

**TESTIMONY OF THE NATURAL RESOURCES DEFENSE COUNCIL  
PJM: Meeting Emerging Electricity Demand**

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**Before the House Environmental Resources & Energy Committee  
October 16, 2024**

Chair Vitali, Chair Causer, and Honorable Members of the Committee,

Thank you for this opportunity to testify. Energy supply in the PJM region is a timely and critical topic, and NRDC applauds the Committee’s focus and attention.

My name is Tom Rutigliano, and I am a Senior Advocate in the Sustainable FERC Project at the Natural Resources Defense Council (NRDC). NRDC is a member-based non-profit environmental organization with over three million members and over 14,000 in Pennsylvania. NRDC works in the U.S. and internationally to protect natural resources, public health, and the environment. We are committed to tackling the climate crisis by driving greenhouse gas emissions down to net-zero by no later than mid-century.

**Background**

PJM is the entity responsible for operating the power grid in the Mid-Atlantic and parts of the Midwest—roughly a triangle from Chicago to Newark to Newport News. This includes the entirety of Pennsylvania. PJM is a regional transmission organization (RTO) that is subject to FERC’s jurisdiction and serves as the largest RTO in the country. PJM also stands out as lagging behind other RTOs in terms of its processes to bring new generation resources online via its interconnection queue and in its obsolete, ineffective method of long-term planning to build new transmission lines to transport power from the source of generation to the distribution system. Reform is needed.

One of PJM’s responsibilities is forecasting the region’s resource adequacy needs and operating a “capacity market” that contracts with power plants, demand response, and other resources several years in advance to ensure the risk of insufficient electricity is acceptably low. For the first time in recent memory, the PJM region is nearing insufficient supply. The latest capacity market auctions, held in July for power in 2025/26\*, cleared only 0.7% more supply than was needed for reliability (the “reserve margin”). To be sure, this in itself is not a reliability crisis, as the target reserve margin already includes abundant contingency reserves: PJM aimed to have resources on call equivalent to 117.8% of the expected peak load and procured 118.5%.

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\* PJM’s planning year runs from June 1 to May 31 of the next year.

This leaves PJM in a delicate balance: should load growth and generator retirements continue to outpace new entry, PJM will soon find itself unable to guarantee it meets reliability standards.

This situation has been ten to fifteen years in the making. Since 2011, over 40GW of coal-fired power plants have retired, largely due to being economically out-competed by high efficiency combined cycle units burning low-cost natural gas (See Figure 1<sup>a</sup>).

Figure 1: PJM Share of Generation by Fuel Source

	Natural Gas	Coal	Nuclear	Other Fuel Type
2008	7.4%	54.9%	34.7%	3.0%
2009	10.0%	50.3%	35.9%	3.7%
2010	11.7%	49.3%	34.6%	4.4%
2011	14.1%	47.1%	34.5%	4.3%
2012	18.8%	42.1%	34.6%	4.5%
2013	16.7%	44.2%	34.8%	4.3%
2014	17.8%	43.3%	34.4%	4.5%
2015	23.0%	36.2%	35.5%	5.3%
2016	26.5%	33.9%	34.4%	5.3%
2017	26.8%	31.8%	35.6%	5.9%
2018	30.6%	28.6%	34.2%	6.6%
2019	36.2%	23.8%	33.6%	6.4%
2020	39.6%	19.3%	34.2%	6.9%
2021	37.7%	22.2%	32.8%	7.4%
2022	39.8%	20.0%	32.3%	7.9%
2023	44.1%	14.7%	33.3%	7.9%

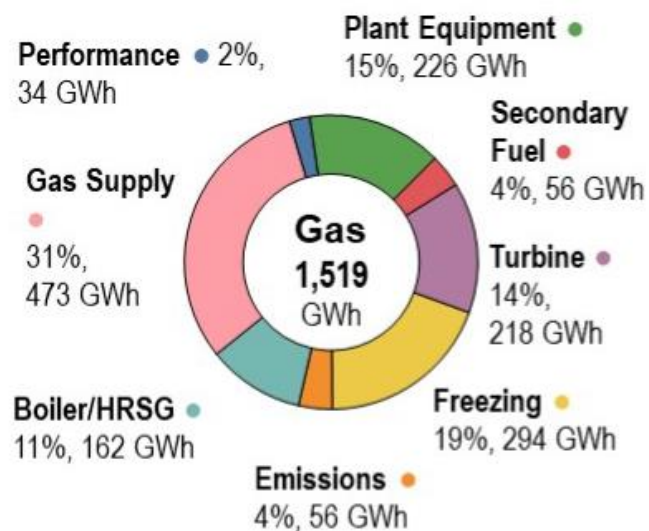
During most of this period, PJM markets appeared to be working as they should: lower-price gas resources underbid less efficient coal units, lowering prices and sending retirement signals. However, two separate problems were allowed to develop during the late 2010’s and early 2020’s.

First, even though new gas-fired plants are individually quite reliable, they have a disturbing tendency to fail in large numbers at the same time. Widespread gas fleet failures were the primary cause of PJM near-blackouts in 2014 and 2022 and occurred with tragic results in Texas in 2021 (ERCOT, the Texas grid operator, is not subject to FERC jurisdiction).

First, even though new gas-fired plants are individually quite reliable, they

Almost two-thirds of the gas plant failures in PJM in 2022 were due to mechanical problems at the plant (Figure 2<sup>b</sup>). Of the 31% of outages that were due to gas supply, the majority appeared to be due to loss of upstream supply, not insufficient pipeline infrastructure. During winter storm Elliott, Appalachian gas production fell by approximately 30%.

Figure 2: Winter Storm Elliott Gas Plant Failures by Cause



Prior to the most recent capacity auction, PJM did not account for this risk of simultaneous plant failures in its markets and planning. The result was a false sense of abundance. As PJM planned around a summer peak it was well supplied for, risks of winter blackouts grew unchecked.

After Elliott, it became obvious that this was untenable, and PJM reformed its capacity market to use a more sophisticated risk assessment approach which considers the risk that plants are not available when most needed. The outcome was a major derating of the gas fleet: plants that had been considered as 92% - 95% available fell to 62% - 79%.<sup>c</sup> The most recent capacity auction was the first to use these new values and reveal a previously hidden capacity shortage.

The second long-simmering problem is that sometime around 2020, PJM's interconnection queue stopped working. Essentially no projects submitted to PJM since September 2020 have begun construction: Of the 157,765 MW of projects submitted to PJM since in the last 49 months, exactly 1 MW has gone into service as of June 2024.<sup>d</sup> There are currently 1,935 solar or solar hybrid projects, 38 gas projects, 593 storage projects, 166 wind projects and 38 gas projects active in PJM's queue.<sup>e</sup> These projects have been there for an average of 1,112 days.<sup>f</sup> This includes both new projects and upgrades to existing facilities.

### **The 2025/26 Base Residual Auction**

These problems came to a head in July 2024, when PJM procured commitments to supply power from June 2025 through May 2026. On top of the long-simmering issues just discussed, several shorter-term changes tightened supply:

- Retirements continued apace, with 5.7 GW of coal and older gas-fired units exiting PJM's markets.
- PJM planners judged there to be both a higher risk of extreme weather and lower confidence in the effects that would have on load. To compensate, they increased their desired reserve margin by 4.3 GW.
- The load forecast increased by 3.5 GW, largely due to data centers.

With the confluence of these factors, PJM's reliability picture changed, seemingly overnight: the region went from a comfortable surplus and low prices to very thin margins and a nearly \$14.7 billion dollar capacity bill (a spike nearly seven times higher than the previous auction price). The capacity market had been designed so that prices increased gradually over years as the supply/demand mix changed. This did not happen, and even if it had, PJM's stuck interconnection queue makes it difficult or impossible for new supply to enter the market in response to increasing prices.

### **Outlook**

Absent dramatic changes, this situation is likely to worsen. Load forecasts continue to rise, and additional waves of policy-driven retirements are expected in 2027, 2028, and 2030. All told, PJM is likely to need to add from 5 GW to 8 GW of capacity annually from 2026 – 2030 to maintain reliability.

PJM may well enter capacity shortage in 2026. However, it is important to note that this is not a "shortage" in the usual sense of the word: PJM will, in fact, have more than sufficient generation to supply all customers, even on the peak day of the year and even with significant load growth.

Rather, the effect of the shortage will be an unacceptable risk of blackouts if a large number of gas-fired units fail during a major winter storm.

There is currently a large amount of storage and generation in PJM’s queue, the vast majority of which entered in September 2022 or earlier. 44% of the resources in queue are solar. Because PJM’s winter risks are most acute during hours of darkness, solar on its own has limited ability to address the reliability issues PJM is facing. The remaining 56% is a mix of storage, wind, solar/storage hybrid resources and gas-fired plants, all of which do have winter reliability value. Discounting the resources in the queue based on their ability to perform during periods of risk reveals that the projects currently waiting for interconnection have double or more the capacity value PJM will need for the remainder of the decade.

Figure 3: Capacity Value of Resources Currently in PJM’s Queue

<b>Technology</b>	<b>Nameplate</b>	<b>Capacity Rating</b>	<b>Capacity Value</b>
Battery	51 GW	59%	30.1 GW
Gas CC	3 GW	79%	2.4 GW
Gas CT	2.4 GW	62%	1.5 GW
Solar	100 GW	9% - 14%	9 - 14 GW
Solar + Storage	32.9 GW	14% - 59%	4.6 - 19.4 GW
Wind	36.9 GW	35% - 41%	12.9 - 15.1 GW
<b>Total</b>			<b>60.5 - 82.5 GW</b>

Not all the projects in the queue will be built. This is counterbalanced by the fact that PJM has not accepted any new applications for several years, so we have no way of knowing how many projects are waiting in the wings for PJM to re-open the queue for new applications. Given the high prices in the last auction and the prospect of higher prices yet to come, it is reasonable to expect commercial interest. The overall conclusion is clear: the reliability challenges PJM is facing could be met by deregulated markets, if resources were able to interconnect in a timely manner.

Timely interconnection will be the gating resource adequacy challenge in PJM for the remainder of the decade. PJM implemented interconnection queue reform beginning in July 2023. If those reforms proceed as planned, PJM will complete working through roughly one-quarter of the current queue backlog in August 2025, an additional half in October 2026, and the remainder, possibly including new applications, in December 2027.

Projects typically only begin the multi-year process of permitting, financing, and construction once they have exited the PJM queue. This means that in all likelihood, PJM will not see significant new capacity additions until the 2028/29 capacity year, which starts June 1, 2028.

### **Technology Types**

The reliability challenge facing PJM is emphatically *not* an issue caused by increasing renewable generation. In 2023, just 4.9% of PJM’s energy came from wind and solar resources. If all states in the region meet their policy goals, PJM will obtain 22% of its energy from wind and solar by

2035. These are low percentages of renewables by current standards. For comparison, wind and solar supplied 34% of the electricity used in Texas in 2023 and 27% in California in 2021. Even by 2035, PJM will likely have a lower percentage of renewables than California and Texas are reliably running with today.

PJM's resource adequacy needs for the foreseeable future can be met with additions of storage, wind, and solar. A recent study by PJM finds that the region can maintain reliability with current technology up to at least 93% carbon-free energy, a level far in excess of all current state and policies combined.<sup>8</sup>

While solar alone has limited ability to address the winter reliability issues at the core of PJM's immediate concern, storage, wind, and grid-charging solar/storage hybrids are all perfectly capable of providing the needed capacity. No doubt some will seek to misrepresent PJM's current situation as somehow calling for panicked construction of new fossil fuel power plants. There is no evidence to support those claims. PJM's reliability issues are purely a matter of timing and of ensuring that new resources can be brought into service quickly enough to meet load growth and retirements.

## **Solutions**

To summarize: In 2025/26, PJM will have barely enough capacity to keep the risk of blackouts during extreme winter weather to an acceptable level. This scarcity will raise capacity costs from \$2 billion to over \$14 billion per year. At expected rates of load growth and retirement, PJM may fall below its reliability targets in 2026/27 or 2027/28, and costs may increase even more. New supply adequate to fix these problems is in PJM's interconnection queue, but even with reforms, will most likely not be built until several years too late. This section outlines options to improve this situation.

- 1. Address reliability issues at existing gas plants.** The electricity shortage facing PJM is not a shortage as it is usually thought of, but rather an increased risk of blackouts if there are systemwide gas plant failures during extreme winter conditions. If PJM could rely on its gas fleet to perform at 90 – 95% reliability during winter storms, there would be no imminent capacity problem.

In the 2025/26 auction, 87,110 MW (nameplate) of gas-fired units cleared, with an average capacity rating of 76%. Raising their reliability value to an entirely achievable 90% would add 12.2GW of capacity to the system<sup>†</sup>, saving billions of dollars over the next few years and delaying resource adequacy shortfalls until 2028. Critically, this buys PJM and project developers much-needed time to process the interconnection queue and build the storage, wind, and solar resources that will keep the system reliable well into the 2030's.

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<sup>†</sup> PJM reports average winter outage rates of 4.7%, and peak outage rates of 7.9% and 7.6% during 2020/21 and 2021/22, corresponding to 92-95% reliability.

In order of importance, winter gas failures were (1) mechanical issues at power plants; (2) upstream supply, generally freezing at wellheads; (3) gas contracting or delivery issues. These are all very solvable problems:

- PJM and Pennsylvania should work together to ensure full compliance with rigorous weatherization standards at power plants.
- Wellheads are under state jurisdiction. The legislature should take all necessary measures to ensure that we never see a repeat of the 30% loss of production that occurred during Winter Storm Elliott.
- Gas plants with liquid fuel backup are among the most reliable performers during winter storms, with 94.4% availability during Elliott. The legislature should consider actions to strongly encourage dual fuel upgrades at existing gas plants. This is already a requirement in New York, and it underlies the key point that maximizing the reliability of Pennsylvania's existing fleet is a more immediate and cost-effective solution than devoting resources to constructing new fossil plants.
- PJM capacity market rules do not reflect the improved reliability that can be obtained through these investments until several years have passed. While this is a prudent approach and relies on generators demonstrating performance, PJM and Pennsylvania should consider approaches that allow quicker recognition of improved reliability with sufficiently rigorous oversight.

We realize that these steps will be neither easy nor cheap. But the potential savings will quickly reach billions per year for most of the remainder of the decade. NRDC argues that rapid investment in the reliability of the existing gas fleet is a highly cost-effective way to address resource adequacy issues in the short term and should be fully explored before considering green-field investment in new power plants or gas infrastructure.

2. **Make interconnection-adjacent improvements.** PJM's interconnection queue reforms are in full swing, and we respect PJM's position that attempting to make changes to queue processing in the short term could be counterproductive. However, improvements to closely related processes could allow for addition of needed capacity in the critical 2026-2028 timeframe:

- PJM's study assumptions for energy storage must be updated and made more flexible.
- The process of reusing the interconnection of retiring generators should be completely overhauled. There is often a several year gap between a generator retiring and new generation being able to take advantage of the freed up transmission capacity, and PJM is limited to considering only transmission options to address reliability concerns caused by retirements. The region should accept nothing less than a seamless process that allows for 'same-day' cutover from a retiring plant to its replacement.
- The interconnections of wind and solar resources are often underused when those resources are not generating power. Rules should be reformed to allow those plant owners to quickly and easily add storage to take advantage of otherwise wasted transmission capacity.

Perhaps most challenging, PJM needs to deliver these reforms on a much faster schedule than they are used to doing. PJM’s stakeholder process routinely takes 18 to 24 months to even bring solutions to issues of this scope to a vote. The region simply does not have that much time. To address impending resource adequacy issues, PJM must find a way to put improvements to these issues in front of FERC by early 2025.

3. **Use fast-track options with care.** PJM has recently announced a ‘fast-track’ that will allow new resources to be added to the batch scheduled to emerge from the queue in October 2026. While we appreciate the need to have this in the toolbox, NRDC is also concerned it could easily end up undermining competition and open access or subverting state energy policies.

The goal for any fast track should be prioritizing projects that address reliability needs and will be built quickly after exiting the queue. Before any consideration of allowing new projects to jump the queue, PJM should seek projects currently in the queue that can demonstrate and commit to firm in-service dates. Should introduction of new projects prove necessary, it should only be done in close consultation with the state hosting the project—the spirit and letter of the Federal Power Act both bode against any entity other than states choosing winners and losers in electricity markets.

4. **Remove artificial limits on imports from neighboring regions.** For many years, PJM routinely imported approximately 4 GW of capacity from neighboring regions. In 2022, PJM imposed limits on those imports that cut them by about two-thirds (Figure 4).<sup>h</sup> NRDC was and remains concerned that those limits primarily served to protect power plants in western PJM from competition and are not justified by any technical requirements. Given the current resource adequacy situation, they should be removed.

Figure 4: PJM Capacity Imports

	UCAP (MW)					
	MISO		Non-MISO		Total Imports	
Base Residual Auction	Offered	Cleared	Offered	Cleared	Offered	Cleared
2007/2008	1,073.0	1,072.9	547.9	547.9	1,620.9	1,620.8
2008/2009	1,149.4	1,109.0	517.6	516.8	1,667.0	1,625.8
2009/2010	1,189.2	1,151.0	518.8	518.1	1,708.0	1,669.1
2010/2011	1,194.2	1,186.6	539.8	539.5	1,734.0	1,726.1
2011/2012	1,862.7	1,198.6	3,560.0	3,557.5	5,422.7	4,756.1
2012/2013	1,415.9	1,298.8	1,036.7	1,036.7	2,452.6	2,335.5
2013/2014	1,895.1	1,895.1	1,358.9	1,358.9	3,254.0	3,254.0
2014/2015	1,067.7	1,067.7	1,948.8	1,948.8	3,016.5	3,016.5
2015/2016	1,538.7	1,538.7	2,396.6	2,396.6	3,935.3	3,935.3
2016/2017	4,723.1	4,723.1	2,770.6	2,759.6	7,493.7	7,482.7
2017/2018	2,624.3	2,624.3	2,320.4	1,901.2	4,944.7	4,525.5
2018/2019	2,879.1	2,509.1	2,256.7	2,178.8	5,135.8	4,687.9
2019/2020	2,067.3	1,828.6	2,276.1	2,047.3	4,343.4	3,875.9
2020/2021	2,511.8	1,671.2	2,450.0	2,326.0	4,961.8	3,997.2
2021/2022	2,308.4	1,909.9	2,162.0	2,141.9	4,470.4	4,051.8
2022/2023	954.9	954.9	603.1	603.1	1,558.0	1,558.0
2023/2024	967.9	836.5	560.1	560.1	1,528.0	1,396.6
2024/2025	949.9	820.4	577.2	577.2	1,527.1	1,397.6

## Conclusion

The electricity supply situation in PJM is precarious, and if not managed carefully will cost tens of billions of dollars and risk life-threatening winter power outages. Commonsense options exist to meet the region’s reliability needs, but both PJM and the Commonwealth must act quickly and decisively. Time is not on our side.

We urge the Committee to not lose sight of the fact that this issue is primarily one of timing and administration and to resist any attempts to take advantage of it to undermine other states' energy policies or give undue preference to favored technologies.

Thank you again for the opportunity to testify, and I'm happy to address any questions.

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## Sources

<sup>a</sup> Monitoring Analytics [2023 PJM State of the Market](#) report, Table 3-66

<sup>b</sup> PJM, [Winter Storm Elliott: Event Analysis and Recommendation Report](#), fig. 37.

<sup>c</sup> Original 92-95% rating from 2023 State of the Market report table 5-34. New 62-79% rating from [PJM 2025-2026 BRA ELCC Class Ratings](#).

<sup>d</sup> Monitoring Analytics [2024 State of the Market Report](#), Table 12-19. The one lucky project is a battery storage pilot in Maryland.

<sup>e</sup> 2024 State of the Market Report, Table 12-34.

<sup>f</sup> 2024 State of the Market Report, Table 12-22.

<sup>g</sup> PJM, [Energy Transition in PJM: Flexibility for the Future](#).

<sup>h</sup> 2023 State of the Market Report, Table 5-10.