



PENNY-WISE AND POUND
FOOLISH:

PJM'S CAPACITY AUCTION
DEMONSTRATES THE COST
IMPERATIVE OF SIMPLIFIED AND
SPEEDY INTERCONNECTION

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TABLE OF CONTENTS

- Executive Summary 1**
- 1. PJM 2025/2026 Capacity Auction.....3**
 - PRM Review of BRA Results 3
 - Stakeholder Responses to BRA Results 4
- 2. Analysis of Potential Cost Reduction from Interconnection Reforms6**
 - Supply and Demand..... 7
 - Generator Interconnection 7
 - PJM Interconnection Track Record..... 7
 - Current Queue Status 8
 - Resource Accreditation 9
 - Cost of Proactive Transmission Upgrades..... 10
- 3. Network Upgrades Required..... 11**
- 4. The Cost of Excessive Processing 11**
- 5. Speeding Up Interconnection 12**
- 6. This is Not a Single-Region or Single-Auction Issue 12**
- Conclusions 13**

EXECUTIVE SUMMARY

A theme of FERC transmission reforms has been to proactively plan transmission while reducing the complexity of the interconnection process. Even so, most regions still use reactive transmission planning and complex interconnection processes. While proponents of that approach argue that detailed studies of generator cost responsibility protect consumers, the approach slows new supply additions, resulting in high prices in capacity markets and forcing consumers to pay much more than they would have with faster interconnection processes in place.

In the PJM Interconnection's latest capacity auction, prices for the 2025/26 delivery year soared. The total cost to consumers was \$14.7B, up \$12.5B from the previous auction's \$2.2B price tag. **We estimate that consumer costs in the last auction could have been reduced by as much as \$7B if PJM had employed proactive transmission planning and implemented simplified interconnection process reforms years ago.** Further, many analysts expect even higher prices in upcoming auctions. Retail rates are expected to increase significantly throughout the region starting in the spring or summer of 2025, with bill changes of as much as 24% in parts of the region.¹ The active engagement of Governors on the subject suggests significant political consequences and risk for the structure of the market.²

Key drivers of cost increases include load growth, generator retirements, updated resource accreditation numbers, and new market rules focused on extreme weather impacts. Compared to PJM's previous capacity auction, there was ~6.6 GW less supply offered and estimated peak load (demand) was ~3 GW higher. After many years of supply well in excess of demand and resulting prices below long-run equilibrium levels, the excess disappeared and prices rose as one would expect. At the same time, generation interconnection in PJM has been very slow. PJM is part-way through a multi-year transition to a reformed interconnection process, but, even when implemented, that process may not prove significantly more efficient. The result is that developers who have lined up in huge numbers to respond to the changing supply/demand dynamics in PJM are still waiting to bring their projects online.

To put interconnection reforms into context, we evaluate the potential cost savings for consumers in capacity markets that could result from speedier interconnection.

¹ Bill and Rate Impacts of PJM's 2025/2026 Capacity Market Results & Reliability Must-Run Units in Maryland. Maryland Office of People's Counsel. August 2024. https://opc.maryland.gov/Portals/0/Files/Publications/RMR%20Bill%20and%20Rates%20Impact%20Report_2024-08-14%20Final.pdf?ver=V9hZfyTmjLeNVt2Dg3cTgw%3d%3d

² "State utility regulators, 4 governors urge FERC to lower PJM capacity price cap." Ethan Howland. Utility Dive. January 23, 2025. <https://www.utilitydive.com/news/ferc-pjm-capacity-market-pennsylvania-shapiro/738095/>

One can roughly assume that returning the supply/demand situation to one similar to that of the previous auction, which would require an increase of ~10 GW in available capacity, could result in costs similar to those of the previous auction. This would yield cost savings of ~\$12.5B.

Supply has been slow to enter PJM. Only ~3 GW were placed in service in 2022 while less than 5 GW were added in 2023. As of September 12, 2024, less than 2 GW had been added in that year.³ The slow entry of new supply into the market is driven, in large part, by delays in generation interconnection in the region.

In the recent capacity auction, PJM paid a high price for interconnection delays. Had the region used a faster, simpler process to connect just 15% of the proposed generation currently in its queue, it likely would have yielded more than the ~10 GW in accredited capacity needed to bring auction costs in line with historical norms. PJM's current process is "penny wise." It identifies exactly which projects are cost causers for which network upgrades, assigning costs with a deliberate—and very slow—precision. But it is also "pound foolish." It almost certainly fails to result in the most cost-effective outcomes—both because it delays bringing needed new generation online and because it results in a piecemeal buildout of the transmission grid. A superior approach to new generator entry would be to integrate generator network upgrade mitigation with comprehensive transmission planning.

As regions across the country face significantly increased load growth⁴, the strain on the PJM capacity market should be seen as a herald of tightening supply and demand nationally. States, utilities, stakeholders, and grid operators should consider simpler, faster means of interconnection to address the growing supply/demand imbalance. For instance, under an "entry fee" approach, interconnection needs are planned and costs are set prior to the interconnection process. Generators assume known financial and development risks but benefit from the higher level of cost certainty and streamlined interconnection process provided by the proactively planned interconnection capacity. By reducing the complexity of cost allocation, this process should reduce the need for drawn out and litigious study and re-study processes. Our analysis demonstrates that consumers would save significant amounts of money through such a speedier and simpler process.

³ "Commercial Deployment of New Generation." PJM Markets and Reliability Committee Presentation. Jason Shoemaker. September 25, 2024. <https://www.pjm.com/-/media/DotCom/committees-groups/committees/mrc/2024/20240925/20240925-item-09---pjm-interconnection-queue---presentation.ashx>

⁴ The Era of Flat Power Demand is Over. Grid Strategies. December 2023. <https://gridstrategiesllc.com/wp-content/uploads/2023/12/National-Load-Growth-Report-2023.pdf>

1. PJM 2025/2026 CAPACITY AUCTION

In the 2025/26 Base Residual Auction (BRA), the PJM Interconnection's latest capacity auction, prices for consumers soared. The total cost to consumers was \$14.7B, an increase of \$12.5B from the previous auction's \$2.2B total cost. The auction's significant jump in cost was driven by load growth, generator retirements, updated resource accreditation numbers, and new market rules focused on extreme weather impacts. Changes in supply/demand dynamics were particularly notable. While the estimated peak load was ~3 GW greater than the previous auction, bids were ~6.6 GW lower.

High capacity prices are not expected to be a one-off or outlier event. In fact, costs in upcoming auctions could be even higher than the recent 2025/26 BRA. Load forecasts continue to rise, and very little new generation has entered service. PJM has received Federal Energy Regulatory Commission (FERC) approval to delay each of its next three capacity auctions by 6 months in order to reassess market rules and respond to concerns raised after the 2025/26 BRA.⁵ In addition, a settlement agreement between PJM and Governor Shapiro of PA would set a cost cap in the next two capacity auctions.⁶ However, in the absence of new, in-service generation, tweaks to market rules will likely offer only a temporary solution at best.

While a significant part of the price increase was in a small area of the overall market, the supply/demand situation is tightening across the whole region. Thus, generation anywhere in the region would help. Higher prices in the BGE and Dominion zones should attract generation to locate there if it is able to.

PRM Review of BRA Results

Following the 2025/26 BRA, PJM released the results along with a discussion of the factors that contributed to the high costs.^{7,8}

The auction cleared 135,684 MW of unforced capacity (UCAP), representing an 18.6% reserve margin, which satisfies the reserve requirement but is a notable decline from the 21.7% reserve margin of the

⁵ Order Granting Waiver Request. FERC. November 8, 2024. https://elibrary.ferc.gov/eLibrary/filelist?accession_num=20241108-3018

⁶ Governor Josh Shapiro Reaches Agreement with PJM to Prevent Unnecessary Price Hikes and Save Consumers Over \$21 Billion on Utility Bills. Commonwealth of Pennsylvania. January 28, 2025. <https://www.pa.gov/governor/newsroom/2025-press-releases/gov-shapiro-agreement-pjm-prevent-price-hikes-save-consumers-ove.html>

⁷ 2025/2026 Base Residual Auction Report. PJM. July 30, 2024. <https://www.pjm.com/-/media/DotCom/markets-ops/rpm/rpm-auction-info/2025-2026/2025-2026-base-residual-auction-report.ashx>

⁸ "2025/2026 Base Residual Auction Results." PJM Markets and Reliability Committee Presentation. Tim Horger and Adam Keech. August 21, 2024. <https://www.pjm.com/-/media/DotCom/committees-groups/committees/mrc/2024/20240821/20240821-item-08---2025-2026-base-residual-auction---presentation.ashx>

2024/25 BRA. The total cost to customers of the 2025/26 BRA was \$14.7B, a dramatic increase from \$2.2B in the 2024/25 BRA. The clearing price increased to \$269.92/MW-day, as compared to \$28.92/MW-day in the 2024/25 BRA. The cleared capacity included 48% natural gas, 21% nuclear, 18% coal, 1% solar, 1% wind, 4% hydro, and 5% demand response, on a UCAP basis. Very little uncleared capacity was offered in the auction. Constrained Locational Deliverability Areas (LDAs) BGE and Dominion hit their clearing price caps of \$466.35 and \$444.26/MW-day, respectively, and cleared short of their reliability requirements.

PJM identified key factors that contributed to the auction results. These included an increase of 3,243 MW in forecasted peak load, a reliability margin increase from 14.7% to 17.8%, and decreased supply due to retirements. In addition, PJM noted that market rule changes such as new resource accreditation values based on marginal Effective Load Carrying Capability (ELCC) and new must-offer exceptions further reduced supply. PJM estimated a 5,700 MW UCAP reduction in available supply due to 1) ~2,150 MW UCAP of retirements and 2) ~3,550 MW UCAP of must-offer exceptions.

Stakeholder Responses to BRA Results

The 2025/26 BRA results elicited significant reactions from stakeholders. The Independent Market Monitor (IMM) for PJM highlighted the impacts of key market design choices, including the use of marginal ELCCs for resource accreditation, the exclusion of certain resources from must-offer requirements, and the exclusion of Reliability Must-Run (RMR) assets from the supply curve. The IMM analysis indicated that each of the variables in question, all else held constant, could have altered total auction cost by billions of dollars.⁹ PJM responded to the IMM's findings by defending the adoption of the marginal ELCC accreditation as an industry-standard approach and arguing that inclusion of RMR resources in the capacity supply curve could exert downward pressure on capacity price signals, potentially deterring new capacity investments.¹⁰

The Maryland Office of People's Counsel likewise raised the issue of the RMR plants, arguing that the inclusion of the plants in the auction would have reduced capacity costs by \$5B. The Maryland Office of People's Counsel report highlighted the rate impacts of the auction, noting that Maryland is included in all or portions of four LDAs.¹¹

⁹ Analysis of the 2025/2026 RPM Base Residual Auction. The Independent Market Monitor for PJM. September 20, 2024.

https://www.monitoringanalytics.com/reports/Reports/2024/IMM_Analysis_of_the_20252026_RPM_Base_Residual_Auction_Part_A_20240920.pdf

¹⁰ PJM Response to Independent Market Monitor Report on 2025/2026 Base Residual Auction. PJM. October 11, 2024.

<https://www.pjm.com/-/media/DotCom/Library/reports-notices/reliability-pricing-model/20241011-response-to-imm-25-26-bra-report.ashx>

¹¹ Bill and Rate Impacts of PJM's 2025/2026 Capacity Market Results & Reliability Must-Run Units in Maryland. Maryland Office of People's Counsel. August 2024.

Table 1 Bill and Rate Impacts of the 2025/26 BRA relative to 2024/25 BRA for the BGE LDA and the Maryland portion of APS, DPL-South, and Pepco LDAs

Maryland LDAs	Monthly Bill Change (%)		
	All	Residential	Commercial
BGE LDA Customers	14	16	170
APS LDA Customers (Maryland only)	24	18	81
DPL-South LDA Customers (Maryland only)	2	4	16
Pepco LDA Customers (Maryland only)	10	14	163

Source: Maryland Office of People's Counsel

The Organization of PJM States, Inc. (OPSI), also raised market design concerns, including around RMR resources, must-offer exemptions, maximum capacity price, and the shift to ELCC-based resource accreditation. In addition, OPSI called for a sub-annual capacity market and continued improvements to PJM’s interconnection process, noting that generators cannot respond to high price signals if they cannot connect to the grid.¹² In a joint letter, the Governors of Illinois, Maryland, Delaware, New Jersey, and Pennsylvania called for market changes similar to those recommended by OPSI.¹³

On the basis of the exclusion of RMR resources from the 2025/26 BRA, the Sierra Club, along with a group of other environmental and consumer organizations, filed a complaint with FERC urging changes to PJM’s market rules.¹⁴

https://opc.maryland.gov/Portals/0/Files/Publications/RMR%20Bill%20and%20Rates%20Impact%20Report_2024-08-14%20Final.pdf?ver=V9hZfyTmjLeNVt2Dg3cTgw%3d%3d

¹² OPSI Letter to PJM. September 27, 2024. <https://www.pjm.com/-/media/DotCom/about-pjm/who-we-are/public-disclosures/2024/20240927-opsi-letter-re-results-of-the-2025-2026-bra.ashx>

¹³ Governors’ Letter Regarding Capacity Auction. October 25, 2024. <https://www.pjm.com/-/media/DotCom/about-pjm/who-we-are/public-disclosures/2024/20241025-governors-letter-regarding-capacity-auctions.ashx>

¹⁴ Complaint of Sierra Club, et al. September 27, 2024. <https://www.sierraclub.org/sites/default/files/2024-09/complaint-of-sierra-club-et-al.pdf>

First Energy also raised concerns about the rate impact of the 2025/26 BRA, stating that their more than 6 million retail customers will see rate impacts of 11-20%.¹⁵

PJM requested FERC approval to delay each of its next three capacity auctions by 6 months in order to reassess market rules and respond to concerns raised after the 2025/26 BRA, which FERC granted.¹⁶

As potential market reforms continued to drive controversy, Governor Shapiro of PA filed a complaint with FERC arguing that PJM's market costs are unjust and unreasonable. The complaint points to the freeze of PJM's interconnection queue as a key flaw in the market and calls for it to be re-opened. In addition, he argues that FERC should order PJM to lower its price cap to no more than 1.5x the Net Cost of New Entry (CONE) for the next two capacity auctions.¹⁷ OPSI and the governors of Delaware, Illinois, Maryland and New Jersey, among others, came out in support of this proposed price cap, noting that higher capacity prices cannot serve to bring additional generators online while the interconnection logjam remains.^{18,19} On January 28, 2025, Governor Shapiro announced a settlement agreement with PJM. If approved by FERC, the deal would result in a \$325/MW-day price cap and a \$175/MW-day floor for its 2026/27 and 2027/28 delivery year capacity auctions and settle Governor Shapiro's previous complaint.²⁰

2. ANALYSIS OF POTENTIAL COST REDUCTION FROM INTERCONNECTION REFORMS

The 2025/26 BRA has brought significant attention to the challenges facing PJM's capacity market. Rising demand, constrained supply, and evolving resource accreditation methods have created a perfect storm, leading to a dramatic increase in capacity prices and associated consumer costs. While there is considerable debate about appropriate market changes that might address soaring costs, any market tweaks will only serve as temporary solutions to the underlying problem: high prices are a signal that more

¹⁵ Comments of the FirstEnergy Companies. October 22, 2024.

https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20241022-5125

¹⁶ Order Granting Waiver Request. FERC. November 8, 2024.

https://elibrary.ferc.gov/eLibrary/filelist?accession_num=20241108-3018

¹⁷ Complaint of Governor Josh Shapiro and the Commonwealth of Pennsylvania. December 30, 2024.

[https://pa.gov/content/dam/copapwp-pagov/en/governor/documents/pjm-lawsuit/gov.%20shapiro%20and%20commonwealth%20of%20pa%20complaint\(119760108\).pdf](https://pa.gov/content/dam/copapwp-pagov/en/governor/documents/pjm-lawsuit/gov.%20shapiro%20and%20commonwealth%20of%20pa%20complaint(119760108).pdf)

¹⁸ OPSI Comments on PA Complaint. January 17, 2025.

https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20250117-5114

¹⁹ Governors' Letter to FERC in Support of PA Complaint. January 17, 2025.

https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20250117-5226

²⁰ Governor Josh Shapiro Reaches Agreement with PJM to Prevent Unnecessary Price Hikes and Save Consumers Over \$21 Billion on Utility Bills. Commonwealth of Pennsylvania. January 28, 2025.

<https://www.pa.gov/governor/newsroom/2025-press-releases/gov-shapiro-agreement-pjm-prevent-price-hikes-save-consumers-ove.html>

supply is needed, but supply cannot respond to this need if it cannot interconnect to the grid. Hence, this analysis considers how the elimination of the underlying supply/demand imbalance via common sense interconnection reforms might have reduced costs, had the interconnection reforms been implemented in advance, and how this BRA should inform future interconnection policy. While this analysis is backward-looking, it is intended to inform opportunities to address the foundational challenges that persist and threaten to keep prices high.

The analysis is organized into four sections:

- **Supply and Demand:** Estimates the amount of additional accredited capacity necessary to bring the supply/demand dynamics of the 2025/26 BRA into line with the prior BRA
- **Generation Interconnection:** Examines PJM's track record for bringing new resources online and evaluates whether the recent interconnection queue contains sufficient generation to provide the amount of additional accredited capacity deemed necessary in the previous section
- **Resource Accreditation:** Assesses the amount of nameplate capacity necessary to provide the amount of additional accredited capacity deemed necessary in the previous section
- **Cost of Proactive Transmission Upgrades:** Estimates the investments required to address PJM's capacity shortfall through targeted transmission improvements

This analysis makes a number of assumptions and should be considered a simplification of complex market dynamics. However, the scale of the supply constraint PJM faces should not be underestimated and merits the consideration of significant policy adjustments.

Supply and Demand

The 2025/26 Base Residual Auction (BRA) highlighted a stark tightening of the supply/demand balance in PJM's capacity market. Compared to the prior year's auction, supply was significantly reduced, with approximately 6.6 GW less capacity offered. Meanwhile, estimated peak demand increased by approximately 3 GW, from 150 GW in the previous auction to 153 GW. The convergence of shrinking supply and growing demand erased the excess capacity that had historically characterized PJM's auctions.

Comparing the amount of accredited capacity offered in the 2025/26 BRA to that of the previous auction, a rough approximation indicates that an increase of 10 GW in available accredited capacity could return the supply/demand situation to one similar to that of the previous auction. Assuming a similar supply/demand curve, this should result in cost savings of ~\$12.5B. In this approximation, the annual value of accredited capacity to the grid is, on average, \$1250/kW.

Generator Interconnection

PJM Interconnection Track Record

Interconnection delays significantly limit the ability of generation to enter the PJM market. Only ~3 GW were placed in service in 2022 while less than 5 GW were added in 2023. As of September 12, 2024, less

than 2 GW had been added in that year.²¹ These low annual numbers compare to over 50 GW connected by both PJM and MISO 2015-17.²² The sluggish pace of interconnection is a known issue. In 2022, PJM brought its proposed interconnection cluster study process, which was intended to help it clear its interconnection queue backlog, to FERC. The Commission approved both PJM’s queue reform and implementation of parallel processing, including management of PJM’s backlog through Transition Cycles 1 and 2, and the pause in processing and studying new interconnection applications.²³

PJM’s cluster study process is new and differs significantly from serial generator study employed in the past. This change has been accompanied by delay and, in the case of Transition Cluster-2, has introduced uncertainty as to the ultimate size (i.e. number of requests) and potential upgrade mitigation for interconnection customers. PJM did allow backlog projects to receive Generator Interconnection Agreements (GIAs) subject to network upgrades lower than \$5M. However, that one-time fast track was limited and did not fundamentally alter the dynamics of PJM’s delayed queue and the lack of new entry.²⁴

Current Queue Status

Based on PJM’s Interconnection Service Requests as of the end of 2023, the following amounts of generation are in the interconnection queue.²⁵

- Wind: 37 GW, or approximately 15% of the nameplate generation in the queue
- Solar: 106 GW, or approximately 45% of the nameplate generation in the queue
- Storage: 53 GW, or approximately 23% of the nameplate generation in the queue
- Natural Gas: 8 GW, or approximately 3% of the nameplate generation in the queue
- Hybrid Resources: 29 GW, or approximately 12% of the nameplate generation in the queue

²¹ “Commercial Deployment of New Generation.” PJM Markets and Reliability Committee Presentation. Jason Shoemaker. September 25, 2024. <https://www.pjm.com/-/media/DotCom/committees-groups/committees/mrc/2024/20240925/20240925-item-09---pjm-interconnection-queue---presentation.ashx>

²² Generator Interconnection Scorecard. Grid Strategies and Brattle. February 2024. <https://gridstrategiesllc.com/wp-content/uploads/2024/03/AEI-2024-Generation-Interconnection-Scorecard.pdf>. Page 22, Table 4.

²³ Order Accepting Tariff Revisions Subject to Condition re PJM Interconnection. FERC. November 29, 2022. https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20221129-3092

²⁴ Generator Interconnection Scorecard. Grid Strategies and Brattle. February 2024. <https://gridstrategiesllc.com/wp-content/uploads/2024/03/AEI-2024-Generation-Interconnection-Scorecard.pdf>.

²⁵ Regional Transmission Expansion Plan 2023. PJM. March 7, 2023. <https://www.pjm.com/-/media/DotCom/library/reports-notice/2023-rtep/2023-rtep-report.ashx>

Resource Accreditation

To derive the amount of accredited capacity that could participate in the capacity auction from nameplate capacities, we reviewed Effective Load Carrying Capabilities (ELCC) used for the 2025/26 BRA.²⁶

Resource Class	ELCC
Onshore Wind	35%
Offshore Wind	60%
Fixed-Tilt Solar	9%
Tracking Solar	14%
4-hr Storage	59%
6- to 10-hr Storage	67%-78%
Gas Combined Cycle	78%
Gas Combustion Turbine	62%

Using the following assumption and the amounts of capacity in the PJM interconnection queue, as reported in the PJM 2023 Regional Transmission Expansion Plan (RTEP) and listed above²⁷, we determine that approximately 68.6 GW of accredited capacity is currently in PJM’s interconnection queue. Hence, bringing less than 15% of generating capacity that has applied for interconnection online would provide the relevant 10 GW of capacity.

While many projects would not be able to move forward immediately, even with signed interconnection agreements, due to other project readiness factors, it is reasonable to assume that at least 15% of generator requests, by capacity, would be successful. This is further reinforced by LBNL's analysis of PJM queue data, which finds that projects requesting interconnection from 2000-2018 have a 15% success rate on a capacity weighted basis.²⁸ Other regions have higher project completion rates, indicating that

²⁶ ELCC Class Ratings for 2023/2024 3IA, 2025/2026 BRA and 2026/2027 BRA. PJM. January 2023. <https://www.pjm.com/planning/resource-adequacy-planning/effective-load-carrying-capability>

²⁷ Regional Transmission Expansion Plan 2023. PJM. March 7, 2023. <https://www.pjm.com/-/media/DotCom/library/reports-notice/2023-rtep/2023-rtep-report.ashx>

²⁸ Queued Up: 2024 Edition. Lawrence Berkeley National Laboratory. April 2024. https://emp.lbl.gov/sites/default/files/2024-04/Queued%20Up%202024%20Edition_1.pdf

improvements to PJM’s interconnection process could yield an interconnection success rate in excess of 15%.²⁹ Our analysis makes the following simplifying assumptions:

- Wind: treated as all onshore
- Solar: assumed all is tracking, given the low numbers of fixed-tilt installations of late³⁰
- Storage: treated all as 4-hour
- Gas: treated as 70% ELCC
- Hybrid: primarily solar capacity, according to the 2023 RTEP — treat as all tracking solar

Cost of Proactive Transmission Upgrades

LBNL’s 2023 analysis of PJM interconnection costs found that costs were up significantly in recent years. For complete projects, average costs have doubled relative to those seen from 2000-2019. Average costs of broader network upgrades (beyond the interconnecting substation) are also up since 2019. As of LBNL’s 2023 analysis, average costs for complete projects were \$71/kW and \$227/kW for active projects.³¹

Since active projects with high costs tend to not proceed, the likely cost for projects that do proceed is likely somewhere between the \$71/kW for complete projects and \$227/kW for active projects. Using \$150/kW may be a decent approximation. We estimate that, in order to provide 10 GW of additional capacity in the recent auction, we would need 33 GW of nameplate capacity (based on the average 30% ELCC of resources with current interconnection service requests).

Assuming we can simply scale the \$150/kW average cost of broader network upgrades up to cover the 33 GW of additional nameplate capacity, we find that the cost of broader network upgrades necessary to reduce the supply constraints seen in the recent PJM auction is approximately \$5B.

For comparison, during 2023, the PJM Board approved 48 new baseline transmission projects, which are intended to maintain system reliability criteria, at a projected cost of \$6.6B. In addition, the Board approved 93 network transmission projects, at a total cost of approximately \$180M, to support the reliable interconnection of generation projects.³²

²⁹ Ibid.

³⁰ Form EIA-860 data. Energy Information Administration. September 2024. <https://www.eia.gov/electricity/data/eia860/>

³¹ Interconnection Cost Analysis in the PJM Territory. LBNL. January 2023. <https://emp.lbl.gov/news/pjm-data-show-substantial-increases>

³² Regional Transmission Expansion Plan 2023. PJM. March 7, 2023. <https://www.pjm.com/-/media/DotCom/library/reports-notice/2023-rtep/2023-rtep-report.ashx>

3. NETWORK UPGRADES REQUIRED

Since PJM has not been performing pro-active multi-purpose transmission planning, network upgrades are assigned to interconnecting generators according to their individual and shared contribution to an assigned overload or transmission constraint. This analysis entails extensive assessment of project and cluster impacts, including re-studies in the event of project withdrawals from a cluster. The inter-dependent nature of the queue not only bogs down individual projects but also burdens the cluster and subsequent clusters with delays.

Often there are disputes between the customer and PJM, given the substantial funds at stake. Very often the dollars assigned to one customer change based on other customers' strategies actions. Thus, upgrade assignment numbers are inherently volatile. Risk is further accentuated by Interconnection modeling errors and lack of alignment in identifying affected system impacts on a project-by-project basis.

Many network upgrades are common across generation since generators tend to want to site in similar locations. This phenomenon is also the underlying basis for the faster process in Texas, and reforms in CAISO and SPP, which all rely on proactive identification of network upgrade needs to connect supply. CAISO, for instance, has adopted a zonal approach to interconnection and will prioritize interconnection requests in areas where transmission capacity exists or has been approved for development while aligning transmission planning processes with established Transmission Zones.³³ The degree to which necessary network upgrades can be predicted ahead of specific interconnection requests depends on the concentration of generating resources in geographic and transmission areas and may vary between regions. While this is challenging to quantify for PJM, the number of interconnection service request dependencies triggered by various interconnection requests can serve as a reasonable proxy. Anecdotally, most interconnection requests trigger upgrades that overlap with those triggered by other projects and quantification of this overlap could be an area of further study. Based on these factors, it is reasonable to assume that, had transmission needs been proactively identified and addressed, the interconnection generators would have had simpler, cheaper, and speedier interconnection.

4. THE COST OF EXCESSIVE PROCESSING

The \$5B cost of network upgrades is 40% of the \$12.5B capacity price increase consumers paid in a single auction, and the generation connected would be available for many subsequent years. If those

³³ Order on Tariff Revisions re CAISO. FERC. September 30, 2024.
https://elibrary.ferc.gov/eLibrary/filelist?accession_num=20240930-3094

network upgrades had been built a few years ago – as they could have been with a simple and fast interconnection process, or one that proactively built for future demand – **consumers would have saved \$7B in the 2025/2026 BRA alone.** These savings could be much greater in the upcoming BRA.

In addition, PJM could have structured a more proactive interconnection process such that generators could still have paid some share of network upgrade costs upfront. **Even if generators were still required to pay all of the upgrade costs, the fee could have been fixed up front, and the process could have been much quicker because of the certainty provided by a stable entry fee.**

5. SPEEDING UP INTERCONNECTION

A variety of reforms have been proposed at FERC, PJM, and other RTO/ISOs. Some proposed reforms have included those related to processing, such as automation of tasks including model preparation and assessment of network upgrade mitigation across large regions like PJM's. Other proposed reforms focus on **managing queue size through rationing.** Some reforms focus on **simplification of analysis and providing greater cost certainty.** An **entry fee approach**, for example, wherein a fee would be determined based on average costs on interconnection, **could avoid extensive analysis**, the results of which have limited meaning because assumptions about which generation ultimately connects are very uncertain and affect analysis results. In addition, by getting funds to Transmission Owners more quickly, the use of an entry fee approach could speed the construction of network upgrades and hence reduce the project delays following generator interconnection agreements. **Instead of conducting detailed analysis without much benefit, a simpler, speedier process could connect more generation more quickly.**

In *Unlocking America's Energy: How to Efficiently Connect New Generation to the Grid*, Grid Strategies and The Brattle Group delve into proposed interconnection reforms in greater detail.³⁴

6. THIS IS NOT A SINGLE-REGION OR SINGLE-AUCTION ISSUE

The recent PJM capacity auction serves as a stark warning of the risks of interconnecting too little new generation in the face of load growth and mounting retirements in the whole country. While much of the discussion around the exorbitant price tag has treated this as a one-off issue that can be fixed by tweaks to market rules, the issue is more fundamental. PJM has forecast significant load growth in coming years and has numerous retirements scheduled. In the absence of interconnection and transmission reform, the

³⁴ *Unlocking America's Energy: How to Efficiently Connect New Generation to the Grid*. Grid Strategies and The Brattle Group. August 2024. <https://gridstrategiesllc.com/wp-content/uploads/Exec-Sum-and-Report-Unlocking-Americas-Energy-How-to-Efficiently-Connect-New-Generation-to-the-Grid.pdf>

supply-demand curve will continue to tighten, and high prices will persist. Moreover, this issue is not isolated to PJM – regions across the country should expect to face similar repercussions if they do not address the generation and grid infrastructure needs posed by increased power demand.

Across the country, the 5-year load growth forecast has increased by almost a factor of five over the last two years and nationwide electric demand now predicted to increase by 15.8% by 2029. This demand growth, which is largely driven by data center development and growth in manufacturing, is especially notable in specific regions such as the Pacific Northwest, SPP, MISO, ERCOT, Georgia Power, and PJM.³⁵ PJM’s recent capacity auction should be seen as a harbinger of tightening supply/demand dynamics across the country and especially in regions facing rapid load growth in the absence of significant new generation. All regions should consider adopting interconnection reforms and leveraging proactive, comprehensive transmission planning that accounts for its multi-value nature – the costs of near-term investment can be quickly outweighed by the cost of inaction, as seen in PJM’s 2025/26 BRA.

CONCLUSIONS

A more rapid interconnection of generation could have saved consumers from most of the cost they are paying in capacity prices, and those savings could increase significantly in multiple future capacity auctions. Capacity payments will hit retail rates very soon and will keep driving up retail rates as long as supply is scarce. No single interconnection reform can resolve all interconnection delays. Even an optimized interconnection process would not allow all queued capacity to come online immediately – project development takes time, especially in the face of supply chain shortages and increasingly difficult local permitting. However, the recent PJM BRA highlights the urgent need to implement prudent reforms and allow for the timely interconnection of additional generation capacity.

Policy makers in the regions and at FERC should prioritize speedier and simpler interconnection as a primary means of managing rising consumer prices.

³⁵ Strategic Industries Surging: Driving US Power Demand. Grid Strategies. December 2024. <https://gridstrategiesllc.com/wp-content/uploads/National-Load-Growth-Report-2024.pdf>