Pennsylvania House Environmental Resources & Energy ("ERE") Committee

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Re: PJM: Meeting Emerging Electricity Demand

Introduction

Dear Chair Vitali, Chair Causer, and members of the House ERE Committee,

Thank you for the opportunity to provide testimony before your committee on the critical issue of meeting emerging electricity demand in the PJM region. With electricity playing an increasingly important role in our lives and the economy, this issue is as important as ever. I applaud your committee for making this issue a priority at this critical juncture.

MN8 Energy develops, owns, and operates renewable energy infrastructure across the United States. We provide renewable energy and related services to enterprise customers. With a more than 3.2 gigawatt operating solar fleet comprised of over 850 projects across 28 states and over 270 megawatts of operating battery storage projects, MN8 is one of the largest and most sophisticated independent renewable energy power producers in the United States. MN8 has over a dozen solar projects currently participating in the PJM capacity market, as well as a multi-gigawatt pipeline of solar and battery energy storage projects in the PJM queue. In Pennsylvania specifically, we have numerous operating projects today and are actively working on facilities in in different stages in the queue, at different phases of development.

As the Head of Regulatory & Government Affairs at MN8, I work extensively with my team on regulatory matters affecting our projects at the local, state, federal, and regional levels. I'm pleased to share our perspective on the issues and opportunities at PJM impacting the ability of suppliers like us to meet burgeoning load growth.

PJM is Facing an Uptick in Resource Adequacy Requirements; the Market can Address these

PJM is experiencing a paradigm shift in demand growth. Over the past two decades, PJM has typically had flat or declining peak demand, with 155 GW of peak demand in 2005, 149 GW in 2015, and 151 GW in 2024. With ongoing electrification of buildings and transport, an uptick in power demand from data centers, and the onshoring of US manufacturing capacity, PJM is now expecting substantial increases in peak demand over the next decade, which has largely taken the industry and PJM by surprise over the last year or so. In its most recent load forecast report, released in February 2024, PJM projected a 26 GW increase in peak load over the next ten years, which represents an average compounded annual growth rate of 1.6%; in its prior load report, released January 2023, its forecast over this same period was just 11 GW[1].

[1] Page 3, https://www.pjm.com/-/media/library/reports-notices/load-forecast/2024-load-report.ashx

This means that the capacity market needs to achieve something substantially different over the coming decade versus what it needed to do over the past two decades: instead of retaining an approximately constant supply of resource adequacy, it needs to support material net increases in resource adequacy year over year. The good news is that the market has supported substantial new entry to-date, with over 71 GW of new entry in PJM between 2005-2023, and there is an unprecedented number of resources in the PJM queue today that are requesting to interconnect to the system and supply power. Today, there is approximately 426 GW of resources with active interconnection requests, which would be enough to supply approximately 73 GW of new resource adequacy, or Unforced Capacity ("UCAP"), by 2030[2], as shown in Table 1 below[3].

Table 1: Cumulative Active Interconnection Requests in PJM's Queue as of October 9, 2024

Queue Cycle	Maximum Facility Output	UCAP in 2030
Pre-Transition	56.3 GW	8.3 GW
Fast Lane	34.8 GW	4.0 GW
Transition Cycle 1	36.8 GW	5.2 GW
Transition Cycle 2	148.4 GW	27.7 GW
Cycle 1	149.8 GW	28.3 GW
Total	**426.0 GW**	**73.4 GW**

Approximately 82% of this prospective capacity is battery energy storage, solar, and offshore wind, which comprise 37.6 GW, 12.8 GW, and 9.8 GW, respectively. Of this 426 GW, 37 GW of resources, or 9%, and 5.2 GW of resource adequacy, or 7%, is located in Pennsylvania. These statistics do not consider the substantial number of projects that are likely to enter the queue in Cycle 1 when it reopens, which will represent approximately four years of project development work between the queue closing in early 2022 and Cycle 1 commencing in early 2026.

So, is the supply in the queue sufficient to meet resource adequacy needs? In the last auction, covering the 25/26 Delivery year, there was 514 MW of "Excess Supply." Between 2026 and 2030, the Reliability Requirement is expected to increase by 8.8 GW[4]. Furthermore, PJM projects that 10.7 GW (in 2030 UCAP terms) will retire between 2026 and 2030[5]. In other words, 19.5 GW of new supply is needed over this period, and from the existing queue, 73 GW is available. However, this does not factor in any "project attrition," or exiting of resources from the queue, which can occur for

[2] This is based on PJM's forecasted resource class accreditations in 2030: https://www.pjm.com/-/media/planning/res-adeq/elcc/preliminary-elcc-class-ratings-for-period-2026-2027-through-2034-2035.ashx

[3] PJM queue data as of October 9, 2024. 2030 UCAP values assume all batteries are 4 hours in duration; total UCAP would increase by over 10 GW to 84 GW if we assumed that all batteries are 10 hours in duration. Hybrid solar-plus-storage resources are assumed to use batteries sized at 25% of the listed capacity; this is aligned with PJM's recent analysis (referenced in footnote 4), which we believe is a conservative assumption.

[4] Slide 6, https://www.pjm.com/-/media/committees-groups/committees/pc/2024/20240806/20240806-item-08---supplementary-information---elcc-class-ratings.ashx

[5] This is based on PJM's deployment forecast derived with S&P Global, Inc. information as discussed on slide 3 of the deck referenced in footnote 4. Deployment forecast is available via request from PJM.

any number of reasons, including, for example, uneconomic interconnection cost allocations or the inability for projects to get discretionary permits. If more than 73% attrition occurs, then the system will tighten further from the last auction result.

In addition to the queue, we believe that there are opportunities to realize more resource adequacy from existing resources, which could provide further relief to this picture. One example includes using a FERC-required expedited process to add surplus resources at existing solar facilities to increase the utilization of their capacity rights, which could bring up to 8 GW UCAP of capacity into the system in addition to what is in the queue today[6].

We are aware that PJM has voiced some concerns about the 37 GW of projects that have received generator interconnection agreements (GIAs) but have not yet been energized. It's worth digging deeper into this figure. Of the 37 GW, over two thirds of these projects are either in the stage of "Engineering and Procurement" or "Under Construction[7]." These projects are proceeding according to their original schedules; it simply takes multiple years to build and energize these complex infrastructure projects. Less than one third are "Suspended," or unable to meet the initial milestone schedule that exists in their interconnection agreements. Many Suspended projects are still proceeding in good faith and are expected to energize, but simply cannot meet the milestone dates for any number of reasons.

Due to substantial delays under PJM's legacy interconnection process, and concerns of further delays under the new process, many projects halted permitting, procurement, and other work until their interconnection agreements were tendered. While the decision to hit pause on incurring these sorts of development expenses was reasonable given these delays and uncertainty, this sequencing of development should not persist under the new interconnection rules if PJM can demonstrate that it can stay on schedule. Furthermore, PJM does not permit suspensions for interconnection agreements tendered since September 2023.

Projects that have entered suspension are, in many cases, moving forward now that they have interconnection agreements in hand. In certain cases where projects are stalled, we have anecdotally heard that some of these are waiting for utilities to complete project interconnection facilities and/or network upgrades that are substantially behind schedule and holding these projects up. PJM should provide more granular analysis of the cause for and duration of suspension, so that the stakeholder community can better assess whether some of these projects are in fact not moving forward, and if so, why. If PJM has broader concerns with the other two thirds of projects that are progressing according to plan, it should explain why. If not, then the *37 GW question* is really a *12 GW question*.

If PJM optimizes contributions from existing projects and facilitates new entry from the queue, PJM should be able to maintain reliability with gigawatts to spare. However, doing so will require sending a consistent, predictable price signal to the market that more UCAP is needed, as well as

[6] Page 15, https://acore.org/wp-content/uploads/2024/09/Report-ReSISting-a-Resource-Shortfall-Fixing-PJMs-Surplus-Interconnection-Service-SIS-to-Enable-Battery-Storage.pdf
[7] Slide 7, https://www.pjm.com/-/media/committees-groups/committees/mrc/2024/20240925/20240925-item-09---pjm-interconnection-queue---presentation.ashx

optimizing the interconnection process to facilitate the level of new resource adequacy needed over the coming years.

PJM's Capacity Market is Working, but Targeted Changes should be Considered

In the capacity auction before last, for Delivery Year 24/25, capacity prices in the RTO region cleared at $28.92/MW-day. This signaled to the market that PJM did not need capacity; the prior two years were not much higher than that, with the DY 22/23 and 23/24 BRAs clearing at $50.00 and $34.13/MW-day, respectively. This resulted in many deactivation notices over the last several years, with more than 4 GW of retirements in each of the years between 2018-2023, and an average of 7,429 MW per year over this period[8]. The latest BRA cleared at $269.92, which is 833% above the prior year's price, and 616% above the average price over the prior three years. This reflects a new equilibrium, in which the market is signaling that it needs more UCAP. While this uptick in prices was in part due to much-needed capacity market reforms by PJM that went into effect in the most recent auction, a large majority of the erosion in excess supply between the 24/25 and 25/26 Delivery Years—around 83% of it, according to PJM[9]—had nothing to do with recent reforms and was caused by an increase in demand and decrease in supply between the prior auction and the most recent one.

This represents a meaningfully different price signal in terms of resource exit and new entry decisions, which is already beginning to change supplier actions. For example, in the few months since the latest auction result, the Elgin natural gas plant rescinded its deactivation notice[10], avoiding 483 MW of retirements that were previously slotted to occur. The current price signal also fosters a different incentive environment for the large number of resources in the interconnection queue and will encourage more of these resources to interconnect and supply capacity than was previously the case. However, although PJM's recent capacity market reforms place PJM on the cutting edge of reliability risk modelling and did a lot to appropriately signal the need for more resource adequacy, additional reforms should be pursued.

Some of these reform opportunities were correctly pointed out by the Organization of PJM States, Inc. ("OPSI") in a recent letter[11]. For example, we agree that PJM should take a close look at how it's currently modelling winter performance for thermal resources, which is currently based on summer ratings and may undercount capacity contributions. This on its own could result in a material increase in the resource adequacy accounted for from operating generators in the winter months, which is when most of the risk is present under PJM's new reliability risk model. Furthermore, we agree that a sub-annual market construct is needed. Work on this reform, which will not be trivial, should promptly begin. A sub-annual market would better align capacity resource participation and performance obligations with their expected performance in the applicable period (e.g., a three-

[8] Page 5, https://www.puc.pa.gov/media/3124/2024-epo-2023-2028-7-2024_final.pdf
[9] Slide 12, https://www.pjm.com/-/media/committees-groups/committees/mrc/2024/20240821/20240821-item-08---2025-2026-base-residual-auction---presentation.ashx
[10] https://www.pjm.com/-/media/planning/gen-retire/deactivation-notices/elgin-deactivation-withdrawal.ashx
[11] https://www.pjm.com/-/media/about-pjm/who-we-are/public-disclosures/2024/20240927-opsi-letter-re-results-of-the-2025-2026-bra.ashx

month season), resulting in more appropriate compensation and less risk that is outside of the resource's control. It would also enable more efficient use of the interconnection system by allowing resources to more precisely request the level of service that they need for each season. Additionally, it would mitigate some of the risks that come with the need to forecast the generation mix ex-ante under an annual construct. In these regards, a sub-annual construct would make the capacity market more efficient and reliable.

There are other, less urgent opportunities to improve the ability of suppliers to manage and reflect risks that come with participating in the market. Namely, PJM should evaluate the need for reforms to the Market Seller Offer Cap following FERC's rejection of its recent filing on this, and it should consider changes to Capacity Exchange to allow for more granular trading of Capacity Performance obligations. These reforms would encourage greater resource new entry and capacity market participation.

With this handful of reforms to the capacity market, particularly to modelling winter performance and the annual market construct, we believe that PJM's capacity market will be well-positioned to reliably and efficiently meet resource adequacy needs. However, achieving this requires more than market design reform – resources must be able to promptly and efficiently respond to market signals, which requires a robust interconnection and transmission planning framework.

Interconnection and Transmission Planning Reforms are Necessary to Facilitate Timely and Cost-effective New Entry of Resources

PJM made dramatic improvements with its recent queue reforms, which were approved by FERC in November 2022. PJM is continuing to work through its queue backlog under these new rules and is meant to issue interconnection agreements to all "Fast Lane" projects before the end of this year. If it successfully achieves this milestone, all subsequent projects will be studied as part of "clusters." Clusters studies, or the study of a large group of projects simultaneously, should result in dramatic improvements in processing time for interconnection requests as compared to the serial project study process that was previously used. It should also reduce attrition, by allowing multiple projects to share the costs of expensive network upgrades that no single project can bear. However, an efficient system for processing interconnection requests is a necessary but insufficient component of a robust interconnection framework. In addition, PJM must create an interconnection process that facilitates the efficient use of its grid and must proactively plan and expand its grid to prepare for future needs. Failing to do so would cause interconnection to become an endemic bottleneck and threaten the efficacy of the capacity market.

The efficient use of the grid is imperative to move quickly to meet growing resource adequacy needs. The more generation that PJM can support per unit of grid infrastructure, the more quickly PJM can bring on new supply to provide much-needed resource adequacy, while also containing the transmission costs needed to meet demand. This is more urgent than ever because of the large uptick in demand that was not anticipated in transmission planning to date. This is a challenge, since creating more "headroom" for generators on the grid can entail multi-year infrastructure projects. Indeed, the entire process to plan, permit, and build a new greenfield transmission line

can take upwards of ten years. Fortunately, there are a number of ways that PJM can extract more resource adequacy from the grid that it has today.

Firstly, PJM should review its Generator Deliverability Test. Although this was updated in a recent reform, the current test requires more generator deliverability than is necessary, resulting in overbuild of the system to ensure that electrons can be delivered in very infrequent scenarios. Most critically, PJM requires high levels of deliverability in instances where the generator is not requesting capacity rights (CIRs). PJM should better align its Generator Deliverability Test for these energy-only requests with what we see across other ISOs and RTOs, whereby transmission providers do not plan for these resources being deliverable across numerous infrequent, stressed system conditions. This change would free up a material amount of system headroom that can then be used for new capacity resources. Furthermore, PJM should review how it studies battery energy storage resources. One low hanging fruit reform would be to align study assumptions with pumped hydro, namely removing the assumption that energy storage discharges during the light load period, as recommended in a recent report prepared by Gabel Associates[12]. PJM should also consider allowing interconnection customers to submit generator-specific operating assumptions, possibly from a menu of options, which could then be memorialized in interconnection agreements, as FERC proposed in its Order 2023.

PJM should also make it easier to modify existing interconnection agreements to better utilize existing interconnection rights. This can be done by implementing a more workable Material Adverse Impact standard, consistent with what other transmission providers, such as MISO and SPP, are doing. This standard should study modifications to existing projects through a separate study process that ensures they aren't creating system violations or affecting projects ahead of them in the queue. In cases where no violations are found, PJM should permit project modifications to occur. These modifications can take a number of forms: Surplus Interconnection Service, Material Modifications, transfers of interconnection rights to electrically-proximate resources, and Generator Replacements. In making these modification options more workable, PJM will enable projects to reconfigure to unlock more resource adequacy while honoring existing interconnection rights and requests and without requiring any additional system infrastructure.[13]

Finally, PJM should review its treatment of interconnection customers throughout its interconnection process to ensure that it isn't placing undue requirements on projects that result in unnecessary costs or project attrition. For example, today, PJM is implementing its Adjacent Parcel Rule in such a way that is overly restrictive versus what many believe is actually required under its tariff, unnecessarily restricting the ability of interconnection customers to optimize their site control throughout the study process. This may result in the use of suboptimal parcels to build a project, insofar as it dissuades customers from changing to superior new parcels, and/or costlier

[12] Page 17, https://acore.org/resources/resisting-a-resource-shortfall-fixing-pjms-surplus-interconnection-service-sis-to-enable-battery-storage/?mc_cid=646e7ca99b&mc_eid=0bfe704a2a

[13] For example, many operating wind and solar facilities may have more CIRs than they might request today following the substantial recent changes to capacity accreditation, which resulted in a drop in accreditation for these resource classes. By adding battery energy storage or other firming resources, these existing facilities can better utilize their existing CIRs and bring on new capacity.

site control than necessary for customers that retain more of their original parcels than they otherwise would have. In a similar vein, PJM should review its process for implementing milestones in interconnection agreements. To enable efficient new entry, milestones should be clear and achievable, cure processes should be well-defined, and milestone extensions should follow a well understood process and be permitted in cases related to issues outside of the interconnection customer's control. This will better align the post-GIA process with project finance and execution realities.

The interconnection reforms described above are critical to bringing on sufficient resource adequacy to meet near- and medium-term needs. However, in addition to these interconnection reforms, PJM must capitalize on the huge opportunity that it has to improve its transmission planning process through its compliance filing related to FERC Order 1920. The implementation of a proactive, multi-value, scenario- and sensitivity-based transmission planning process will be critical to serving growing load in the medium- and long-term.

The Focus should be on Market Reforms that Facilitate Long-term Resource Adequacy

The PJM region, along with many other power markets in the US, is facing a challenge in the form of an abrupt, unanticipated increase in expected load growth. This challenge can be met by embracing and enhancing the market that exists today. Now is not the time for band aids or other temporary fixes; rather, we are looking ahead at a decade-plus of meaningful expected load growth, and we should be thinking about targeted and durable improvements to the market and planning structures we have today that will support an affordable and adequate system in the near-, medium-, and long-terms. Fortunately, PJM has made prudent recent enhancements to its generator interconnection process and capacity market and the queue today is unprecedented in size. However, more is needed to enable the market to meet this challenge. With the reforms that I laid out above, PJM will be able to maintain an adequate supply.

Finally, it's worth noting certain reform ideas that should be avoided. The foundation of the PJM market is an open access system under a rules-based order driven by members, with an unbundled market structure that encourages competition. This system has successfully delivered a reliable and affordable generation mix for more than two decades. PJM should avoid doing anything that might undermine this foundation. For example, PJM's recent presentation on its Reliability Resource Initiative, which would create an interconnection fast track for certain types of "reliability" projects by allowing them to jump ahead of other projects in the queue, is fundamentally at odds with open access rules, which are meant to prevent undue discrimination and foster competition[14]. If PJM identifies a specific need that cannot be solved with the open access process that exists today, then it may consider a solution that is narrow, targeted, and not recurring. However, we have not seen convincing analysis to this effect to date. Furthermore, PJM should avoid processes that make "quick fixes" to prevailing rules at the expense of the stakeholder process – these should be the exceptions to address urgent, blatant issues, not the norm. Finally, the unbundled market structure creates a level playing field that has resulted in intense competition between independent power

[14] https://pjm.com/-/media/committees-groups/committees/pc/2024/20241008/20241008-item-06---reliability-resource-initiative.ashx

producers. Utility ownership creates an inherently unlevel playing field, which risks undermining competition and harming consumers, and should not be seriously considered as a solution.

These foundational elements of the market are critical to maintain. Anything to the contrary would undermine the market's ability to respond and meet emerging needs, jeopardizing affordability and reliability. To the degree that market participants cannot count on predictable and non-discriminatory market rules, or a competitive market structure, they will experience material increases in project finance costs, resulting in less new entry, and in turn, higher consumer costs and less reliability. Now is not the time to apply band aids that threaten the medium- and long-term efficacy of the competitive market.

In sum, the planning and market structures that we have today can deliver a reliable and affordable system tomorrow. Despite substantial unanticipated load growth, there is enough new supply in the queue to reliably meet demand in the near-, medium- and long-term. Targeted changes to PJM's capacity market, interconnection process, and transmission planning functions are necessary to realize this outcome. Through continued execution and collaboration, we can achieve the challenge before us.

I want to thank Chair Vitali, Chair Causer, and this committee again for inviting me to present on this important subject.

Sincerely,

Zander Bischof

Head of Regulatory & Government Affairs

MN8 Energy LLC