Natural Gas Generator and Energy Storage Timelines in PJM

Implications for Reliability and Affordability

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Energy at Hopkins

In the face of surging electricity demand, ratepayers across the country are facing pervasive rate hikes and forecasts of lower reliability. A critical component of efforts to address the twin reliability and affordability issue is the pace at which new natural gas and battery energy storage capacity can be connected to the grid.

Our analysis of natural gas and storage project timelines in the PJM region demonstrates five key insights:

#1: Small-scale natural gas generation projects or "uprates" to existing natural gas facilities are most likely to have reached commercial operation over the past decade, encompassing 90% of natural gas generation projects that have successfully come online. The median time from queue submission to completion for these projects is 1.98 years, though some have taken up to more than 6 years.

#2: New large natural gas-fired generation projects that have completed the interconnection study process are projected to face average timelines of 10.8 years after their initial submission to the queue, suggesting long lead times even for projects progressing through the queue. The average duration of PJM studies for natural gas projects submitted after 2015 is 7.4 years.[1]

#3: No new large natural gas-fired power plant over 100 megawatts (MW) that entered the queue since 2018 has successfully come online as of early 2026.

#4: Only 13 natural gas-fired generators over 100 MW out of 102 submitted to the queue in the past decade have come online as of the beginning of 2026, and all were submitted prior to 2018.[2] These larger generators took, on average, over 5 years after their initial submission to reach completion, with some taking more than 7 years.

#5: Projected in-service dates at the beginning of the development process are typically substantially shorter than late-stage estimates,

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[1] Duration of PJM studies is measured as the duration between the project's submission to the queue and the effective date of the Interconnection Study Agreement (ISA).

[2] This includes new build projects with a Maximum Facility Output (MFO) greater than or equal to 100 MW and uprate projects with added capacity greater than or equal to 100 MW

suggesting that policymakers should be cautious when relying on early developer estimates of how long it takes to complete projects.

EXECUTIVE SUMMARY

Across the country, energy policymakers are in crisis mode - urgently seeking new energy resources to keep pace with skyrocketing demand, maintain grid reliability, and ease electricity price increases. To address these affordability and reliability crises, policymakers are looking at a variety of tools to bring new generation to market as quickly as possible. PJM's 2027/2028 capacity auction in December 2025 suggests that the PJM grid is over 6,000 MW (since revised down to just over 4,000 MW) short of its reliability target, suggesting the immediate need to either reduce load growth, accelerate deployment of new generation, or accept a less reliable electric grid.[3] Several states are debating how heavily to focus efforts on promoting energy dense resources with high-capacity accreditation, such as natural gas and storage. Proponents suggest that these resources are an effective short-term solution to high prices and the need to power data centers.

We analyzed natural gas and storage development timelines, based on data sourced from PJM's interconnection queue between 2015 and 2026, to determine how long it takes to bring these new generation supplies online, as well as how good project developers are at predicting connection timelines. Storage and gas were prioritized since these are often perceived as shorter-term investments that yield quick additions of reliable capacity. Additionally, both are actively being considered by policymakers across the region. PJM has similarly focused on natural gas and storage as preferred tools to meet near-term grid reliability issues through their Reliability Resource Initiative[4] and through its expedited interconnection emergency process.[5]

Projects in the analysis are categorized as either "new builds" or "uprates", which refers to the construction of entirely new power plants or upgrades to existing facilities that increase capacity injection rights, respectively. Understanding distinctions between timelines for different project categories and fuel types provides powerful insights for policymakers looking to power data centers, reduce prices, and maintain a reliable grid.

For natural gas projects, our analysis signals several trends relevant to policymakers considering gas development in coming years:

- Smaller-scale projects or uprates are the most likely to have reached commercial operation over the past decade.
- For new build projects submitted to the queue in the past 8 years, no project larger than 18 MW has reached in-service status.
- Based on projected in-service dates, projects that have completed the interconnection study process, but that have not yet come online, are

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[3] PJM "2027/2028 Base Residual Auction Report," December 17, 2025. https://www.pjm.com/-/media/DotCom/markets-ops/rpm/rpm-auction-info/2027-2028/2027-2028-bra-report.pdf.

[4] PJM Inside Lines. "PJM Chooses 51 Generation Resource Projects to Address Near-Term Electricity Demand Growth," May 2, 2025. https://insidelines.pjm.com/pjm-chooses-51-generation-resource-projects-to-address-near-term-electricity-demand-growth/.

[5] Horger, Tim. "PJM CIFP Package Stage 3 Large Load Additions." Slide show. PJM, November 6, 2025. https://www.pjm.com/-/media/DotCom/committees-groups/cifp-lla/2025/20251106/20251106-item-03---pjm-updated-package.pdf; *see also Proposed Tariff Amendments for Expedited Interconnection Track*, Filed at FERC in Docket No. ER26-1562, on Feb. 27, 2026.

projected to face timelines of up to 13 years, and an average of nearly 11 years, after their initial submission to the queue, likely as a combination of a lethargic interconnection study process, awaiting the completion of necessary upgrades to the transmission grid, equipment orders, siting and permitting delays, or a combination of factors.
- On average, natural gas projects that have completed the interconnection study process have taken on average 7.4 years to complete studies and are projected to face nearly 4 additional years in procurement and construction phases.
- Projected in-service dates when projects first enter the queue categorically show shorter estimated development timelines compared to those in later stages. This suggests a potential broader trend of timeline underestimation due to unforeseen late-stage delays, such as those associated with transmission buildout or equipment procurement.

Energy storage projects are far less common in number and size in the PJM region compared to the rest of the nation. Our results reinforce the narrative that storage development is not as mature in PJM as it is in the rest of the country and that even though storage is widely regarded as a fast-deploying resource, it is not immune from a challenging PJM development environment:

- A significant backlog in the amount of storage capacity reaching in-service status, approximately 2% of total projects submitted to the queue after 2015 reaching in-service status, while about 28% of total projects remain under study, and 70% have been withdrawn, deactivated, cancelled, or suspended.
- A gap in projected development timelines when projects are submitted to the queue similar to that observed in natural gas timelines, suggesting late-stage uncertainties in procurement timelines are also relevant for storage buildout timelines.

While PJM is attempting to accelerate deployment of new gas-fired resources, the surge in energy demand alongside the current turbulence of the global trade environment shows no signs of decreasing the strain on supply chains for critical components and higher prices and longer wait-times are likely to remain major challenges for policymakers.[6] Policymakers concerned about the pre-2030 reliability picture in PJM would be well advised to consider the observed timelines when developing policy solutions to the impending reliability crisis.

SUPPLY DEMAND BALANCE IN PJM

In the country's largest regional electricity market, PJM Interconnection, the need for new generation supplies is particularly stark. Utilities anticipate adding more than 5,000 MW of new load (largely, although not exclusively related to data centers)

[6] GE Vernova, one of the largest manufacturers of generation equipment, for example, notes that it is largely sold out of new gas-fired generation through mid-2028. *See* GE Vernova, 2025 Investor Update, Dec. 9, 2025. https://www.gevernova.com/sites/default/files/gev_webcast_presentation_12092025.pdf.

to the grid on an annual basis.[7] PJM is projected to begin (narrowly) missing its reliability targets, starting in 2026, with the reliability shortfall worsening to over 6,000 MW in 2027, although that number was recently reduced to just over 4,000 MW. As a result of these tightening supply-demand conditions, consumer costs in PJM's capacity markets have increased almost seven-fold in just two years and are expected to continue growing over the next several years.

The next few years mark a critical chapter in US energy development. Load growth in the region detailed in PJM's 2025 report is expected to average 4.8% annually for the next 10 years.[8] This is more than double the forecasted growth from the 2024 report, which predicted a rate of 2.3% per year over the same period.[9] In fact, prior to 2023, this rate had not exceeded 1% for an extended period as shown in Figure 1.

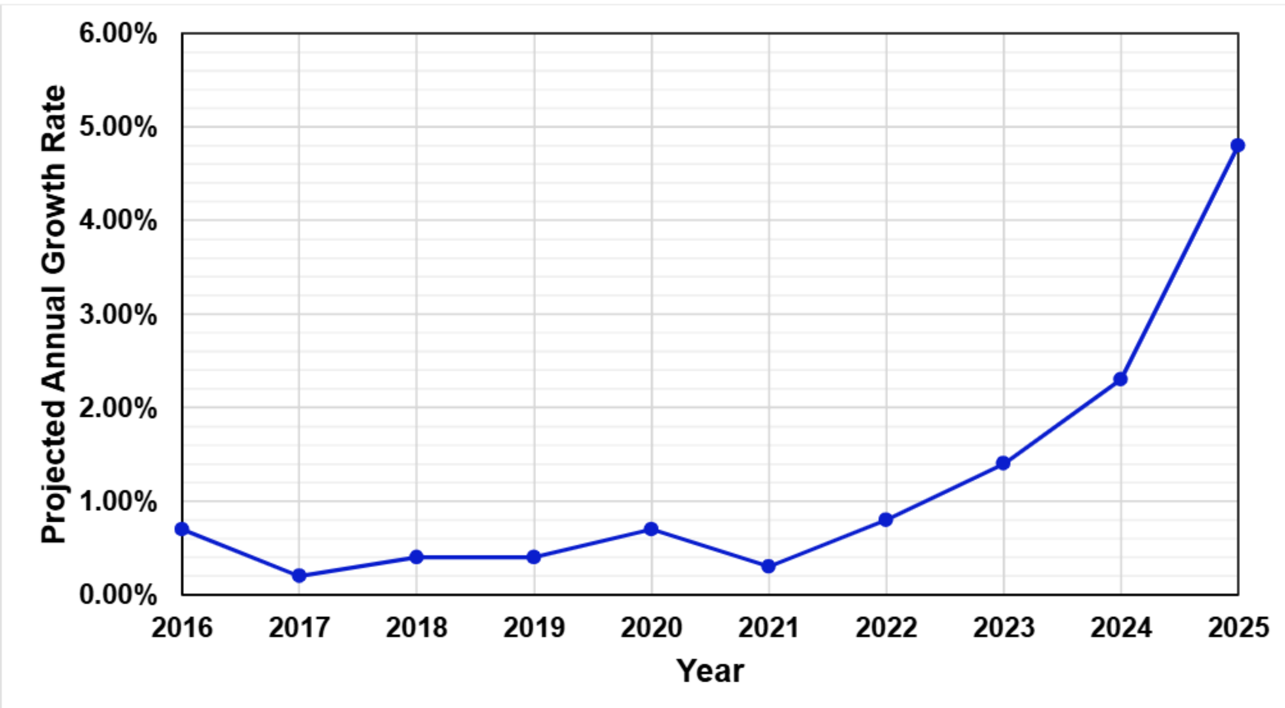

Figure 1. Annual load growth rates of recent years far exceed the norm within the past decade. Data is derived from PJM's Load Forecast Reports for each year.

Load growth is having a significant impact on energy consumers. In the recent PJM Capacity Auction for the 2026/2027 energy year, total price to consumers jumped from the 10-year average of $7.5 billion to a jarring $16.1 billion.[10] Specifically, the auction landed on the roughly $330/MW-day price cap, which represents a 22%

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[7] Keech, Adam, ed. Prefiled Statement of Adam Keech on Behalf of PJM Interconnection, L.L.C. FERC Resource Adequacy Technical Conference, 2025. https://psc.ky.gov/pscecf/2025-00087/jacob.watson%40ekpc.coop/08282025080623/AG_DR2_Response_1d_-_Adam_Keechs_Statement.pdf.

[8] PJM Resource Adequacy Planning Department. "PJM Long-Term Load Forecast Report." Report. PJM Long-Term Load Forecast Report, January 24, 2025. https://www.pjm.com/-/media/DotCom/library/reports-notices/load-forecast/2025-load-report.pdf.

[9] PJM Resource Adequacy Planning Department. "PJM Load Forecast Report 2024," January 2024. https://www.pjm.com/-/media/DotCom/library/reports-notices/load-forecast/2024-load-report.pdf.

[10] PJM Interconnection. "2026/2027 Base Residual Auction Report," July 22, 2025. https://www.pjm.com/-/media/DotCom/markets-ops/rpm/rpm-auction-info/2026-2027/2026-2027-bra-report.pdf.

increase from a year ago, and would have risen further without emergency appeal from Governor Shapiro of Pennsylvania to the Federal Energy Regulatory Commission for rate relief.[11] Many states in the region are facing significant price hikes in consumer bills ranging as high as 20 percent for some utility service territories.[12]

These changes have inspired multiple additional efforts by PJM to fast-track the connection of new energy. First, in January of 2025, PJM instituted "Capacity Interconnection Rights (CIR) Transfer Reforms" which allows new resources to utilize the CIRs of a deactivating resource to expedite the interconnection process.[13] Second, the "Surplus Interconnection Service (SIS)" initiative allows for new generators not requiring transmission system upgrades to utilize an existing generator's unused interconnection capability thus allowing them to avoid typical interconnection queue processing.[11] Third, the "Reliability Resource Initiative (RRI)" has recently been implemented to fast-track 51 carefully selected projects totaling 9,361 MW of UCAP. Projects were chosen based upon a rubric prioritizing the most significant contributions to grid reliability and the shortest development timelines. Natural gas dominates these projects, at 69% of total MW, followed by battery storage at 19%, nuclear at 12% and coal at less than 1%.[14] Finally, PJM recently filed a second version of the RRI program, known as the Expedited Interconnection Track at the end of February, 2026, also aimed at accelerating interconnection of large capacity resources.[15]

Many states in the PJM region have adopted a variety of policy responses aimed at easing price hikes by bringing new supplies online. Pennsylvania's proposed "Lightning Plan", for example, as well as similar initiatives in Maryland and Ohio have established mechanisms to expedite permitting and siting processes for energy projects.[16] Other approaches include incentives to boost clean energy expansion including solar, offshore wind, nuclear, and storage, such as New Jersey's recently-introduced natural gas procurement bill,[17] the New Jersey Garden State Energy

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[11] PA.gov. "Governor Shapiro's Legal Action Against PJM Saves Consumers Billions and Prevents Massive Price Hike Across 13 States," July 22, 2025. https://www.pa.gov/governor/newsroom/2025-press-releases/gov-shapiro-legal-action-against-pjm-saves-consumers-billions-ac.

[12] EIA. "U.S. electricity prices continue steady increase," May 14, 2025. https://www.eia.gov/todayinenergy/detail.php?id=65284#.

[13] Franks, Ed and PJM Interconnection Analysis Department. "Enhancing CIR Transfer Efficiency – Solution Package." Slide show. PJM Interconnection, November 21, 2024.

[14] PJM Inside Lines. "PJM Chooses 51 Generation Resource Projects to Address Near-Term Electricity Demand Growth," May 2, 2025. https://insidelines.pjm.com/pjm-chooses-51-generation-resource-projects-to-address-near-term-electricity-demand-growth/.

[15] *Proposed Tariff Amendments for Expedited Interconnection Track*, Filed at FERC in Docket No. ER26-1562, on Feb. 27, 2026.

[16] PA.gov. "Governor Shapiro Unveils 'Lightning Plan' to Strengthen Commonwealth's Energy Leadership, Create Jobs, and Lower Costs for Consumers," January 30, 2025. https://www.pa.gov/governor/newsroom/2025-press-releases/governor-shapiro-unveils--lightning-plan--to-strengthen-commonwe;The Office of Governor Wes Moore. "Governor Moore Signs Legislation to Make Maryland More Competitive." Press release, May 9, 2024. https://governor.maryland.gov/news/press/pages/governor-moore-signs-legislation-to-make-maryland-more-competitive.aspx.; Kowalski, Kathiann. "Ohio to fast-track energy at former coal mines and brownfields." Canary Media, October 15, 2025. https://www.canarymedia.com/articles/land-use/ohio-fast-track-energy-mines-brownfields.

[17] *Establishes Natural Gas Power Plant Procurement Program in the Board of Public Utilities*, A. 4491, 221st Leg., 2026–2027 Reg. Sess. (N.J. 2026).

Storage Program, and Maryland's Next Generation Energy Act.[18] Some states are electing to lean towards natural gas and coal resources, such as Ohio and West Virginia which have implemented reforms to attract new gas plants and preserve existing coal plants.[19]

BACKGROUND ON PJM'S INTERCONNECTION PROCESS

The PJM Interconnection Queue has been a focal point of energy project developers and policymakers even before the recent surge in demand from large loads. The central concern has been related to the slow rate of new generation entering the grid. The structured queue process is intended to ensure safe and reliable interconnection of new resources to the grid via a series of studies and agreements. However, there are well-documented delays in this process which pose significant roadblocks to the connection of new resources. By the early 2020s, a marked influx in project submissions to the queue, a high prevalence of late-stage withdrawals, as well as spiraling re-studies combined to overwhelm the interconnection process. As a result, PJM is seeing lengthier interconnection study timelines, as well as a significant backlog in generation and energy storage in the queue. Particularly, at the end of 2023, 2,600,000 MW of generation and energy storage remained stalled in queue backlog.[20] These issues impact project timelines in a multitude of ways, such as interfering with project siting and permitting, as well as delaying equipment procurement and financing decisions. Additionally, supply chains for certain essential generator components are facing pressures from an influx in demand as well as a turbulent global trade environment. Thus, for policies to effectively respond to these issues, it is critical that realistic project timelines as well as the factors which influence them are well understood.

PJM's response to these issues has been multi-pronged. Starting in May of 2022, in response to the tripling of projects entering the queue between 2018 and 2021, the interconnection process was temporarily frozen. In response to Order 2023 from the Federal Energy Regulatory Commission (FERC), PJM instituted a new

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[18] New Jersey Board of Public Utilities. "N.J. Takes Charge: Launches Landmark Energy Storage Program to Lower Long-Term Costs and Strengthen Power Grid." Press release, June 18, 2025. https://www.nj.gov/bpu/newsroom/2025/approved/20250618solar.html. "Governor Moore Signs Next Generation Energy Act, Propelling Maryland to a Leadership Position on Energy Storage." Press release, May 20, 2025. https://marec.us/governor-moore-signs-next-generation-energy-act-propelling-maryland-to-a-leadership-position-on-energy-storage/.

[19] "Governor DeWine, JobsOhio Announce $100 Million 'Energy Opportunity Initiative.'" Press release, October 29, 2025. https://governor.ohio.gov/media/news-and-media/governor-dewine-jobsohio-announce-$100-million-energy-opportunity-initiative; West Virginia Office of the Governor. "Governor Patrick Morrisey Announces More Than $4 Billion in Energy Investments, 4,200 Jobs in Less Than One Month." Press release, November 13, 2025. https://governor.wv.gov/article/governor-patrick-morrisey-announces-more-4-billion-energy-investments-4200-jobs-less-one.

[20] Rand, Joseph, Nick Manderlink, Will Gorman, Ryan Wiser, Joachim Seel, Julie Mulvaney Kemp, Seongeun Jeong, Fritz Kahrl, and Lawrence Berkeley National Laboratory. "Queued Up: 2024 Edition Characteristics of Power Plants Seeking Transmission Interconnection As of the End of 2023." Slide show. Lawrence Berkeley National Laboratory, April 2024. https://emp.lbl.gov/sites/default/files/2024-04/Queued%20Up%202024%20Edition_1.pdf.

interconnection process known as the "cycle study" or "cluster study" approach which differs from its original "serial study" approach in multiple fundamental ways. Critically, this approach favors a "first-ready, first-served" approach to project prioritization as opposed to a "first-come, first-served" approach. This applies more weight to projects that have more immediate prospects as opposed to those with higher risks of protracted timelines or eventual withdrawals. Moreover, in response to severe weather events in 2022, FERC approved a proposal out of PJM which adjusted the capacity accreditation method involved in determining the resource adequacy of a given facility. The new metric replaces the *average* effective load carrying capability (ELCC) metric with a *marginal* ELCC metric which is intended to more accurately reflect the resource adequacy contribution of a given facility. This largely reduced the unforced capacity (UCAP) metric for most resource types. Moreover, 3,640 MW of nameplate capacity stemming from economically inefficient, aging, generators retired between the 2024/25 and 2025/26 base residual auctions.

Taking these developments into account, the following sections describe how PJM queue data was extracted to determine trends in project timelines for natural gas and storage projects. This provides a grounded insight into the rate at which capacity has actually reached markets in recent years, and how this relates to the larger issue of supply-demand imbalance.

GATHERING & CLEANING INTERCONNECTION QUEUE DATA

The data used for these analyses were from PJM's Serial Service Request Status queue and the Cycle Service Request Status queue, which are two datasets provided by PJM for interconnection queue data. The Serial Service Request Status shows projects that were studied during PJM's initial "first-come, first-served" approach to queue processing, as well as projects that were part of transition clusters. The Cycle Service Request Status shows projects studied as part of the cluster-study, "first-ready, first-served" approach.[21] It is important to note that as of late April 2026, the PJM queue has reopened. Thus, the data and findings described in this paper provide a retrospective analysis of queue dynamics in prior cycles.

The Serial Service Request Status file includes descriptive information about the project, including the project identification number, the commercial name of the project, the state in which the project is constructed, the status of the project, the associated transmission owner, the size in terms of MFO, MW Energy, MW Capacity, and MW In Service, as well as the fuel type. The file also lists information about transmission rights and the statuses of associated agreements, including initial studies, feasibility studies, system impact studies, facilities studies, interconnection service agreements, and construction service agreements. Finally, the file lists dates associated with each project, including the date of project submission, commercial operation milestones, revised in-service dates, and actual in-service dates. Availability of data for these different categories largely depends on the status of the projects. The Cycle Service Request Status file includes similar descriptive

[21] "Guide for Obtaining Interconnection Information." PJM. https://www.pjm.com/-/media/DotCom/planning/services-requests/guide-for-obtaining-interconnection-information.pdf.

information, in addition to identifying project status and stage within the cycle process.

Project timelines were determined by computing the duration between the date the project is submitted to the queue, and either the projected in-service date or the actual in-service date. The projected in-service date is estimated by the project developer and is only applicable to in-progress projects, and in-service project timelines are computed based on the actual in-service date. Project sizes included in the analyses are based on different metrics for uprates and new builds and different fuel types. For natural gas new builds, the project size is the MFO, and for natural gas uprates, the project size is the MW capacity added to the grid. For in-service storage projects, the project size is taken as the MFO since the technical characteristics of storage facilities create ambiguities around the capacity accreditation specific of battery projects. It is also important to note the queue data does not reliably partition the amount of the MW MFO or capacity attributable to the storage facility itself versus its associated generation facility. For in-progress storage projects, the MW capacity is used to reflect the project size. As previously acknowledged, the capacity accreditation of battery projects is not yet concrete in the queue data, thus this graph provides an approximate sense of the expected capacity contributions of in-progress storage projects.

Since this data is compiled manually by PJM, there is potential for human error or misleading inputs. For example, some projects classified as "new build" natural gas projects are not actually construction of new facilities, but rather projects switching fuel type to gas from another fuel. These projects were excluded from analyses. Additionally, projects that were duplicates of other projects were excluded. Another commonly found discrepancy in the data was projected or actual in-service dates preceding the date that projects were submitted to the queue. In the Cycle Service queue, it was also common to see many projects with no dates listed other than the submitted date. Some projects also did not include submitted dates. For the purposes of these analyses, it was not possible to determine appropriate timelines for these projects and they were excluded. However, for projects identified as RRI projects, a submission date of March 14, 2025 was used to approximate for missing submission dates. This is the date in which the application window for RRI closed. Moreover, projects that were classified as uprates but listed as adding 0 MW capacity to the grid, likely a result of input error or a project type not applicable to these analyses, were excluded. Other examples of excluded projects include those with commercial operation dates or revised in-service dates which have already passed at the time of these analyses. Finally, within the Serial Service Request Status dataset, some projects were explicitly labeled as "moved to TC1" or "moved to TC2". This indicates that the project was moved to the Cycle Service Request Status queue. These projects were excluded to avoid double counting.

Finally, it is important to note that the queue data is consistently being updated, with projected completion dates changing, and projects moving to different statuses, so the statistics detailed in this paper might not be entirely reflective of the queue data at the time of reading.

COMPLETED PROJECT TIMELINES: NATURAL GAS

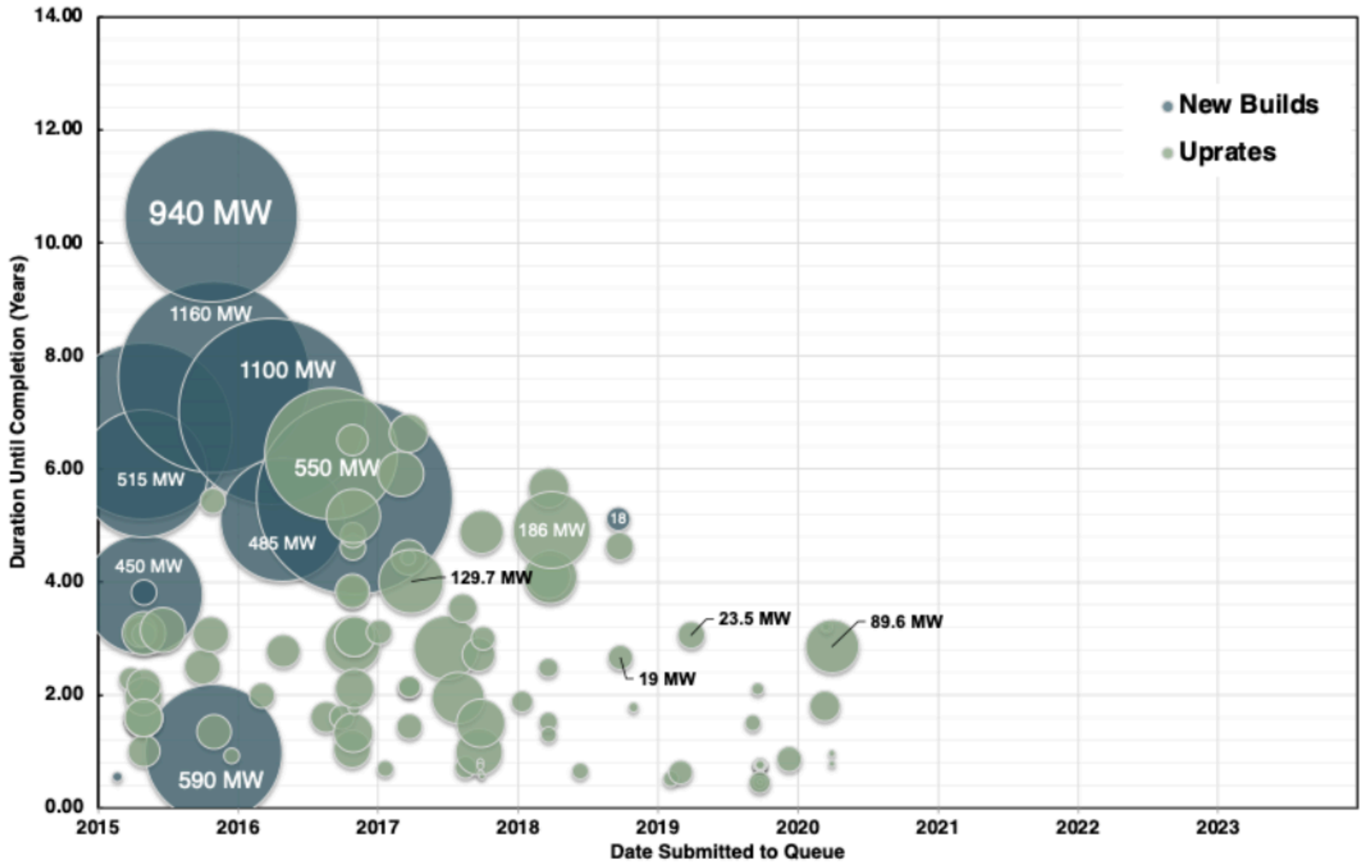

Figure 2. In-Service Natural Gas. Gas-fired generators that are in service at the beginning of 2026 based on the year in which the project entered the interconnection queue. Bubble size is scaled to the size of the project, with dark blue representing new build projects and green representing uprates.

Findings:

No in-service gas plants **larger than 18 MW** have been submitted to the queue in the past 8 years.

⇒ This trend is emblematic of queue backlogs characteristic of PJM in recent years.

91% of gas projects to reach completion in recent years were **uprates to existing plants**.

⇒ This suggests that uprates to existing plants face fewer delays and are easier to reach commercial operation.

No gas projects **submitted after March of 2020** have reached in-service status.

⇒ This is in part attributable to PJM's de facto freeze on interconnection requests that went into effect in 2022, as well as post-Ukraine and pandemic supply chain challenges and historically low-capacity market prices pre-2025.[22]

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[22] "PJM Plans for a Two-Year Pause on Reviewing Project Applications." Institute for Energy Research, February 22, 2022. https://www.instituteforenergyresearch.org/the-grid/pjm-plans-for-a-two-year-pause-on-reviewing-project-applications/.

COMPLETED PROJECT TIMELINES: ENERGY STORAGE

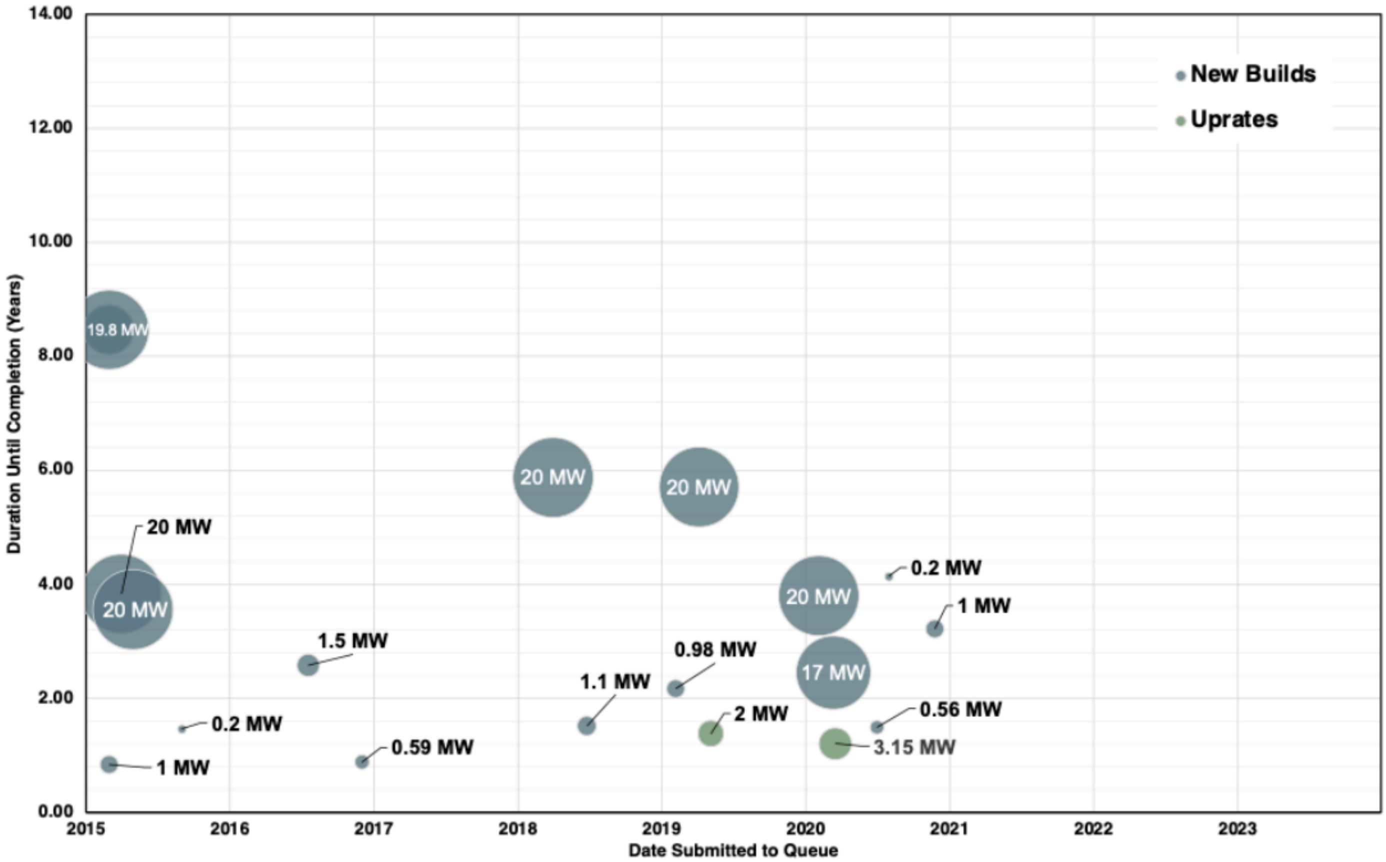

Figure 3. In-Service Storage. Storage projects that are in service as of 2025 based on the year in which the project entered the interconnection queue. Bubble size is scaled to the MFO of the project, with dark blue representing new build projects and green representing uprates. Note that two of the new build projects represent the construction of storage equipment alongside existing generating facilities, while the rest represent the construction of standalone storage facilities. Additionally, while bubble size correlates to MFO, the actual capacity additions of these projects are generally small with an average addition of 1.5 MW capacity. Moreover, some projects do not directly identify the amount of MW MFO attributable to storage rather than associated generation facilities. Thus, the exact numerical MW MFO for each project might not be completely accurate but rather provides a general estimate for the scale of the projects.

Findings:

*Of the few storage projects that reached markets, there were **none over 20 MW** over the full analysis period.*

⇒ No storage projects of significant size have reached markets in the PJM region.

IN-PROGRESS PROJECT ESTIMATED TIMELINES: NATURAL GAS

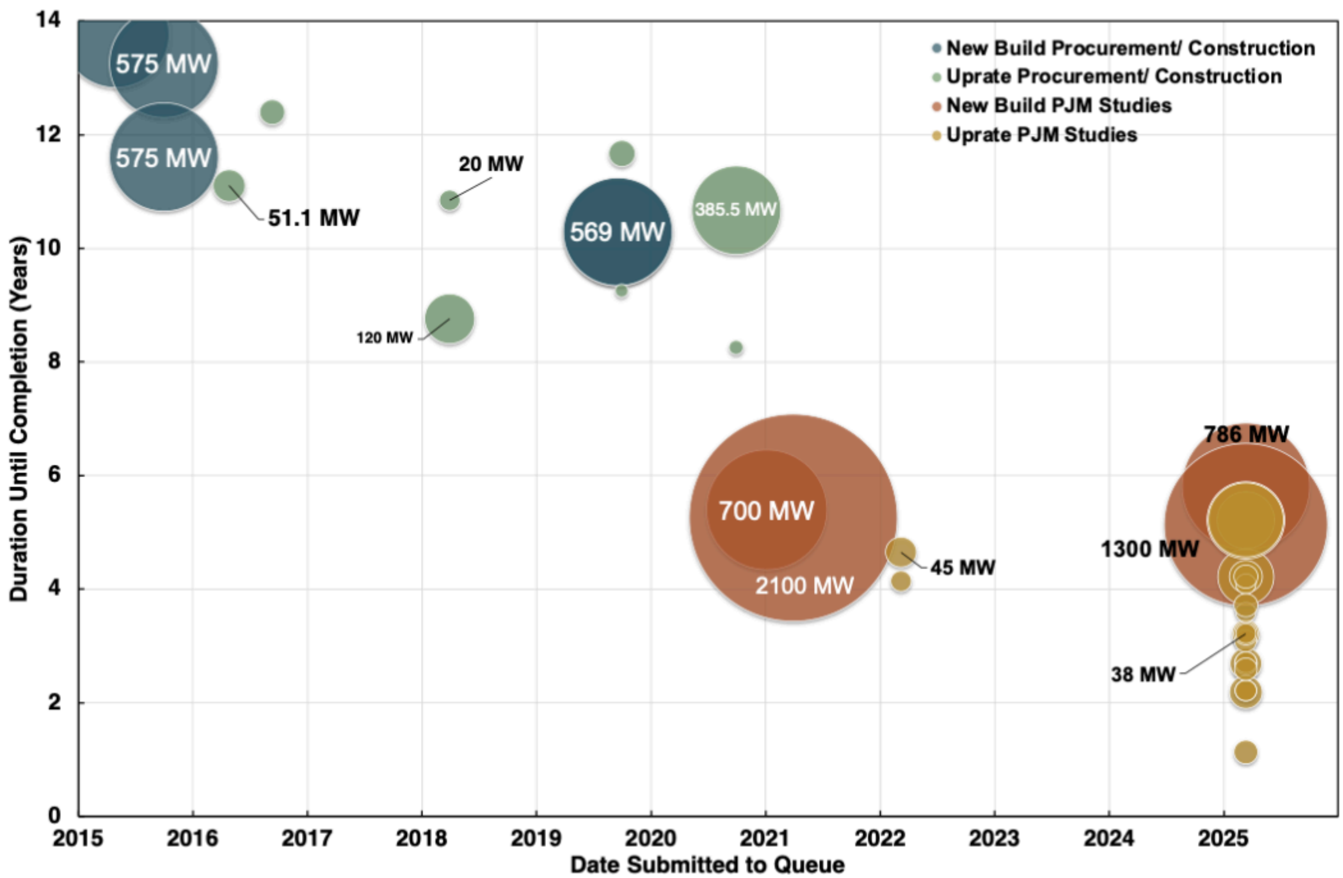

Figure 4. In-Progress Gas. Gas-fired generators that have yet to reach commercial operation as of 2025, based on the year in which the project entered the interconnection queue. Bubble size is scaled to the size of the project. Dark blue (new builds) and green (uprates) indicate projects that have completed initial study phases and are currently in procurement or construction. Orange (new builds) and yellow (uprates) denote projects still in early study phases. This graph includes both Serial Service Request Status data and Cycle Service Request Status data.

Findings:

63% of in-progress gas projects remain in procurement/construction phases.

⇒ For most backlogged gas projects, barriers to completion are associated with transmission infrastructure, equipment procurement or construction of the plant itself.

Nearly across the board, gas projects in procurement/construction phases are expected to take more than 8 years to reach completion.

⇒ These projects total 4,528.6 MW of backlogged capacity, thus while there are relatively few projects in-progress, they represent a significant amount of capacity.

⇒ However, even if every non-RRI project in the queue were to be successful, it still does not erase the 6 GW deficit PJM anticipates by 2027.

IN-PROGRESS ESTIMATED PROJECT TIMELINES: ENERGY STORAGE

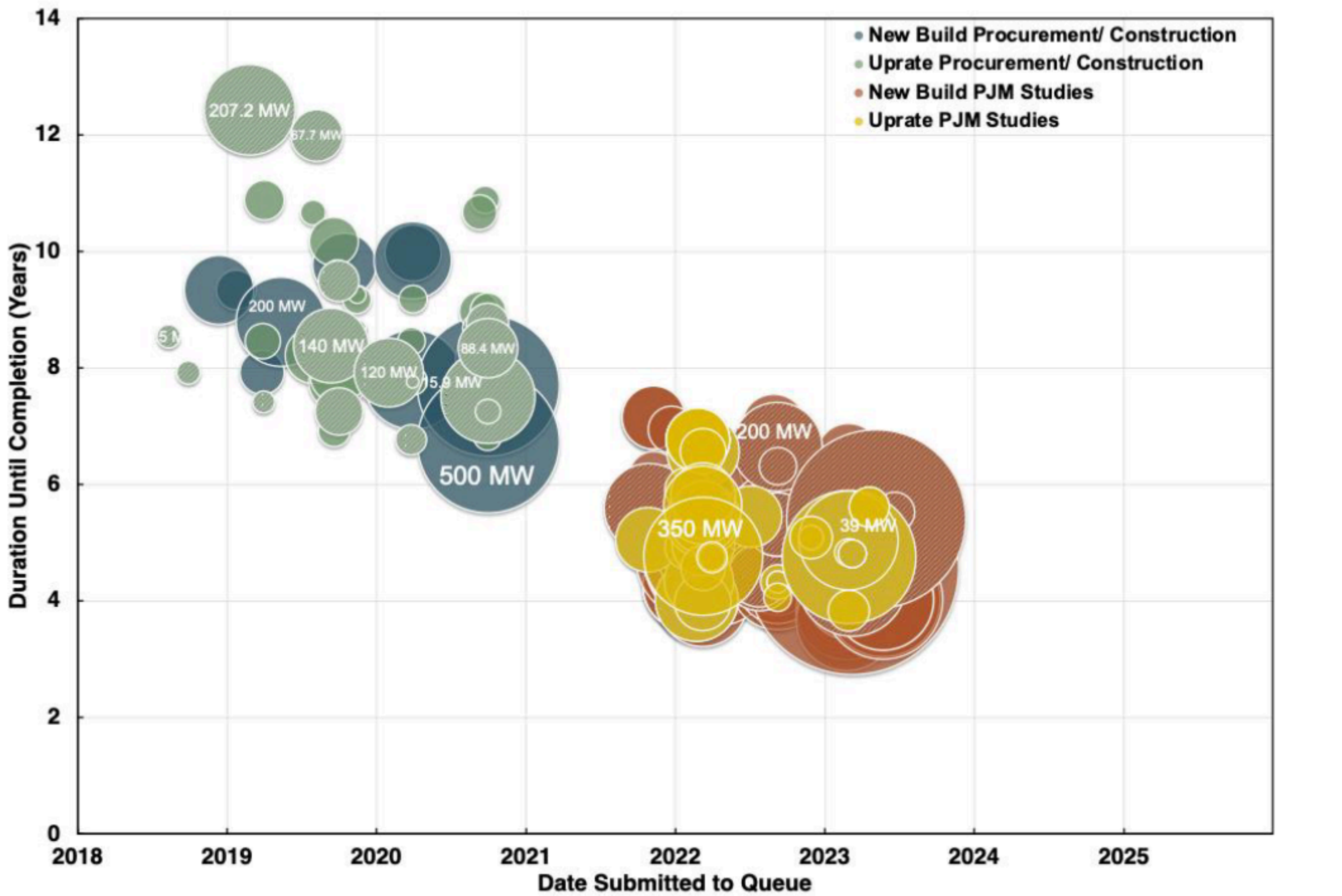

Figure 5. In-Progress Storage. Storage projects that have yet to reach commercial operation as of 2025, based on the year in which the project entered the interconnection queue and developer estimates of expected in-service dates. Bubble size is scaled to the MW capacity of the project. Note that the queue does not always directly identify the amount of MW MFO attributable to storage rather than associated generation facilities, thus totals might not be completely reflective of the relative contributions of the actual storage facilities. Dark blue (new builds) and green (uprates) indicate projects that have completed initial study phases and are currently in procurement or construction. Orange (new builds) and yellow (uprates) denote projects still in early study phases. Hashed datapoints denote hybrid solar/storage projects. This graph includes both Serial Service Request Status data and Cycle Service Request Status Data.

Findings:

There is a tremendous amount of interest in developing energy storage post-2020, totaling nearly 63 GW.

⇒ The massive interest in storage capacity coincides with the slowing of the PJM queue, resulting in relatively few storage resources having reached commercial operation in PJM.

*28% of storage projects submitted to the queue after 2014, totaling **73 GW MFO**, have yet to reach in-service status.*

⇒ The remaining ~72% are either in-service (2%), withdrawn, deactivated, cancelled, or suspended (70%), There is a massive backlog of storage capacity that remains in the PJM queue.

*86% of in-progress storage projects remain in **the PJM study phase.***

⇒ For most backlogged storage projects, PJM has the lead role in the schedule and the work.

HOW GOOD ARE DEVELOPERS AT PREDICTING TIMELINES?

One of the most critical issues for policymakers is understanding how accurate generation developers are at predicting when their projects will come online. This is particularly important as we prepare for a sharp rise in data center load, which has the potential to undermine the reliability of the PJM grid if new generation supplies do not show up as expected. In general, our analysis suggests that developers have a relatively poor record of predicting their in-service dates, based on the projected in-service dates included in their original interconnection submissions versus when they actually came online. Much of this disparity can be attributed to delays in the PJM queue, but it emphasizes how difficult it can be to accurately predict when a project will come online.

Projects in procurement/ construction phases ***categorically have longer estimated completion timelines*** *compared to those undergoing PJM studies.*

⇒ The average projected duration for natural gas projects supplied by the developer of those projects is 5 years at the beginning of the PJM interconnection study process. By contrast, the average projected duration for projects that have completed the study process is more than twice as high, at nearly 11 years.

In-progress natural gas projects that have completed the study phase spent, on average, ***7 years in the study phase****. Construction and procurement is expected to add an* ***additional 4 years*** *to the project duration, on average.*

There is a marked shift in expected in-service dates once a project completes the facilities study phase of the interconnection process, signs the final generator interconnection agreement, and transitions over to construction and procurement. This suggests that PJM and developers are using the completion of the facilities study as a time to “refresh” construction estimates once the facilities study phase is completed.

While pinning down the exact cause of this disparity is outside the scope of this project, the PJM system is seeing a need for extensive amounts of new transmission infrastructure, which often adds years to a project’s timeline and is largely outside the control of the developer.

Siting and permitting delays or equipment availability may also be contributing to the longer timelines that appear once a project has signed its generator interconnection agreement, along with supply chain, business concerns, or other equipment procurement issues that are stalling project completion.

The apparent distinction in timelines suggests that estimations provided in early *project phases are* ***likely to be underestimates****.*

⇒ Delays within the study process or other late-stage delays, such as transmission construction delays, equipment procurement, or other supply chain backups, might be underestimated in early stages.

DISCUSSION

Pervasive consumer cost spikes have made headlines and become a hotly debated political topic. A recent analysis conducted by the PJM Independent Market Monitor highlighted the outsized impact of data centers on energy prices across the country, finding a 267% increase in electricity costs for a single month compared to five years ago in areas proximate to data centers.[23] In fact, Politico has identified energy prices as a "top issue" in the New Jersey gubernatorial race[24] and the New Jersey legislature recently introduced a bill to build new natural gas on a cost-of-service basis.[25] The relevance of this issue and its impact on people's lives is apparent through its relevance in mainstream media and political culture.

Our analysis of gas historical development timelines suggests that – without radical policy reforms – natural gas projects are best viewed as long-term investments that are likely to come online post-2030. This challenges the notion that new gas-fired generation will arrive in time to resolve the reliability crisis facing PJM between now and 2030. Gas projects submitted in the past several years that have come online provide shallow capacity additions relative to the 50,000 MW of load growth expected over the next 10 years.[26] Our research suggests that states looking for immediate sources of new capacity may wish to prioritize uprates to existing facilities, although recognizing that uprates are typically smaller than new generation.

We also wanted to explore whether states with aggressive clean energy policies are seeing longer timelines for natural gas developments. To examine this idea, we compared the relative durations and sizes of natural gas projects in states that lean into fossil-fuels, versus those with more comprehensive renewable energy targets submitted in 2005 or later. In these analyses, the first category includes Pennsylvania, Ohio, West Virginia, Virginia, and Kentucky, and the latter includes

[23] PJM Independent Market Monitor. "PJM CIFP Proposal," October 9, 2025. https://www.pjm.com/-/media/DotCom/committees-groups/cifp-lla/2025/20251024/20251024-item-04g---imm-memo.pdf.

[24] "E&E News: New Jersey Gubernatorial Race Tightens as Power Bills Jolt Voters," September 29, 2025. https://subscriber.politicopro.com/article/eenews/2025/09/29/new-jersey-race-tightens-as-power-bills-jolt-voters-00582972.

[25] *See* Assembly Bill 6190, https://www.njleg.state.nj.us/bill-search/2024/A6190/bill-text?f=A6500&n=6190_I1.

[26] PJM Resource Adequacy Planning Department. "PJM Load Forecast Report 2024," January 2024. https://www.pjm.com/-/media/DotCom/library/reports-notices/load-forecast/2024-load-report.pdf.

Maryland, Illinois, New Jersey, Delaware, and Michigan. As shown in Table 1, there is a slight difference among the groups, with the states we characterize as relatively fossil fuel-friendly are slightly faster at bringing projects online. However, the relatively small difference suggests that state-level clean energy targets are not well correlated with delays in bringing new fossil fuel projects online.

Table 1. Natural Gas Project Statistics for Fossil Fuel Friendly States and States with Renewable Energy Targets

		Renewable Energy Target States	Fossil Fuel Friendly States
New Builds	Number of Projects	23	36
	Average Duration (Years)	5.65	4.91
	Standard Deviation Duration (Years)	2.01	2.06
	Average Project Size (MW MFO)	510	624
Uprates	Number of Projects	88	140
	Average Duration (Years)	2.95	2.35
	Standard Deviation Duration (Years)	1.96	2.03
	Average Project Size (MW Capacity)	28.2	44.4

Additionally, we investigated the relative efficiencies of development in states in which the utility is vertically integrated, and states in which the utility has been restructured such that generation is separated from transmission and distribution, but there were insufficient data to draw meaningful conclusions.

Effective decision-making for energy planning must prioritize the rate at which projects can reach markets. The analysis of in-progress projects highlights a potential trend of broad underestimation of project timelines, particularly in early stages. The pattern observed of shorter timelines for early-stage projects is emblematic of the uncertainties associated with subsequent procurement and construction phases, which are expected to become more pronounced in coming years. Recent load growth has entailed significant stress on power plant equipment supply chains, which is not only lengthening wait-times for critical components but placing significant upward pressure on prices.[27] From turbines, transformers, switchgear components, and even steel costs for pipeline construction, nearly all key components of natural gas plants have become more expensive, rendering these projects increasingly less economically attractive.[28]

The changing economics of natural gas have greatly impacted energy development in various parts of the country. Notably, Texas's ambitious plans to support their strained power grid through natural gas have yielded limited results. Of the $7.2 billion earmarked by the Texas Energy Fund, $2.65 billion has been used to fund 29 selected gas project proposals. Additionally, these projects will provide only 3,564 MW capacity, a small number relative to the roughly 62,500 MW additional projected energy demand for the region by 2030.[29] Cited issues include the supply-chain challenges mentioned in the paper, as well as forecasted changes in the profitability of gas plants.[30]

For storage projects, significant backlogs of projects in the queue, protracted timelines, and modest sizes of completed storage projects suggest that there is a great deal of commercial interest in storage in the PJM region, but that PJM has not successfully emerged from its queue backlog. The low storage penetration is particularly striking compared to other regions of the country, such as ERCOT, where there is already more than 19,000 MW-hours of battery energy storage installed and storage + solar facilities are playing an increasing role in keeping the lights on.[31] Notably, about two-thirds of the battery additions in ERCOT have happened since 2019,[32] suggesting that the national boom in batteries occurred during years in which the PJM queue was largely paralyzed.

Uncertainty surrounding trade barriers injects further ambiguity into future prices and timelines. However, the backlogs in gas turbine supply chains are likely to be more immediately impactful to project timelines, thus storage is likely to play a critical role in addressing near-term resource adequacy goals. In fact, a report from the Brattle Group predicts that 16 GW of storage deployment will be needed in PJM by

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[27] Anderson, Jared. "US gas-fired turbine wait times as much as seven years; costs up sharply." S&P Global, May 20, 2025. Accessed July 11, 2025. https://www.spglobal.com/commodity-insights/en/news-research/latest-news/electric-power/052025-us-gas-fired-turbine-wait-times-as-much-as-seven-years-costs-up-sharply.
[28] Besuner, Phil. "The New Reality of Power Generation." GridLab, September 2025.
[29] "The Texas Energy Fund." Public Utility Commission of Texas, December 19, 2025. https://www.puc.texas.gov/industry/electric/business/texas-energy-fund/.
[30] Cobler, Paul. "Texas Loan Program to Boost New Power Plants Faces Headwinds." The Texas Tribune, August 26, 2025. https://www.texastribune.org/2025/08/26/texas-energy-fund-natural-gas-power-plants/.
[31] Garrett Golding and Reid Taylor, Federal Reserve Bank of Dallas, "Batteries, solar help keep the lights on in Texas but more needed," November 5, 2025. https://www.dallasfed.org/research/economics/2025/1104-golding-grid#:~:text=Notably%2C%20the%20power%20supply%20situation,of%20wholesale%20electricity%20price%20spikes.
[32] *Id.*

2032. Storage is also critical to maintaining affordability, as without adequate storage resources, higher-cost alternatives will be used, raising customer costs as much as 30%.[33]

Overall, policymakers approaching energy development must be astute to these realities of development timelines. At the forefront of what some describe as the second industrial revolution, traditional methods of energy development require evidence-based review. From increasingly uncertain project development timelines, to the eroding profitability of gas plants, to worsening equipment procurement delays, these emerging trends must be carefully considered by policymakers hoping to address reliability and affordability.

GLOSSARY

Active	Project is undergoing studies with PJM. PJM has the lead role in the schedule and work. [21]
In-Service	Project has completed the study process, is constructed and currently operating. [21]
Partially in Service	Under Construction: a project that completed the study process and constructed the facility, but cannot operate fully. This can be due to a phased construction (operating half of the planned wind turbines) or the ability to operate in a limited capacity while transmission owner completes the required transmission system enhancements. [21]
Under Construction	The study phases are complete and the customer is actively constructing the facilities and transmission owners are constructing any required transmission system enhancements (network upgrades). [21]
Engineering and Procurement	A project that has completed the study process, obtained a final agreement (ISA, WMPA, or GIA) and in the early implementation phases with detailed design and equipment procurement. [21]

[33] Sheilendranath, Akarsh, Kate Peters, Johannes Pfeifenberger, Audrey Yan, and The Brattle Group. "Outlook for Energy Storage in PJM." Report. The Brattle Group, October 9, 2025. https://cdn.prod.website-files.com/666b00bb91a866df89c4f469/68e6dae68726c2106670aefa_PJM-Storage-Report_10.08.2025.pdf.

Suspended	A project that completed the study process and obtained a final agreement; however, the customer has requested to pause all work. Customers can enter and exit suspension as often as they like, but the aggregate duration cannot exceed 3 years. [21]
Deactivated	A project that completed the study process, constructed, operated in the market and later requested to deactivate the facility. [21]
Withdrawn	Has multiple categories: CIW: Customer Initiated Withdrawn, CMN: Customer Milestone Not Met, QNR: Queue Not Required, WBSD: Withdrawn Before Study Due. [34]
MFO	Maximum Facility Output: the nameplate capability of the generator.[34]
MW Energy	Relates to the nameplate capability of the generator. This value will be equal to the MFO for a new facility. For an increase in capability, this value will reflect how much additional nameplate capability will be added. [21]
MW Capacity	The amount of Capacity Interconnection Rights requested with the interconnection request. [21]
Capacity Interconnection Rights	The rights to input generation as a capacity resource – as defined in the Reliability Assurance Agreement (RAA) – – into the transmission system at the point of interconnection where the facility connects to the PJM transmission system.[35]
Uprate	An increase in the capacity of an existing generation resource

[34] PJM Interconnection, "Serial Service Request Status."
[35] Jason Quevada, "Capacity Interconnection Rights (CIR) Education," *PJM Resource Adequacy Planning*, 2021, https://www.pjm.com.

APPENDIX

Table A1: Ratios of Projects Completed and In-Progress

Fuel Type	Percentage of All Projects In-Service	Percentage of All Projects In-Progress
Natural Gas	77%	23%
Storage	3%	97%

Note: For in-progress projects, this includes projects that have projected in-service dates that have passed.

Table A2: In-Service Natural Gas Project Summary Statistics

	New Build	Uprate
Total Number of Projects	11	95
Average Duration Until Completion (Years)	4.74	2.35
Median Duration Until Completion (Years)	5.12	1.98

Table A3: In-Progress Natural Gas Projects Summary Statistics

		New Build	Uprate
Number of Projects	Engineering and Procurement	4	6
	Under Construction	1	-
	Partially In Service - Under Construction	1	2
	Active	4	9
Average Duration Until Completion (Years)	Engineering and Procurement	11.5	10.5
	Under Construction	11.6	-
	Partially In Service - Under Construction	10.3	9.93
	Active	5.4	2.05
Median Duration Until Completion (Years)	Engineering and Procurement	11.0	10.8
	Under Construction	11.6	-
	Partially In Service - Under Construction	10.3	9.93
	Active	5.33	2.59

Note: This excludes in-progress projects in which the projected in-service date has passed as of January 2026.

Table A4: In-Service Storage Projects Summary Statistics

		New Build	Uprate
Storage	Number of Projects	1	3
	Average Duration Until Completion	3.8	2.30
	Median Duration Until Completion	3.80	1.38
Solar Storage	Number of Projects	-	6
	Average Duration Until Completion	-	1.76
	Median Duration Until Completion	-	1.36
Wind Storage	Number of Projects	-	1
	Average Duration Until Completion	-	7.34
	Median Duration Until Completion	-	7.34

Table A5: In-Progress Storage Projects Summary Statistics

		New Build	Uprate
Number of Projects	Engineering and Procurement	8	28
	Under Construction	1	1
	Partially In Service - Under Construction	-	-
	Active	42	24
Average Duration Until Completion (Years)	Engineering and Procurement	9.14	9.41
	Under Construction	8.80	7.11
	Partially In Service - Under Construction	-	-
	Active	5.33	5.67
Median Duration Until Completion (Years)	Engineering and Procurement	9.34	8.69
	Under Construction	8.80	7.11
	Partially In Service - Under Construction	-	-
	Active	5.31	5.59

Note: This excludes in-progress projects in which the projected in-service date has passed as of January 2026.

Table A6: In-Progress Solar-Storage Projects Summary Statistics

		New Build	Uprate
Number of Projects	Engineering and Procurement	2	21
	Under Construction	-	5
	Partially In Service - Under Construction	-	-
	Active	51	53
Average Duration Until Completion (Years)	Engineering and Procurement	8.93	7.64
	Under Construction	-	7.16
	Partially In Service - Under Construction	-	-
	Active	4.17	3.65
Median Duration Until Completion (Years)	Engineering and Procurement	8.93	7.88
	Under Construction	-	8.55
	Partially In Service - Under Construction	-	-
	Active	5.31	4.81

Note: This excludes in-progress projects in which the projected in-service date has passed as of January 2026.

Table A7: Natural Gas Projects in Procurement/Construction Phase

Project ID	PJM Study Duration (Years)	Projected Procurement/ Construction Duration (Years)	Total Duration (Years)
AA2-119	10.19	3.57	13.77
AB1-088	10.62	2.64	13.26
AF1-129	4.79	5.50	10.29
AB1-087	10.62	2.64	13.26
AF1-128	6.26	4.04	10.29
AC1-055	8.83	3.57	12.40
AD2-192	7.27	3.57	10.85
AF2-004	5.39	6.28	11.67
AF2-005	5.32	3.94	9.26
AG1-500	4.39	6.28	10.67
AG1-501	4.32	3.94	8.26
AB2-092	9.72	1.38	11.10
AD2-194	7.83	0.93	8.76
Average:	**7.31**	**3.95**	**11.26**

Table A8: Data Omission

No other date available other than submitted date		
AG2-072 - moved to TC2	AH1-703 - moved to TC2	AH1-693 - moved to TC2
AG2-562 - moved to TC2	AH1-704 - moved to TC2	AH1-694 - moved to TC2
AG2-582 - moved to TC2	AH1-706 - moved to TC2	AH1-696 - moved to TC2
AH1-108 - moved to TC2	AH1-711 - moved to TC2	AH1-699 - moved to TC2
AH1-567 - moved to TC2	AH1-712 - moved to TC2	AH1-701 - moved to TC2
AH1-677 - moved to TC2	AH1-715 - moved to TC2	AH1-124
AH1-678 - moved to TC2	AH1-718 - moved to TC2	AH1-725
AH1-679 - moved to TC2	AH1-719 - moved to TC2	AH1-712
AH1-680 - moved to TC2	AH1-721 - moved to TC2	AH1-723
AH1-681 - moved to TC2	AH1-722 - moved to TC2	AH1-696
AH1-682 - moved to TC2	AH1-723 - moved to TC2	AH1-260
AH1-683 - moved to TC2	AH1-734 - moved to TC2	AH1-542
AH1-684 - moved to TC2	AH1-744 - moved to TC2	AG2-420
AH1-685 - moved to TC2	AH1-673	AH1-220
AH1-686 - moved to TC2	AH1-541	AG2-270
AH1-687 - moved to TC2	AH1-543	AH1-716
AH1-691 - moved to TC2	AH1-165	AH1-125
AH1-692 - moved to TC2	AG2-380	AH1-727

AH1-128	AH1-127	
Submitted date after projected in-service date		
AC1-038	AI2-285	AI2-283
AC2-172	AI2-286	AI2-284
AD2-167	AI2-287	AI2-226
AI2-280	AI2-288	AI2-289
AI2-282		
Uprate with capacity = 0 MW		
AH2-181	AE2-062	AA2-082
AH2-252	AF1-019	AA2-123
AF1-325	AG1-044	AB1-063
AF1-328	AG2-050	AC1-025
AF2-404 - moved to TC1	AA2-066	AD2-205
AE1-243	AA2-079	AG1-148
AH2-385	AB1-015	AD2-213
AI2-006	AB1-116	AE1-060
AI2-007	AB1-119	AE2-183
AI2-054	AC1-021	AE2-184
AA2-048	AE1-221	AF2-168
AA2-060	AA2-061	
Projected in-service date has passed		
AE2-156 - moved to TC1	AJ1-023	AH1-223
AH2-075	AD1-039	AH1-125
AH2-107	AH1-563	AH1-727
AH2-127	AG1-460	AG2-341
AH2-244	AF2-441	AG2-518
AH2-245	AH1-673	AH1-314
AH2-259	AH1-541	AG2-272
AI2-044	AG2-524	AG2-566
AI2-045	AG2-061	AH1-127
AF2-396 - moved to TC1	AF2-319	AH1-128
AH2-013	AF2-226	AH1-124
AH2-076	AG2-660	AH1-269
AH2-258	AH1-543	AG2-086
AI1-106	AG2-544	AG2-360
AI1-128	AG2-545	AH1-263

AI1-211	AG2-675	AH1-251
AI1-212	AH1-165	AG2-661
AI1-213	AH1-564	AG2-339
AH2-015	AG2-370	AG2-436
AH2-031	AG2-519	AG2-426
AH2-048	AG2-332	AH1-461
AH2-049	AG2-248	AE2-156
AH2-050	AG2-345	AG1-341
AH2-051	AG2-343	AG2-424
AH2-072	AG2-191	AH1-567
AH2-246	AG2-192	AG2-562
AH2-332	AG1-447	AH1-701
AH2-333	AF2-407	AH1-699
AH2-334	AH1-302	AH1-704
AH2-335	AH1-482	AH1-678
AH2-378	AG2-551	AH1-677
AH2-378A	AG2-126	AH1-108
AH2-420	AG2-014	AH1-567
AH2-421	AG2-492	AG2-562
AH2-422	AH1-261	AH1-701
AH2-423	AH1-552	AH1-699
AI1-086	AG2-380	AH1-704
AI1-087	AF2-396	AH1-678
AI1-088	AF1-176	AH1-677
AI1-089	AF1-161	AH1-108
AI1-149	AE2-325	AI2-281
AI2-010	AG1-109	AI2-231
AJ1-038	AG2-238	AI2-231A
AE2-040	AH1-091	AI2-311
AH2-028	AG2-121	AI2-318
AH2-045	AH1-260	AI2-483
AH2-093	AF1-238	AF1-176 - moved to TC1
AH2-253	AG2-548	AH2-043
AH2-267	AG2-665	AH2-104
AH2-268	AG2-106	AH2-151
AI1-100	AG2-107	AH2-153
AI1-114	AH1-542	AH2-154
AI1-115	AF2-376	AH2-197
AF2-226 - moved to TC1	AG2-289	AH2-256
AF2-319 - moved to TC1	AG2-290	AH2-344
AF2-376 - moved to TC1	AG1-411	AH2-346
AF2-441 - moved to TC1	AG2-329	AH2-408

AG1-411 – moved to TC1	AG2-621	AH2-409
AG1-447 – moved to TC1	AG1-090	AH2-410
AG1-460 – moved to TC1	AG2-429	AH2-411
AH2-056	AG1-548	AI1-039
AH2-086	AH1-206	AI1-127
AH2-087	AH1-249	AI1-129
AH2-088	AG2-420	AI1-175
AH2-090	AH1-535	AI1-214
AH2-131	AG2-571	AI1-215
AH2-132	AH1-221	AI1-216
AH2-150	AF2-404	AI1-217
AH2-288	AH1-098	AI2-030
AH2-289	AG2-384	AI2-274
AH2-290	AG2-088	AI2-401
AH2-347	AH1-220	AF2-378
AH2-377	AG2-182	AG1-090 – moved to TC1
AH2-390	AG2-288	AF2-379
AH2-395	AG2-300	AI2-004
AI2-015	AH1-145	AI1-112
AI2-227	AG2-270	AI1-165
AI2-228	AG2-240	AI1-192
AI2-229	AH1-216	AH2-106
AI2-230	AH1-716	AH2-111
AI2-020	AI2-022	
Reason for Exclusion: Change in Fuel Type		
AB1-144		
Reason for Exclusion: Duplicate		
AF1-026		