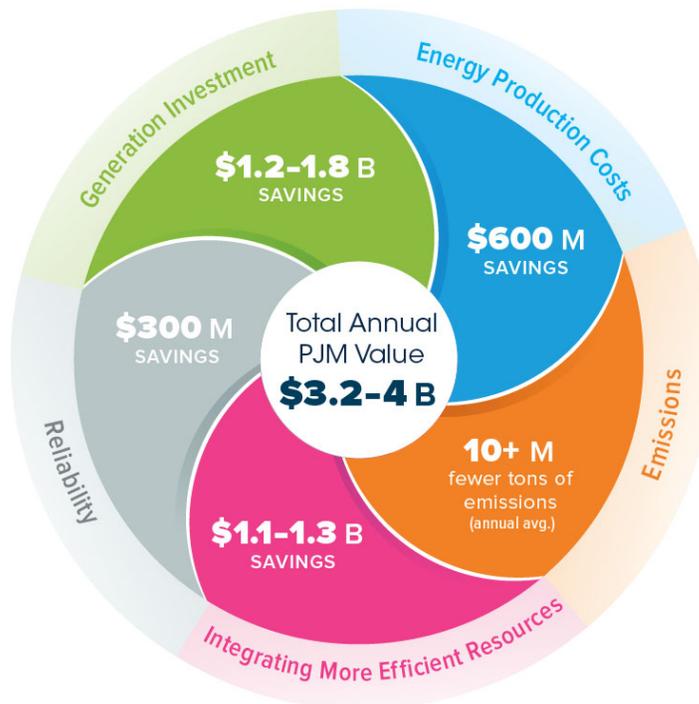
Furthermore, the shift in the resource mix outlined above has led to significant emission reductions.

Figure 4. PJM Average Annual Emissions Rate



And always keeping in mind providing value to the customer, PJM's overall value proposition has produced tangible results for customers as evidenced by this chart below and additional information on our website:

Figure 5. PJM Value Proposition



A variety of different entities have recognized the value of the markets in providing customer benefits. I want to highlight this quote from a letter from the Clean Energy Buyers Association (“CEBA”), a diverse set of over 350 energy customers, including nearly one-fifth of the Fortune 500:

“Organized wholesale electricity markets (OWMs) are fundamental to advancing CEBA’s vision and goals. By leveraging the power of competition and balancing clean energy generation over large geographic regions, OWMs produce billions of dollars in benefits annually. These markets expand purchasing options and support reliable clean energy integration...”⁶

By the same token, we have seen this same recognition from those on both sides of the aisle who have served as FERC commissioners. A bipartisan group of former FERC commissioners wrote to FERC in June 2021, stating:

“As former FERC Commissioners and Chairs, appointed by both Republican and Democratic Presidents over the past three decades, we are united in our strongly held view that organized regional wholesale power markets, known as RTOs and ISOs, provide compelling platforms for renewable energy development and are achieving considerable consumer benefit.”⁷

Do changes to the resource mix and load, including wide-spread electrification and increased risks due to extreme weather, require changes to the structure of the capacity market?

There are two parts to this question. If the reference to ‘structure’ is asking whether a wholesale change is needed to the overall objectives and design features of the capacity market outlined above, I would underscore that the structure is sound as it has met the goals outlined in 2007 of:

- Providing tangible savings to customers as outlined above;
- Sending efficient price signals that have succeeded in attracting new investment and hastening the retirement of inefficient resources; and
- Encouraging innovation by incenting the development of innovative demand response, energy efficiency and storage resources in our region, as well as sending efficient signals to attract new investment.

On the other hand, if the question is asking whether changes to the resource mix and load, including wide-spread electrification and increased risks due to extreme weather require changes to certain capacity market rules, then the

⁶ Clean Energy Buyers Assoc., Organized Wholesale Electricity Markets, <https://cebayers.org/programs/market-policy-innovations/organized-markets>.

⁷ Letter of Nine Former Federal Energy Regulatory Commissioners and Chairs to FERC Re: Organized Wholesale Power Markets (June 2, 2021), <https://www.rstreet.org/wp-content/uploads/2021/06/Former-FERC-Commissioners-Advocate-for-Expansion-of-Organized-Power-Markets-6-2-21-1.pdf>.

answer is yes. There are a number of reasons why changes to the market rules would be in order including, but not limited to:

- **Policy Externalities on the Entry-Exit Balance:** There is an increasing risk of future resource adequacy challenges as a result of the rate of retirements of generation exceeding the rate of new additions of resources that have the attributes we need to manage the grid of the future. One of the main factors driving this risk is the design of certain policies with hard date-certain retirement or output restriction requirements before replacement generation exists. There is also a chilling effect of such policies, together with regulatory uncertainty generally, on the entry of new thermal generation entry;
- **Economic Externalities on the Entry-Exit Balance:** Increasing issues related to supply chain for generation materials, inflationary impact to cost of capital and local siting and permitting challenges faced by generation developers have slowed the entry of new resources coming online, unrelated to the outcomes of RPM.
- **Resource Performance & Accreditation:** Lessons learned from recent events such as Winter Storm Uri and Winter Storm Elliott; and
- **Reliability Risk Modeling:** The increasing reliability risks in the winter period due to strained natural gas infrastructure and enhancements needed to further coordinate the gas and electric markets.

Identified Trends Impacting Future Resource Adequacy

Through its 4R's Report, PJM's recent analysis identifies four trends that, when taken in the aggregate, represent a concerning picture for sustained resource adequacy into 2030. This risk is not a forgone conclusion. Rather, we believe a reliable energy transition is achievable through a focused set of reforms, including, but not limited to, those to our resource adequacy paradigm – RPM.

1. **Sustained Demand Growth:** The growth rate of electricity demand is likely to continue to increase from electrification coupled with the proliferation of high-demand data centers in the region.
2. **Sustained thermal generator retirements:** Thermal generators are retiring at a rapid pace due to certain government and private sector policies, as well as economics.
3. **Certain Policies that force retirements before replacements are available:** Retirements with date-certain deadlines enshrined in policies are at risk of outpacing the construction of new resources, due to a combination of external forces, including siting and supply chain, whose long-term impacts are not fully known.
4. **Multiple megawatts of new resources are required to replace retiring generation:** PJM's interconnection queue is composed primarily of intermittent and limited-duration resources. Given the operating characteristics of these resources, we need multiple megawatts of these resources to replace one megawatt of thermal generation.

Enhancements to Continue the Success of PJM's Capacity Market

Enhancements are needed to continue the success of PJM's capacity market. The PJM system as it stands today is a reliable system with an adequate capacity reserve margin. Despite PJM's healthy reserve margins and success of PJM's capacity market to date, recent winter storms (Uri 2021, Elliott 2022) have provided a sobering reminder of the critical role

that resource adequacy will play through the energy transition. Further, for the first time in recent history, PJM could be at risk of facing resource adequacy challenges should these trends – high load growth, increasing rates of generator retirements, and slower entry of new resources – continue. This situation is not unique to the PJM system – roughly two-thirds of North America is rated by NERC at being at elevated resource adequacy risk this summer.

We believe a reliable energy transition is achievable through policies that accelerate the rate of entry of new generation and stop or slow down the exit of traditional thermal generation we currently use to balance the grid, until replacement generation is installed and operating at the required scale. As a result, PJM is diligently working on a range of initiatives to help achieve a reliable transition - most immediately, reforms to PJM's capacity market, as further discussed detailed by Adam Keech in the second panel as well as our work with the US EPA to encourage liquid trading markets that accompany its Rules and work with the states on effectuating their policies.

We understand that we have a role to play in related areas such as implementing the interconnection reforms that this Commission approved and looking at additional ways to accelerate those queues. We also have proposed various initiatives with the states, such as our work with New Jersey on effectuating its off-shore wind program as another dedicated effort. We understand that to manage this transition, we have to 'work harder and smarter' on those items within our control while also informing policymakers and the public on those issues associated with the transition that could have reliability consequences but are beyond our immediate control. The RPM enhancements we will be proposing in the fall, working with our stakeholders, will be an important puzzle piece to addressing these larger issues.

I want to highlight however that reforms to RPM are only one component and should be considered as part of a larger whole. In Docket No AD21-10-000 the Commission asked questions about the future direction and changes needed in energy and ancillary service markets to accommodate the transition. PJM, along with other RTOs, outlined a road map of those reforms that, over time, work with an enhanced capacity market to ensure reliability through this transition. At the end of the day, the collection of markets – capacity, energy and ancillary services – as well as robust requirements, operating procedures and regional planning all collectively work to provide for reliable service.

Are there other drivers that may be preventing the PJM capacity market from achieving its objectives?

PJM is also facing a separate externality to the markets that further exacerbates the challenge. Specifically, new entry is facing a host of other headwinds. The Commission is well aware of these challenges. They include interconnection queues siting, site availability and local opposition to new construction, supply chain issues, lack of long term offtake agreements and rising interest rates. These factors have always been present to a certain degree but we are facing an unusual confluence of these factors at this time. No market design, be it vertical integration or competitive procurement can, in and of itself, ameliorate these headwinds. At the same time, we need to be ever cognizant of ensuring affordability of this vital product. All of these headwinds, whether in vertically integrated or restructured states, challenge that affordability criterion.

The Direction of Proposed PJM RPM Enhancements

I have outlined above some of the forces outside of the capacity market that are challenging every system operator. Given our size, diverse fleet of generation and broad geographic footprint, we have more flexibility than other smaller regions to weather them. But as I noted above, the reforms needed are not all external to the markets. There are certain key reforms

that we believe are prudent to be made to our market rules that would help to mitigate the premature retirements and also hasten the entry of new generation with the attributes we will need. Adam Keech will highlight those more on his panel, but they include:

- Enhanced modeling of Winter Risks and Market Rule changes to reflect those winter risks;
- Aligning accreditation with the contribution of various resources to the reliability needs of the system;
- Aligning of the capacity performance penalty risk with the Market Seller Offer Cap;
- Recognizing the seasonal differences between summer and the winter to better address system needs and to allow for greater participation by resources that have differences in seasonal performance; and,
- Developing improved qualifications for capacity resources including enhanced accreditation and testing.

The goal of these design changes is to ensure that the proposed design continues to focus the capacity product on resources' contribution to reliability and ability to perform when needed during hours of highest reliability risk.

This process was launched with a letter from our Board to stakeholders on February 24, 2023, a copy of which is attached. We welcome feedback on how these goals can be met in a way that ensures reliability, efficiency and affordability going forward given the headwinds I outlined above.

We view this forum as a helpful step in that process and welcome the Commission and its Staff's feedback and thoughts.