



The Storage Solution:

How Batteries Can Enhance Grid Reliability, Affordability, and Decarbonization in the Data Center Era

October 2026

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Acknowledgments

Many thanks to Melissa Birchard, Kate Zyla, Pete Rafle, Alex Hopkins, and Tim Profeta for their constructive feedback and insightful comments that improved this paper.

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The Georgetown Climate Center (GCC) was launched in 2009 at the request of state leaders who recognized the need to strengthen connections between climate policies and policymakers at all levels of government. Part of Georgetown Law, GCC serves as a resource to state, federal, and local policymakers who are working to develop policies to reduce greenhouse gas pollution and become more resilient to the effects of climate change.



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Executive Summary

Widespread deployment of energy storage systems offers myriad benefits that can help to address grid reliability, affordability, and climate challenges posed by data center buildout. Rising electricity demand in the United States complicates efforts to reduce greenhouse gas emissions and address climate risks, while also raising cost and grid stability issues. Driven largely by rapid the buildout of data centers to serve AI applications, by 2030, U.S. power sector emissions could be as much as 28 percent higher than they would have been without additional data center development.¹ Our energy system is at a key inflection point, and the decisions made by policymakers, utilities, and hyperscalers about how to meet large load growth will be critical to managing climate and affordability impacts effectively and equitably.

Key potential benefits of energy storage to address these challenges include:

- Rapidly deploying added capacity to the electric grid without the need for expensive power generation or transmission infrastructure construction, thus supporting energy affordability.
- Enabling participation in peak shaving, virtual power plant, and demand response programs for both large loads and residential customers, thus reducing strain on the grid.
- Providing backup power and islanding capabilities for large loads without producing particulate or greenhouse gas pollution, helping to limit climate and air quality impacts.
- Maximizing the value of renewable energy by storing it when it is plentiful and dispatching it onto the grid when renewable generation is scarce.

To fully leverage the benefits that energy storage provides to help meet the large loads challenge, states may need to deploy distinct policy solutions in vertically integrated and restructured regulatory contexts. Potential solutions in vertically integrated states include “Bring Your Own New Clean Energy” (BYONCE) tariffs and integrated planning reforms. For restructured states, potential solutions include enhanced planning coordination, establishment of ambitious energy storage deployment goals, and incremental storage procurement alongside new large loads.

If deployed as part of a suite of policies designed to connect large loads to the grid in a thoughtful way, energy storage can form the foundation for a more resilient, reliable, and distributed power grid. Ultimately, energy storage has the potential to help mitigate many of the risks that data center growth poses to the electricity system.

¹ Jeremiah X. Johnson et al., *Power System Costs and Emissions from Data Center and Cryptocurrency Mining Expansion in the United States*, 21 Env’t Rsch. Letters 114007, 11 (2026), <https://doi.org/10.1088/1748-9326/ae6c3d>.

Background: Energy Storage Can Help Meet the Large Loads Challenge

Energy costs, grid emissions, and reliability challenges are on the rise as large loads proliferate

The U.S. electric system is at a crossroads. Demand for electricity is rising rapidly, with impacts on electricity rates, greenhouse gas emissions, grid reliability, and community health. Data centers are not the only driver of large load growth; factors such as onshoring of manufacturing, semiconductor and chip manufacturing, and vehicle and appliance electrification are also contributing to increased demand on the electric grid. However, very large loads, particularly large-scale data centers used for training artificial intelligence (AI) models or providing inference capacity that models use to respond to prompts in real time, have an outsized impact.² These hyperscale data centers are the largest driver of the unprecedented load growth that is stressing the power grid.³ At the same time, aging, inefficient electric infrastructure is contributing to cost hikes and reliability challenges.

The size and speed of AI data center deployment has upended long-held power sector paradigms, presenting new challenges for grid affordability, reliability, and sustainability. Without policy and regulatory intervention, many of these challenges are on track to become more severe. Recent progress on power sector decarbonization is particularly at risk. Partially in response to data center demand, investment in natural gas has increased dramatically,⁴ and emissions from natural gas-fired power plants are projected to rise by 20 percent by 2030 in response to large loads like data centers.⁵ In addition to system-wide emissions, data centers are also increasing greenhouse gas (GHG) emissions and air pollution in the communities that

² Phill Powell & Ian Smalley, *What Is a Hyperscale Data Center?*, IBM, <https://www.ibm.com/think/topics/hyperscale-data-center>.

³ See Melissa Birchard & Nate Burnand, *State Utility Tariffs: A Tool to Manage Large Load Growth*, 1 (Georgetown Climate Ctr. 2026), <https://www.georgetownclimate.org/articles/issue-brief-state-utility-tariffs.html> (discussing how large loads are driving load growth); see, e.g., Arman Shehabi et al., *2024 United States Data Center Energy Usage Report* 5 (Lawrence Berkeley Nat'l Lab. Dec. 2024), https://eta-publications.lbl.gov/sites/default/files/2024-12/lbnl-2024-united-states-data-center-energy-usag-e-report_1.pdf; N. Am. Elec. Reliability Corp., *2025 Long-Term Reliability Assessment* 6 (Jan. 2026), https://www.nerc.com/globalassets/our-work/assessments/nerc_ltra_2025.pdf.

⁴ Daniel Raimi et al., *Global Energy Outlook 2026: How the World Lost the Goal of 1.5°C* 16 (Res. for the Future, Report No. 26-06, Apr. 2026).

⁵ Christopher Louney, *Natural Gas Powers the Data Center Boom*, RBC Cap. Mkts. (May 14, 2026), <https://www.rbccm.com/en/insights/2026/05/natural-gas-powers-the-data-center-boom>.

host them because of backup diesel generators collocated with data centers.⁶ While there is significant uncertainty about exactly how much large load growth will increase electricity demand, demand has already gone up considerably in many parts of the country, and that trend is expected to continue for the foreseeable future.⁷

Policy changes at the federal and regional levels carry the risk of compounding the emissions impacts of data centers. Increasingly, energy regulators are encouraging or requiring large loads to participate in curtailment programs during times of high electricity demand and incentivize those loads to bring their own capacity.⁸ Large loads often respond by deploying high-polluting resources such as diesel backup generators or natural gas turbines.⁹ For instance, in May 2026, PJM received permission from the U.S. Department of Energy (DOE) to curtail load from data centers during an unexpected rise in electricity demand.¹⁰ Ultimately, PJM did not curtail data center demand. However, had it done so, several gigawatts (GW) of data center electricity demand might have switched to diesel back-up generation. Other policy makers at the state and regional levels have also considered financial incentives and faster grid interconnection if large data centers bring their own power or agree to curtail their demand for electricity when it is scarce.¹¹ If large load curtailment continues to arise as a policy option during spikes in electricity

⁶ Damian Pitt et al., *Modeling Localized Air Pollution Impacts from Data Centers in Northern Virginia* (Va. Commonwealth Univ., Inst. for Sustainable Energy & Env't 2026), https://scholarscompass.vcu.edu/cgi/viewcontent.cgi?article=1003&context=isee_pub.

⁷ *Global Data Centre Electricity Consumption, by Equipment, Base Case, 2020–2030*, Int'l Energy Agency, <https://www.iea.org/data-and-statistics/charts/global-data-centre-electricity-consumption-by-equipment-base-case-2020-2030>.

⁸ See U.S. Department of Energy, Order No. 202-26-23 (May 20, 2026), <https://www.energy.gov/documents/doe-emergency-order-no-202-26-23pdf>; PJM Interconnection, L.L.C., *A Reliability Framework for Rapid Large Load Growth* (Fact Sheet) PJM, <https://www.pjm.com/-/media/DotCom/about-pjm/newsroom/fact-sheets/interim-resource-adequacy-service-proposal.pdf>; Pa. Pub. Util. Comm'n, *Tentative Order*, Docket No. M-2025-3054271, at 39 (Nov. 6, 2025), <https://www.puc.pa.gov/pcdocs/1901687.pdf>.

⁹ Arcelia Martin, *Data Centers' Use of Diesel Generators for Backup Power Is Commonplace—and Problematic*, Inside Climate News (Nov. 12, 2025), <https://insideclimatenews.org/news/12112025/data-center-diesel-generators-noise-pollution/>.

¹⁰ U.S. Department of Energy, Order No. 202-26-23 (May 18, 2026), https://www.energy.gov/documents/doe-emergency-order-no-202-26-23pdf?_sp=ccebd46e-c723-4e84-894e-febc98b7e268.1791215478744.

¹¹ See Fed. Energy Regul. Comm'n, *FERC Launches Aggressive Targeted Action to Speed Large Load Integration* (June 18, 2026), <https://www.ferc.gov/news-events/news/ferc-launches-aggressive-targeted-action-speed-large-load-integration>; PJM Interconnection, L.L.C., *Interim Resource Adequacy Service Proposal: A Reliability Framework for Rapid Large Load Growth* (Aug. 2026), <https://www.pjm.com/-/media/DotCom/about-pjm/newsroom/fact-sheets/interim-resource-adequacy-service-proposal.pdf>; *Interconnection and Tariffs for Large Load Customers*, Docket No. M-2025-3054271, Final Order (Pa. Pub. Util. Comm'n Apr. 30, 2026), <https://www.puc.pa.gov/pcdocs/1929842.pdf>.

demand, it will become increasingly important for policymakers to consider the economic and environmental tradeoffs.

To date, the significant majority of the generation that large data centers have brought to the grid themselves has been powered by natural gas.¹² At present, as much as 48 GW of data center demand may end up being met by behind-the-meter natural gas turbines,¹³ which are connected directly to data centers or other loads and do not have a point of interconnection to the broader electricity system.¹⁴ Additionally, ground has already been broken on large, behind-the-meter natural gas plants that will exclusively serve data centers in Ohio, Texas, and Pennsylvania with nameplate capacities of 9.2, 7.6, and 4.4 GW, respectively.¹⁵ Texas's "GW Ranch" single-cycle natural gas facility alone has been permitted for as much as 33 million tons of CO₂ emissions per year.¹⁶

According to analysis by Cleanview, ***"Data center developers are using anything they can get their hands on....The equipment being deployed is not what utilities typically buy to generate power. Heavy-duty combined-cycle gas turbines—the most efficient option for baseload power—have long lead times and are largely unavailable. Data center developers are instead turning to:***

- *Mobile gas generators strapped to semi trucks*
- *Aeroderivative turbines originally designed for aircraft and warships*
- *Reciprocating engines that ramp fast, but are less efficient*
- *Refurbished turbines acquired from industrial operations"*

Source: <https://cleanview.co/reports/behind-the-meter-data-centers>

¹² Michael Thomas, *Bypassing the Grid: How Data Center Developers Are Building Their Own Power Plants*, Cleanview (Feb. 2026), <https://cleanview.co/reports/behind-the-meter-data-centers>.

¹³ See *Six Things to Know About BNEF's New US Data Center Capacity Outlook* Bloomberg NEF (July 29, 2026), <https://about.bnef.com/insights/data-centers/six-things-to-know-about-bnefs-new-us-data-center-capacity-outlook/> (projecting that 48GW of on-site gas will need to be built by 2035 to meet BNEF's base-case data center demand forecast).

¹⁴ "Behind-the-meter" typically refers to generation resources that provide electricity to a customer without using either the electric distribution or transmission systems. The "meter" refers to the device that measures a utility customer's electricity consumption. Generation resources that rely on the electric distribution system or the transmission to deliver electricity to an end-user are often referred to as front-of-meter resources.

¹⁵ See *Energy Department Announces Partnership to Ensure Affordable Energy and Power America's AI Future*, Dept. of Energy, (Mar. 20, 2026), <https://www.energy.gov/articles/energy-department-announces-partnership-ensure-affordable-energy-and-power-americas-ai>; *Project Overview*, Homer City Redevelopment, <https://www.homercityredevelopment.com/project-overview>; *GW Ranch, Powering the Future of AI. Private-Grid and at Scale*, Pacífico Energy, <https://www.pacificoenergy.com/gw-ranch>.

¹⁶ Letter from Samuel Short, Deputy Director, Air Permits Div., Tex. Comm'n on Env't Quality, to Constantyn Gieskes, Vice President, Pacífico GW, LLC (Jan. 21, 2026),

Fortunately, powering hyperscale data centers with several gigawatts of natural gas at a single site is not an inevitable design architecture. For example, hyperscale data centers can be designed to accommodate AI training workloads that can be shifted both geographically and temporally, moving hyperscaler power consumption away from peak demand on the energy system.¹⁷ Energy storage can enable demand flexibility by allowing hyperscalers to store electricity ahead of time and dispatch it directly to data centers when the broader energy system is short on supply. Some data center developers have already begun to leverage energy storage to enable a more distributed and flexible computational design architecture.¹⁸

Ultimately, whether data centers are powered by drawing electricity from behind-the-meter natural gas turbines backed up by polluting diesel generators or from a combination of storage and renewable energy will be determined largely by the policy, regulatory, and design choices of federal, state, and local policymakers. Widespread renewable energy adoption, enabled in part by aggressive energy storage deployment, offers an alternative pathway to protect grid decarbonization efforts.

This paper focuses on the specific policy choices that leaders in state government can make to unleash storage as a significant part of the solution to the challenges large loads present to the grid.

Energy storage is ready to be part of the solution

A variety of energy storage technologies are commercially available, in different configurations, with distinct grid service capabilities. Storage can be stand-alone or co-located with an end user and may be connected to the distribution system, the transmission system, or directly to homes and businesses behind the meter.

In addition to electrochemical battery storage options such as lithium-ion batteries, other forms of energy storage include pumped hydroelectric storage, thermal energy storage, compressed air storage, and flywheels. Energy storage technologies also continue to emerge and evolve.

The chart below describes some of the energy storage configurations available and their applications to large load users.

https://storage.googleapis.com/data-center-source-files/campuses/572__gw-ranch/2026-01-21_air-permit_psdtx1672-issued-permit-approval-letter.pdf.

¹⁷ Tyler Norris et al., *Rethinking Load Growth: Assessing the Potential for Integration of Large Flexible Loads in US Power Systems*, Nicholas Institute 11 (2025), <https://nicholasinstitute.duke.edu/sites/default/files/publications/rethinking-load-growth.pdf>.

¹⁸ Vaidhynathan et. al, *Vulcan Test Platform: Demonstrating the Data Center as a Flexible Grid Asset*, (Nat'l Lab. of the Rockies June 2025), <https://research-hub.nlr.gov/en/publications/vulcan-test-platform-demonstrating-the-data-center-as-a-flexible-/>.

Figure 1: Different energy storage configurations offer distinct grid benefits

Duration	Configuration	Key Attributes	Large Load Solutions
2-4 hr	Connected to the distribution system 	• Sited at substation/feeder • Serves multiple customers • Fast response • Short duration	• Defers distribution system investment • Peak shaving for feeder-level loads • Voltage support • Short ride-through during outages
	Sited behind the meter and/or co-located onsite 	• Customer-sited and controlled • Fast-responding • Sized to facility load	• Demand response potential • Enables virtual power plants • Short-duration backup during grid disturbances
	Stand-alone, transmission connected 	• Utility-scale • Participates in wholesale electricity markets (capacity, energy, ancillary markets)	• Frequency regulation • May defer transmission upgrades • Adds capacity quickly • Arbitrage in wholesale energy markets
4-24+ hr	Stand-alone, transmission connected 	• Up to full-day duration • Utility-scale • Grid-serving	• Firm capacity for large loads over extended periods • Reduces need for new gas peakers
	Co-located with large load (hybrid) 	• Paired directly with load • May be paired with on-site generation • Capable of islanding from the grid	• Increases grid resilience and reliability • Enables near-24/7 carbon-free matching for the load

Over the past decade, the cost of battery storage has plummeted. The price of lithium-ion batteries has fallen by 99 percent since 1991.¹⁹ As the cost curve for storage technologies has fallen, the economics for different storage applications have shifted as well. Batteries have traditionally participated primarily in regional ancillary services markets. However, energy storage is also beginning to offer a wider array of grid services, such as adding new capacity to supply-constrained wholesale capacity markets, energy arbitrage (storing electricity when prices are low and discharging it when prices are high), and integrating intermittent renewable generation into the grid.

¹⁹ Hannah Ritchie & Pablo Rosado, *Battery Costs Have Declined by 99% in the Last Three Decades, Making Electrified Transport a Reality*, Our World in Data (Mar. 30, 2026), <https://ourworldindata.org/battery-price-decline>.

The changing economics of storage have brought technologies like lithium-ion batteries down in cost to be in line with, or ahead of, many other grid capacity options for meeting new demand from data centers. While new sources of electricity, such as small modular nuclear reactors (SMR), are being explored, the timeline for technology readiness, permitting approvals, and grid interconnection remains uncertain.²⁰ The development of additional natural gas generation facilities also faces major supply chain delays, increasing the value of energy storage as a solution to make better use of existing generation sources. The delays to build new plants are driven in part by a backlog of available turbines, with new customers waiting five to seven years in some cases.²¹ While there is the potential that energy storage technologies like lithium-ion batteries may also face supply chain challenges and concerns about the impacts of critical minerals extraction as the technology scales, energy storage is currently underdeployed and is not experiencing the same types of multi-year supply chain backlogs.²² Because the technology is mature, permitting and construction are less time-consuming and resource-intensive than new generation and transmission infrastructure.

The diversity of configurations represented in these images is, in and of itself, a key attribute of energy storage. Energy storage developers can stack multiple attributes simultaneously and shift operations depending on what the electric system needs the most at any given moment. For instance, a battery storage facility connected to the transmission system can provide resource adequacy in the capacity market while also providing arbitrage services that integrate renewable energy into the grid. Another deployment of battery storage, colocated with a data center behind the meter, could provide ancillary services to the data center while also providing an alternative to diesel backup generators. In a time of uncertain load growth and rapidly evolving technology, the flexibility that storage provides is emerging as a central benefit of the resource. In this paper, we refer to these compounding benefits as the “energy storage value stack.” The figure below illustrates three of the key values that energy storage can offer: affordability, reliability, and clean energy.²³

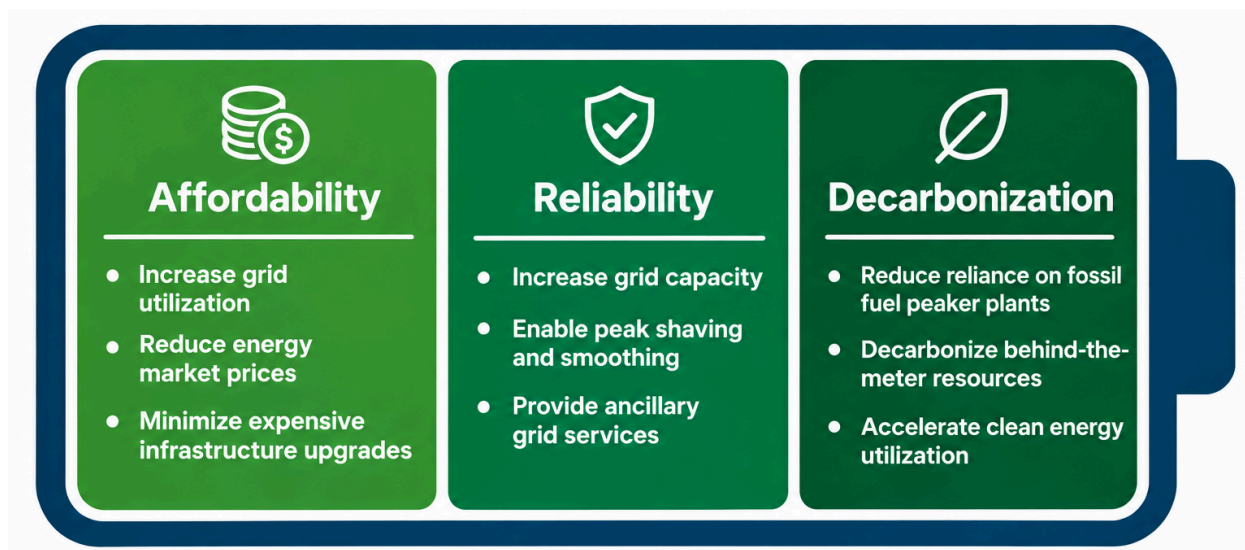
²⁰ *Advantages and Challenges of Nuclear-Powered Data Centers*, U.S. Dep’t of Energy (Apr. 8, 2025), <https://www.energy.gov/ne/articles/advantages-and-challenges-nuclear-powered-data-centers>.

²¹ Aaron Larson, *Gas Turbine Supply Chain Bottlenecks Could Reshape the Generation Mix in 2030 and Beyond*, POWER Magazine (Jan. 15, 2026), <https://www.powermag.com/gas-turbine-supply-chain-bottlenecks-could-reshape-the-generation-mix-in-2030-and-beyond/>.

²² Mattea Mrkusic, *How Battery Storage Can Tackle Load Growth and High Energy Bills*, Evergreen Collaborative (Sept. 15, 2025), <https://www.evergreencollaborative.com/resources/how-battery-storage-can-tackle-load-growth-and-high-energy-bills/>.

²³ Tyler Norris et al., *Rethinking Load Growth: Assessing the Potential for Integration of Large Flexible Loads in US Power Systems*, Nicholas Institute 11 (2025), <https://nicholasinstitute.duke.edu/sites/default/files/publications/rethinking-load-growth.pdf>.

Figure 2. The energy storage value stack



Ultimately, it will take a range of grid capacity additions, energy efficiency improvements, and regulatory reforms to solve the challenges that large loads like data centers bring to the electricity grid. However, energy storage has the potential to be a significant part of the solution. The remainder of this paper focuses on ways that storage can respond to the energy affordability, grid reliability, and clean energy challenges that data centers pose.

The energy storage value stack: Storage as a reliability, affordability, and emissions reduction solution

Energy storage as an affordability solution

Data centers' impacts on energy affordability to date have been mixed, though there is widespread concern that data center proliferation is contributing to rising costs in certain parts of the country. Some utilities, data center developers, and other energy experts have argued that data centers can reduce electricity rates by increasing grid utilization.²⁴ Grid utilization is a broad term, but generally it describes a dynamic by which utilities seek to get more out of the existing

²⁴ *New Brattle Report Finds Better Utilization of Existing Power Grid Could Save US Consumers More Than \$100 Billion in the Next Decade*, Brattle Group (Mar. 2026), <https://www.brattle.com/insights-events/news/new-brattle-report-finds-better-utilization-of-existing-power-grid-could-save-us-consumers-more-than-100-billion-in-the-next-decade/>.

grid before investing in new grid infrastructure.²⁵ Higher levels of grid utilization tend to decrease electricity rates when increased electricity sales outpace new infrastructure buildout, reducing the fixed cost that all ratepayers need to cover when they pay their utility bills.²⁶ Fixed costs, which do not change in the short term as more electricity is consumed by customers—like the cost of building a new power plant—can make up the majority of a customer’s electricity bill.²⁷

This theory of the case for grid utilization has proven to be true for retail electricity prices in places like Indiana and Georgia, where public utility commissions in both states have approved plans to reduce electricity rates primarily as a result of utilities adding new large load customers to their systems.²⁸ However, this beneficial grid utilization story has been demonstrated everywhere that there are data centers. Other factors like tariff structure, distribution system costs, fuel costs, capacity market prices, and interstate transmission costs can outweigh the fixed cost reductions that large loads might bring to the grid.

New large loads, primarily data centers, have also brought new costs to other electricity customers. Increased power consumption from data centers has contributed to record prices facing customers in the country’s largest regional transmission organization (RTO), PJM.²⁹ These record prices are ultimately passed onto customers in the form of wholesale electricity charges on their utility bills. Despite potential affordability gains from grid utilization in the short term, there is a long-term risk that new grid infrastructure built expressly to serve large loads will become stranded. Stranded assets, which lose value before the end of their useful life, are especially risky in the utility context because the risk is externalized to other electricity customers. Once investments are approved, utility companies are still able to collect a reasonable return on those investments. If large loads stop using the assets that are built for them, the financial burden could fall to other customers for years or even decades.

This risk will become especially pronounced if data centers shift from the energy-intensive process of training AI models to inferencing, the process of responding to AI queries, which may

²⁵ *Id.*

²⁶ Linus Beer et al., *Understanding the Drivers of Rising Electricity Rates and the Role of Data Centers* (Energy & Env’t Econ., Inc. May 2026), https://www.ethree.com/wp-content/uploads/2026/05/Understanding-the-Drivers-of-Rising-Electricity-Rates-and-the-Role-of-Data-Centers_E3-2026.pdf.

²⁷ Lisa Wood et al., *Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives* 6 (Lawrence Berkeley Nat’l Lab., Future Elec. Util. Regul. Report No. 5, June 2016), <https://eta-publications.lbl.gov/sites/default/files/lbnl-1005742.pdf>.

²⁸ *I&M Announces Base Rate Reduction for Hoosiers Through Customer Benefits Plan*, Indiana Michigan Power (Feb. 24, 2026), <https://www.indianamichiganpower.com/company/news/view?releaseID=10776>; *Georgia PSC approves plan to lower overall rates, deliver annual savings of \$50 per year for Georgia Power residential customers*, Georgia Power (May 28, 2026), <https://www.georgiapower.com/news-hub/press-releases/georgia-psc-approves-plan-to-lower-overall-rates.html>.

²⁹ *State of the Market Quarterly Report*, Monitoring Analytics, LLC (Aug. 13, 2026), https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2026/2026q2-som-pjm.pdf.

not require as much overall energy, as some energy experts predict will happen.³⁰ Data centers that focus on AI training can demand several gigawatts of electricity, while inferencing-focused data centers typically demand several megawatts. Some data center developers may simply go out of business or shift to other types of economic activity. If the anticipated new load on the system fails to materialize, the utility that owns the infrastructure may still be able to collect a reasonable return on that asset for the remainder of that asset's lifetime, which can be as much as 40 years for some power plants.³¹ If that happens, it will fall to other electricity customers to foot the bill.

Whether or not large loads increase electricity rates depends on what part of the grid they are connected to and the specifics of how that grid interconnection is regulated by state and federal governments. It is up to policymakers to design policies that capture the grid utilization opportunities of large loads while mitigating the risks they bring to the grid. Grid utilization is a measurement of the amount of energy delivered on a given piece of grid infrastructure, such as a transmission line or substation, compared to its total capacity. Because the electricity grid is designed to meet periods of peak demand that generally spike on the hottest and coldest days of a year in a given region, large portions of the electric grid's total capacity sit unused for the majority of the year.³² Sound regulatory policy design will go a long way toward achieving a much higher level of grid utilization, and energy storage is a foundational piece of the physical infrastructure that will allow regulators to maximize the benefits of large electric loads while minimizing the risks they bring to the system.

Energy storage can lock in savings and mitigate cost risks

Energy storage deployment can help maximize the potential for data centers to reduce fixed costs on the grid, all while using clean energy and mitigating the long-term risks.

Storage can do this in three key ways:

1. **Maximize grid utilization:** Grid utilization is emerging as a key strategy to make electricity more affordable. One of the principal challenges to getting the most out of the grid is the system's reliance on inefficient fossil-fuel-fired power plants that are often paid in advance to operate for as little as a few hours a year during peak electricity demand. These plants are aptly called "peaker plants." Reliance on peaker plants decreases grid utilization substantially because electricity customers are forced to pay for an asset that

³⁰ Chhavi Arora, *The Next Big Shifts in AI Workloads and Hyperscaler Strategies*, McKinsey (Dec. 17, 2025), <https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/the-next-big-shifts-in-ai-workloads-and-hyperscaler-strategies>.

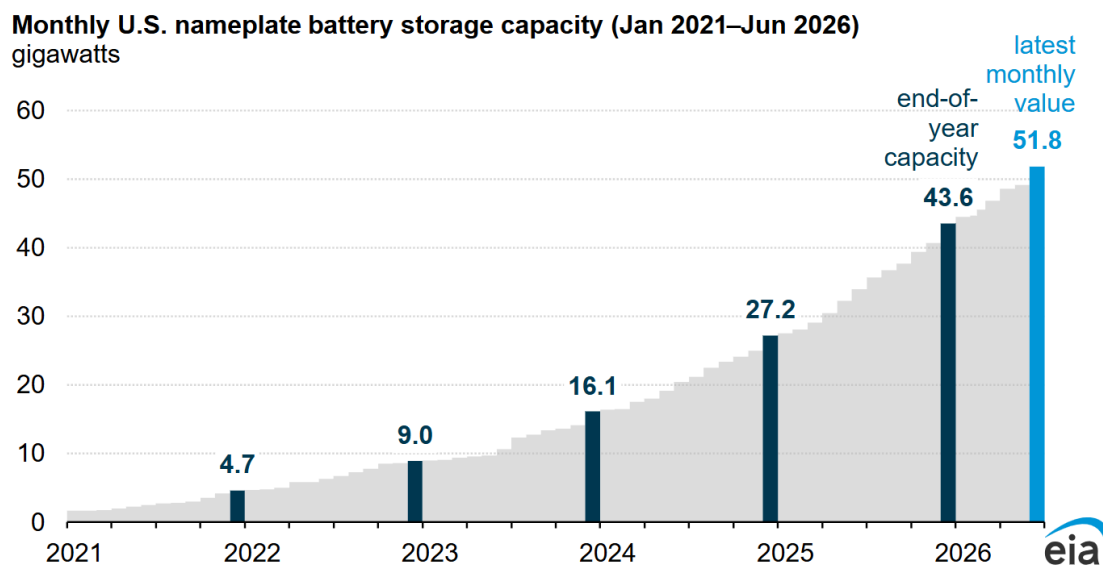
³¹ *Natural Gas at a Glance*, Ctr. for Climate & Energy Sols., <https://www.c2es.org/content/natural-gas/>.

³² Noah Goldmann & Molly Knoll, *Beyond Peak: Defining, Measuring, and Optimizing Grid Utilization* (Utilize Coal. Sept. 2026), <https://static1.squarespace.com/static/690280509e66645927efa39a/t/6ab5d5e014c9c77b16de8e35/1790301664568/Beyond-Peak-Defining-Grid-Utilization.pdf>.

operates at only a fraction of its capacity. Battery storage has become increasingly efficient at storing electrons when renewable energy is abundant and cheap, then dispatching those electrons when demand for electricity goes up, regardless of the immediate availability of intermittent resources like wind and solar.³³ To the extent that additional batteries or other energy storage can meet large load electricity demand instead of new peaker plants, grid utilization will tend to go up.

2. Quickly deploy new grid capacity: Batteries can also reduce costs for electricity customers by increasing the amount of power that the electric grid can reliably deliver. This is especially true when demand for electricity is at its peak. Batteries can do this by adding capacity to the grid quickly, and they are the fastest-growing source of new electric capacity nationally.³⁴ Battery storage has grown the fastest in California and Texas, but is growing rapidly throughout the U.S. in general. As the figure below shows, storage capacity has become an increasingly significant source of grid capacity in the last five years.³⁵

Figure 3. Monthly U.S. nameplate battery storage capacity (Jan 2021–Jun 2026)



Storage can also reduce costs by fully unlocking demand-side resources like virtual

³³ *Battery Energy Storage Systems: Key to Renewable Power Supply-Demand Gaps*, Int'l Renewable Energy Agency (Aug. 27, 2025), <https://www.irena.org/News/articles/2025/Aug/Battery-energy-storage-systems-key-to-renewable-power-s-apply-demand-gaps>.

³⁴ Dennis Wamsted & Seth Feaster, *Solar, Battery Storage to Continue Rapid Growth as Coal and Gas Share of Power Keeps Shrinking*, Inst. for Energy Econ. & Fin. Analysis (Mar. 2, 2026), <https://ieefa.org/resources/solar-battery-storage-continue-rapid-growth-coal-and-gas-share-power-keeps-shrinking>.

³⁵ U.S. Energy Information Administration, *Battery storage capacity averaged 70% growth over the last three years*, Today in Energy (Aug. 7, 2026), <https://www.eia.gov/todayinenergy/detail.php?id=67925>.

power plants (VPP) and allowing data centers to become flexible sources of load.³⁶ To the extent that expanded storage deployment increases the capacity of VPPs, investments in more-costly resources like natural gas power plants could be reduced or avoided entirely. If system costs are reduced due to greater grid utilization, the rate reductions we have observed in Indiana and Georgia may become more significant and widespread.

Deploying energy storage that is directly connected to the source of load, in this case data centers, can also reduce system cost in proportion to load growth. Deploying storage alongside new data centers could allow data centers to store clean energy and briefly disconnect from the grid during peak demand. In a report published last year, the Nicholas Institute found that if new data center load curtailed for just 2.5 hours at annual peak demand, an additional 26 GW of new capacity could be made available.³⁷ Energy storage is a crucial part of the physical infrastructure that will be needed to convert the Nicholas Institute's findings into reality.

3. Reduce risk exposure to other electricity customers: Many affordability advocates and energy experts have raised concerns about the long-term risks that large loads like data centers bring to the grid. Specifically, there is a risk that the infrastructure we build to serve new large loads will become stranded assets later on. Energy storage, deployed correctly, can act as a hedge against that risk. First, the capital costs of energy storage, particularly four-hour lithium-ion battery storage, have been falling, especially in relation to energy resources like solar and natural gas.³⁸ The lower capital costs of energy storage compared to other investments decrease the stranded asset risk that electricity customers face because utility companies can pay down the expense of new storage more quickly than they can the total costs of technologies like nuclear or natural gas generating facilities.³⁹ Additionally, the modular and flexible nature of energy storage technologies like batteries sets them up well to continue to provide value to the grid if demand from data centers falls suddenly or if data centers become smaller and more

³⁶ A virtual power plant (VPP) is a collection of small scale energy resources such as electric vehicle batteries, distributed solar arrays, and smart thermostats, that are aggregated together to provide reliability and economic value to consumers and the grid as a whole. See Kevin Brehm & Liza Martin, *Clean Energy 101: Virtual Power Plants*, RMI (Jan. 10, 2023), <https://rmi.org/resources/clean-energy-101-virtual-power-plants/>.

³⁷ Tyler Norris et al., *Rethinking Load Growth Assessing the Potential for Integration of Large Flexible Loads in US Power Systems*, Nicholas Institute 11 (2025), <https://nicholasinstitute.duke.edu/sites/default/files/publications/rethinking-load-growth.pdf>.

³⁸ *Battery Storage Costs Hit Record Lows as Costs of Other Clean Power Technologies Increased*, BloombergNEF (Feb. 18, 2026), <https://about.bnef.com/insights/clean-energy/battery-storage-costs-hit-record-lows-as-costs-of-other-clean-power-technologies-increased-bloombergnef/>.

³⁹ Wesley Cole et al., *Cost Projections for Utility-Scale Battery Storage: 2025 Update* (Nat'l Renewable Energy Lab., Technical Report No. NREL/TP-6A40-93281, June 2025), <https://docs.nrel.gov/docs/fy25osti/93281.pdf>.

distributed throughout the grid as AI energy use transitions from training to inference.⁴⁰ Energy storage that serves large loads today could be well positioned to serve other large loads — like electrified trucking and buildings or new industries — tomorrow.

Energy storage as a reliability solution

The reliability challenges that data centers pose to the grid fall into two primary buckets. First, increased electricity demand from data centers has elongated periods of peak electricity demand and has pushed up peak demand overall. Second, the way data center operators manage their power usage and the specifics of how they connect and disconnect from the electricity grid can cause voltage disturbances that create a risk of widespread electricity outages.

Peak demand on the electric grid is growing longer in duration and is rising dramatically in many parts of the country.⁴¹ According to the U.S. Energy Information Agency's most recent projections, 2026 and 2027 are both set to see record highs of peak electricity demand on the system.⁴² Data centers are by and large the reason energy experts anticipate increased peak demand on the system year after year.⁴³ At the same time, many aging and inefficient fossil fuel-fired resources are retiring.⁴⁴ The combination of new demand and soon-to-be-retired power plants has led to concerns that data centers will add demand to the electric grid faster than new generation can be built and placed into service.

Additionally, the operational behavior of large data centers on the grid has led to concerns that data centers could cause cascading power outages. Recently, the North American Electric Reliability Corporation (NERC) issued a rarely used Level 3 reliability warning in response to large electric loads suddenly disconnecting from the grid and almost causing widespread power outages.⁴⁵ Data centers are particularly predisposed to this kind of behavior because operators want to protect their valuable graphics processing units (GPU) when the voltage of the electricity

⁴⁰ Yuki Numata et al., *Fast, Flexible Solutions for Data Centers*, RMI (July 17, 2025), <https://rmi.org/resources/fast-flexible-solutions-for-data-centers/>.

⁴¹ Alex Mey, *U.S. Electricity Peak Demand Set New Records Twice in July*, U.S. Energy Info. Admin. (Aug. 5, 2025), <https://www.eia.gov/todayinenergy/detail.php?id=65864>.

⁴² U.S. Energy Info. Admin., *Short-Term Energy Outlook* (Oct. 6, 2026), <https://www.eia.gov/outlooks/steo/>.

⁴³ *Id.*

⁴⁴ N. Am. Elec. Reliability Corp. (NERC), *2025 Long-Term Reliability Assessment* (Jan. 2026), https://www.nerc.com/globalassets/our-work/assessments/nerc_ltra_2025.pdf.

⁴⁵ N. Am. Elec. Reliability Corp., *Essential Action to Industry: Computational Load Modeling, Studies, Instrumentation, Commissioning, Operations, Protection, and Control* (May 4, 2026), <https://www.nerc.com/globalassets/programs/bpsa/alerts/level-3-computational-load-alert.pdf>.

they receive from the grid falls outside of their acceptable range.⁴⁶ Furthermore, many AI data centers train their models simultaneously across multiple campuses, and they have disconnected from the grid simultaneously in the past.⁴⁷ As NERC points out, there is a risk that several gigawatts of data center load disconnecting all at once could throw off the voltage balance of the grid altogether and shut the power off for millions of customers.⁴⁸

Energy storage can bolster grid reliability

Energy storage solutions like batteries are responsive to both resource adequacy and voltage challenges that data centers present to the grid. Storage can shorten peak conditions on the grid and reduce peak demand on the grid overall by enabling large loads to shift their demand for electricity across time and space. Storage can also respond to grid reliability concerns by making the load (like a data center) more flexible. To the extent that storage provides a facility like a data center with behind-the-meter capacity, those loads can flex to behind-the-meter resources when the grid is stressed (e.g., because of high electricity demand, equipment issues, or extreme weather).

Energy storage is among the fastest-growing sources of new capacity on the grid and has allowed places such as Texas to meet record peaks in electricity demand on several occasions.⁴⁹ The practice of energy arbitrage that storage enables is another key benefit of the technologies. Batteries can store energy when intermittent generation sources such as wind and solar power are plentiful and dispatch it during times of high electricity demand. This arbitrage also provides a financial mechanism for battery operators to be compensated for the grid benefits of storage, if enabled by policy and market design.

Storage also provides myriad ancillary services to the power grid. In addition to directly supporting data center facility operations, energy storage may help mitigate frequency impacts, oscillatory behavior, voltage fluctuations, and balancing challenges. When large loads can be added or removed from the power grid suddenly, they risk disruption to the frequency and voltage requirements that the power grid needs to function. This is particularly true of the data centers that train AI; because multiple facilities train the same language model simultaneously, a voltage oscillation at just one data center can cause several hyperscale facilities to disconnect from the grid all at once. Notably, in its reliability warning regarding data center behavior on the grid, NERC specifically called out the ancillary capabilities of battery storage as a potential

⁴⁶ Mohamed Shamseldeen et al., *Reliability Impacts of Large Loads* 11 (Energy Sys. Integration Grp., Large Loads Task Force, July 2026), <https://www.esig.energy/reports-briefs/large-loads-reliability-impacts>.

⁴⁷ *Id.* at 10.

⁴⁸ N. Am. Elec. Reliability Corp. (NERC), *NERC Issues Level 3 Alert, Reliability Guideline Focused on Large Load Challenges* (May 4, 2026), <https://www.nerc.com/newsroom/nerc-issues-level-3-alert-reliability-guideline-focused-on-large-load-challenges>.

⁴⁹ U.S. Energy Info. Admin., *New U.S. Electric Generating Capacity Expected to Reach a Record High in 2026* (Feb. 20, 2026), <https://www.eia.gov/todayinenergy/detail.php?id=67205>.

solution.⁵⁰ By helping to alleviate sudden spikes in data center load, storage can serve as a “shock absorber” for the grid and prevent cascading load disconnections.

Large loads are increasing greenhouse gas emissions; Energy storage can help

Data centers have led to an increase in electricity demand, and greenhouse gas (GHG) emissions from the power sector have increased as a result.⁵¹ Furthermore, the pollution impacts of large load-driven electricity demand growth are on track to become more pronounced without policy intervention. The emissions that data centers cause are coming from two places. First, utilities are building more natural gas infrastructure and increasing the frequency with which existing fossil fuel fired power plants are used. Second, large loads are increasingly bringing their own fossil fuel-fired resources to the grid. The vast majority of these behind-the-meter resources are natural gas power plants.⁵²

Behind-the-Meter (BTM) Natural Gas Undercuts State Renewable Portfolio Standard (RPS) Laws

Increased emissions from BTM natural gas would undercut the effectiveness of legislatively mandated renewable portfolio standards (RPS) across the country. Over the course of the past decade, many states have passed laws that require regulated utilities to shift their generation portfolio towards 100% renewable energy over time. Emissions from behind the meter natural gas plants would not be included in many RPS laws and could render them ineffective as a means of reducing overall power sector GHG emissions.

Rising utility investment in natural gas as a result of large load demand is represented in both new physical projects under construction and the utility capital expenditure pipeline. Investments planned by Dominion Energy, the utility that serves Virginia’s Data Center Alley, provides an illustrative example of new natural gas infrastructure that has already received regulatory approval to serve large loads.⁵³ In 2025, the utility received regulatory approval from the Virginia State Corporation Commission for the Chesterfield County Reliability Center, which is set to host a 1 GW natural gas plant.⁵⁴ Notably, Dominion was granted an exception from Virginia’s 2020 Clean Economy Act to construct the

⁵⁰ N. Am. Elec. Reliability Corp., Essential Action to Industry: Computational Load Modeling, Studies, Instrumentation, Commissioning, Operations, Protection, and Control (May 4, 2026), <https://www.nerc.com/globalassets/programs/bpsa/alerts/level-3-computational-load-alert.pdf>.

⁵¹ Tianqi Xiao et al., *Environmental Impact and Net-Zero Pathways for Sustainable Artificial Intelligence Servers in the USA*, 8 Nature Sustainability 1541, 1541–53 (2025), <https://doi.org/10.1038/s41893-025-01681-y>.

⁵² Michael Thomas, *Bypassing the Grid: How Data Center Developers Are Building Their Own Power Plants*, Cleanview, <https://cleanview.co/reports/behind-the-meter-data-centers>.

⁵³ Data Center Alley refers to a cluster of data centers that are located in the Northern Virginia area. In total, Virginia has more data centers than anywhere else on earth and is thus considered the data center capital of the world.

⁵⁴ Application of Va. Elec. & Power Co., Case No. PUR-2025-00037, Final Order at 3 (Va. State Corp. Comm’n Nov. 25, 2025), <https://www.scc.virginia.gov/docketsearch/DOCS/89g501!.PDF>.

plant.⁵⁵ The utility explicitly cited the need to serve new large loads as a reason for approving the plant.⁵⁶ The Chesterfield facility is only one example of a larger trend in the energy industry. In total, utilities are planning billions of dollars in new natural gas investment to serve large data centers.⁵⁷ NextEra Energy, the largest energy developer in the country, laid out its data center hub strategy in a recent earnings call with investors. The plan includes billions of dollars in natural gas investment, including the construction of 9.5 GW of new natural gas plants to serve data centers in Texas and Pennsylvania.⁵⁸ The buildout of new natural gas generating facilities to power data centers is on track to become a significant source of increased carbon emissions and local air pollution.

Precise data on behind-the-meter gas generation serving large loads is difficult to obtain. An analysis by the market analysis website Cleanview found that at least 90 GW of new behind-the-meter natural gas is in the planning pipeline.⁵⁹ According to the Global Energy Monitor, new gas-powered developments collocated with data centers have risen by 50 percent between 2025 and 2026, with 378 GW of new gas fired power plants proposed.⁶⁰ Some of that planned capacity will not ultimately be built, and supply chain delays for combined-cycle natural gas turbines could decrease the amount of natural gas infrastructure is actually built. At least in the short run, supply chain delays have not led to data center developers changing their generation portfolios. Instead, some data centers are powering their facilities with single-cycle turbines or repurposed factory turbines because of this turbine backlog.⁶¹

⁵⁵ *Id.*

⁵⁶ *Id.*

⁵⁷ Christopher Louney, *Natural Gas Powers the Data Center Boom*, RBC Cap. Mkts. (May 14, 2026), <https://www.rbccm.com/en/insights/2026/05/natural-gas-powers-the-data-center-boom>.

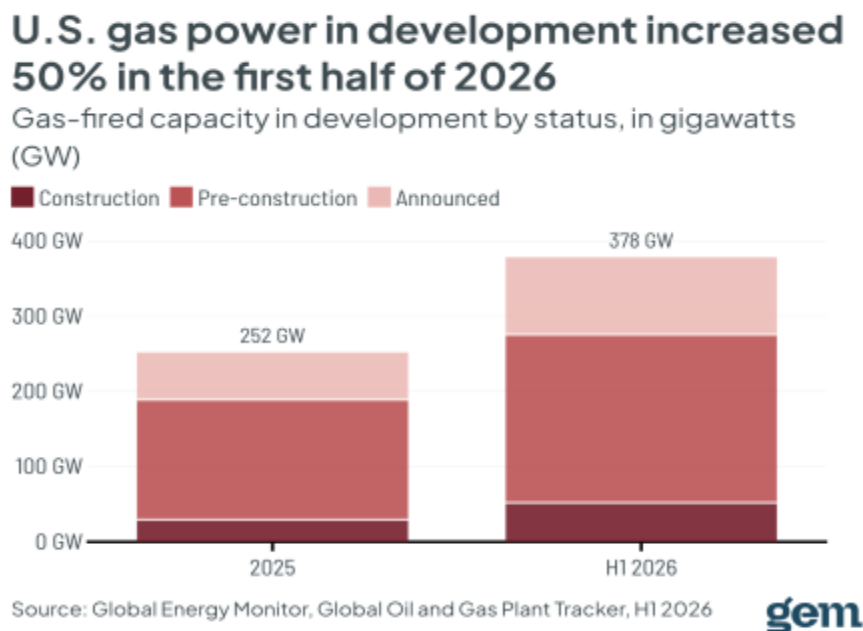
⁵⁸ NextEra Energy, Inc., *NextEra Energy Reports First-Quarter 2026 Financial Results* (Apr. 23, 2026), <https://www.sec.gov/Archives/edgar/data/753308/000075330826000028/neeq12026exhibit99.htm>.

⁵⁹ Michael Thomas, *Bypassing the Grid: How Data Center Developers Are Building Their Own Power Plants*, Cleanview (Feb. 21, 2026), <https://cleanview.co/reports/behind-the-meter-data-centers>.

⁶⁰ Jenny Martos, *U.S. Gas Power Proposals Tied to Data Centers Nearly Double in Six Months*, Global Energy Monitor (Aug. 2026), <https://globalenergymonitor.org/research/us-gas-power-proposals-tied-data-centers-nearly-double-six-months>.

⁶¹ Drew Robb, *Data Centers Look to Old Airplane Engines for Power*, IEEE Spectrum (Oct. 20, 2025), <https://spectrum.ieee.org/ai-data-centers>.

Figure 4. U.S. gas power in development increased on 2026



Despite the uncertainty about future data center-driven natural gas development, we can extrapolate the significance of the problem from behind-the-meter natural gas projects that have already been confirmed publicly by hyperscalers across the country. Recently, Amazon confirmed that it will be the end-use customer for a 7.6 GW single-cycle natural gas plant in Texas, referred to as the GW Ranch facility.⁶² That facility alone has been permitted for as much as 33 million tons of CO₂ as well as millions of tons of the hazardous pollutants sulfur dioxide and nitrous oxide.⁶³ Ground has already been broken on several behind-the-meter natural gas plants that would make up a sizable portion of the new 90 GW of behind-the-meter load represented in Cleanview's analysis.⁶⁴ In Ohio, plans were recently announced for the construction of a 9.2 GW natural gas plant collocated with an OpenAI hyperscale data center,⁶⁵ and construction on a 4.4 GW behind-the-meter natural gas plant is already underway in

⁶² Michael Thomas, *Scoop: Amazon Is Behind One of the Largest Planned Gas Power Plants in the US*, Distilled (Aug. 7, 2026), <https://www.distilled.earth/p/scoop-amazon-is-behind-one-of-the>.

⁶³ *Id.*

⁶⁴ Michael Thomas, *Bypassing the Grid: How Data Center Developers Are Building Their Own Power Plants*, Cleanview (Feb. 21, 2026), <https://cleanview.co/reports/behind-the-meter-data-centers>.

⁶⁵ *Fact Sheet: The Department of Energy Is Ensuring Affordable Energy Access in Ohio While Powering the Future of AI*, U.S. Dep't of Energy (Mar. 20, 2026), <https://www.energy.gov/articles/fact-sheet-department-energy-ensuring-affordable-energy-access-ohio-while-powering-future>.

Pennsylvania.⁶⁶ When the capacities of those behind-the-meter natural gas plants are added to the natural gas generation serving xAI's Colossus facilities, we arrive at a figure that is at least 19 GW.

Emissions from the backup diesel generators that serve most data centers are also a growing concern. A Virginia Commonwealth University study found that emissions from the diesel backup generators data centers in Virginia use to ensure that they never lose power are equivalent to those of a large natural gas power plant.⁶⁷ Regulators are increasingly contemplating expanding the use case for diesel backup generators from a backup power source to a grid resource during times of high electricity demand.⁶⁸ Curtailing large loads and forcing them onto diesel backup and behind-the-meter natural gas generators would exacerbate emissions impacts even further.

States can leverage storage to decrease GHG emissions

Scaling up the deployment of energy storage can help state governments respond to large load-driven emissions increases in several ways. Energy storage can replace or reduce the need for both baseload and peaking natural gas units in front of the meter, while also providing a viable alternative to the behind-the-meter generation that data centers are increasingly procuring on their own. Energy storage technologies like batteries can partially replace the backup power function that diesel backup generators serve. As a combination of technologies, with diverse attributes including short-, medium-, and long-term energy storage, as well as modular stacking configurations, each type of energy storage solution has specific use cases and can make a variety of contributions to the overall energy storage value stack. Put together, energy storage provides a viable solution to many of the GHG pollution challenges created by large loads, particularly data centers, especially when combined with rising levels of clean energy investments overall on the grid.

How storage can decrease emissions from utility-owned resources

Peaker Displacement and/or Replacement

Energy storage can reduce the emissions that large loads cause by supplying electricity to the grid when fossil fuel-fired power plants would have otherwise run. This dynamic played out in Texas in the summer of 2026. According to an analysis conducted by the Institute for Energy Economics and Financial Analysis, Texas reached a record high 91 GW of electricity generation

⁶⁶ Ethan Howland, *Largest US Gas-fired Power Plant Planned for Data Centers in Pennsylvania*, Utility Dive (Apr. 3, 2025), <https://www.utilitydive.com/news/homer-city-gas-fired-power-station-data-center-firstenergy/744332/>.

⁶⁷ Damian Pitt et al., *Modeling Localized Air Pollution Impacts from Data Centers in Northern Virginia* (Va. Commonwealth Univ., Inst. for Sustainable Energy & Env't 2026), https://scholarscompass.vcu.edu/cgi/viewcontent.cgi?article=1003&context=isee_pubs/.

⁶⁸ Ethan Howland, *PJM Gets Emergency Approval to Curtail Data Centers, Large Loads During Hot Weather*, Utility Dive (May 19, 2026), <https://www.utilitydive.com/news/pjm-doe-emergency-order-curtail-data-centers/820571/>.

on the system, in large part due to plentiful battery storage and renewable energy on the system.⁶⁹ As ERCOT's grid reached peak demand, renewable energy from earlier in the day was dispatched by batteries, avoiding the need to turn on fossil fuel-fired peaker plants.⁷⁰ As places like Texas continue to see load growth from large data centers, plentiful storage and renewable capacity will be crucial to avoiding increased emissions from fossil-fuel-fired power plants.

Enable Virtual Power Plant Deployment

A combination of two- and four-hour lithium-ion batteries can enable a more distributed grid and put downward pressure on capital expenditures for new natural gas projects by enabling the deployment of VPPs. By storing power when it is plentiful and dispatching power when it is needed, batteries form the backbone of most VPP systems. Where distributed storage solutions have been allowed to be deployed as VPPs, their capacity has grown rapidly. Recently, Base Power, a leading distributed storage company, began deploying distribution-system-level storage solutions in Illinois. In the first two months within just one utility's service territory, Base deployed 40 MW, and it expects to deploy approximately 100 MW of new capacity per month in Illinois.⁷¹ Tesla, Sunrun, and Renew Home have announced plans to deploy a 16.8 GW network of VPPs using a combination of EV chargers, home battery systems, demand response, and solar panels to aggregate capacity across the country.⁷² In general, VPPs are emerging as a significant solution to large-load-driven demand growth by simultaneously adding new grid capacity and getting the most out of the capacity that we already have.

⁶⁹ Dennis Wamsted, *PJM lags badly in renewable, battery buildout, consumers pay the price*, Inst. for Energy Econ. & Fin. Analysis (Aug. 31, 2026), <https://ieefa.org/resources/pjm-lags-badly-renewable-battery-buildout-consumers-pay-price>.

⁷⁰ *Id.*

⁷¹ Base Power Co, *Base Power Company's Comments on Staff's Virtual Power Plant Straw Proposal*, Docket No. QO26030099 (N.J. Bd. of Pub. Utils. Aug. 18, 2026), https://publicaccess.bpu.state.nj.us/CaseSummary.aspx?case_id=2114254.

⁷² Sunrun, Inc., *Sunrun, Renew Home, and Tesla Team Up to Deliver More Than 16 Gigawatts of Fast, Flexible Power for Data Centers and Large Loads* (June 24, 2026), <https://investors.sunrun.com/news-events/press-releases/detail/372/sunrun-renew-home-and-tesla-team-up-to-deliver-more-than>.

Emissions from behind-the-meter sources

Large BTM Energy Storage + Renewables

Rapid deployment of energy storage would be an indirect but effective response to the boom in behind-the-meter natural gas plants being procured by data center developers. The rise in behind-the-meter procurement is driven largely by constraints in the queue for new generation to connect with the electric system. Utilities and RTOs were already facing long interconnection pipelines and cannot add new capacity to the grid quickly enough to keep up with the pace of hyperscaler electricity demand. However, batteries can be placed into service faster than many other forms of grid capacity. Continued storage deployment paired with reforms that open up regional interconnection queues to energy storage has the potential to be a significant part of the solution to behind-the-meter natural gas that is increasingly powering new data centers.

Diesel Replacement and Resilience

Energy storage could directly replace or reduce the use of diesel back up generators, which would reduce CO₂ emissions and other air pollution affecting public health, like nitrogen dioxide (NO_x), sulfur dioxide (SO_x), and other harmful pollutants. Replacing diesel generators with batteries would also allow the data centers to stack the load flexibility and reliability benefits of storage on top of their ability to quickly get the power back on after it goes out, which is also referred to as grid resilience.

Microsoft and Google have deployed demonstration projects in Sweden and Belgium, respectively, that replace diesel backup generators with grid-connected battery storage.⁷³ In Google's case, those same battery storage components provide distribution system capacity to the surrounding grid when they are not being used for resilience purposes.⁷⁴ While these deployments are relatively small in scale, they reflect the technical feasibility of replacing backup diesel with battery storage.

Community Concerns about Data Centers

Data centers are also facing rising community pushback over concerns about a range of impacts outside of the scope of this paper including, air quality, noise, and a lack of community benefits for the communities that host data centers. In particular, diesel generators are a focal point of community distrust due to their highly visible and audible impacts on local air quality and noise pollution.

Replacing diesel generators with batteries could be part of a response to these concerns by improving local air quality and reducing noise in the communities where data centers are sited.

⁷³ Joe Kava, *Cleaner Data Centers, Batteries Included*, Google (Dec. 16, 2020), <https://blog.google/innovation-and-ai/infrastructure-and-cloud/global-network/cleaner-data-centers-batteries-included/>.

⁷⁴ *Id.*

Emerging requirements from NERC that will require data centers to manage power fluctuations from the grid without disconnecting from it entirely⁷⁵ may make battery storage an increasingly attractive resilience option for large loads. State government policy that requires or explicitly encourages large loads to use battery storage in lieu of diesel backup generators could help states manage the pollution impacts of backup diesel, while also mitigating many of the reliability impacts that data centers have on the grid.

In sum, there are a variety of energy storage deployment use cases, both behind and in front of the meter, that can reduce the GHG emissions and other pollution that results from the proliferation of data centers, without compromising electricity affordability or grid reliability. State regulatory policy will play a critical role in unlocking all the benefits of battery storage and responding to the large loads challenge. Many of the necessary reforms are already underway across the country. We explore those emerging solutions, as well as additional reforms state governments may want to consider, in the remainder of this paper.

⁷⁵ N. Am. Elec. Reliability Corp. (NERC), *Risk Mitigation for Emerging Large Loads* 32 (May 2026), https://www.nerc.com/globalassets/our-work/guidelines/reliability/RG_Risk-Mitigation-For-Emerging-Large-Loads.pdf.

Deployment strategies for different state regulatory environments

The vertically integrated regulatory context and what it means for energy storage deployment

What is a “vertically integrated” state?

Vertical integration refers to a regulatory structure where utilities are granted a distinct service territory in which they may have a monopoly over generation (e.g., power plants, solar panels) and distribution system infrastructure (e.g., poles, wires, transformers, substations).⁷⁶ Electric utilities in vertically integrated states are primarily regulated by state public utility commissions (PUC). As part of their regulatory compact, these utilities have a guaranteed rate of return on their capital investments that are approved through rate cases. Utilities also often participate in integrated resource planning proceedings at which regulators approve multi-year long-term plans for infrastructure investments.

With vertically integrated utilities, energy storage is regulated primarily through state utility commission oversight, integrated resource planning, and cost-of-service ratemaking.⁷⁷ Many vertically integrated states have renewable portfolio standards (RPS), which require regulated utilities to decarbonize their assets in total or in part by a certain date. These states are striving to meet renewable energy goals and the demands of large load growth simultaneously. Strategic battery deployment can help states maintain progress on clean energy deployment amid rising electricity demand.

Barriers to deployment in a vertically integrated state

The current regulatory paradigm provides vertically integrated utility companies with an incentive to make capital-intensive investments in infrastructure such as coal and natural gas, in lieu of less capital-intensive investments like batteries and VPPs.⁷⁸ Utility companies may not currently have a direct financial incentive to meet large load demand, or growing electricity demand in general, in the most cost-effective manner possible. However, state PUCs in vertically integrated states have already begun to overcome utility incentives to overbuild the grid. Many states have explored the potential of performance-based rates to better align utility

⁷⁶ Madeline Tyson, *Vertical Integration in the Energy Industry*, EBSCO (2013).

⁷⁷ *Valuation and Ratemaking*, Nat'l Ass'n of Regul. Util. Comm'rs, <https://www.naruc.org/core-sectors/energy-resources-and-the-environment/valuation-and-ratemaking/>.

⁷⁸ Jamie Scripps, *Regulators' Financial Toolbox: Virtual Power Plants* 12 (Nat'l Ass'n of Regul. Util. Comm'rs 2023), <https://pubs.naruc.org/pub/F93C25D1-AD76-1A01-876D-E996D9522545>.

investment with important policy goals like clean energy deployment and resilience.⁷⁹ PUCs are also exploring ways to assign costs that new large loads bring to the system directly to those customers and to reform integrated resource planning processes to ensure that less capital-intensive infrastructure investments are considered more fully.⁸⁰

Enabling factors in a vertically integrated state

Hyperscale data centers can demand hundreds of megawatts or even gigawatts of electricity at a time. Vertically integrated states have the advantage of being able to plan grid infrastructure in one singular planning process, usually referred to as an integrated resource plan (IRP).⁸¹ Utility companies can seek regulatory approval for multi-year infrastructure plans that coordinate spending across a utility's generation and distribution system portfolios to meet expected demand on that utility's system.⁸² IRPs also often include detailed load forecasts for each customer class that lay out how much a given utility can expect to invest to serve each customer class over the next five or so years. Thus, as new large loads seek interconnection to the grid, their load can be added into IRP load forecasts, infrastructure plans for generation and distribution infrastructure can be made, and the appropriate costs can be signed to the large load rate class (assuming the state has a large load tariff). As a result, vertically integrated states are well equipped to plan for the new grid infrastructure that will be needed to supply large loads with clean electricity.

What vertically integrated states can do next

Bring Your Own New Clean Energy (BYONCE) Tariffs

Bring your own new clean energy (BYONCE) tariffs present a promising opportunity to mobilize hyperscaler capital toward the construction of clean energy. Conceptually, a BYONCE tariff is a regulatory mechanism that allows new large loads, like data centers, to bring new clean energy with them to the grid that is comparable to their demand for electricity. Mechanically, a BYONCE tariff is a type of utility tariff that operates much like a generic energy supply agreement. Under

⁷⁹ Daniel Shea, *Performance-Based Regulation: Harmonizing Electric Utility Priorities and State Policy*, Nat'l Conf. of State Legislatures (Apr. 7, 2023), <https://www.ncsl.org/energy/performance-based-regulation-harmonizing-electric-utility-priorities-and-state-policy>.

⁸⁰ See *Application of Consumers Energy Co.*, Case No. U-21870, Order at 493 (Mich. Pub. Serv. Comm'n Mar. 27, 2026); *Application of Ohio Power Company for New Tariffs Related to Data Centers and Mobile Data Centers*, Case No. 24-508-EL-ATA, Opinion and Order (Ohio Pub. Utils. Comm'n July 9, 2025) https://www.supremecourt.ohio.gov/pdf_viewer/pdf_viewer.aspx?pdf=993580.pdf&subdirectory=2025-1458%5CDocketItems.

⁸¹ Restructured states may also require utility IRPs, but they are often handled somewhat differently, given the lack of vertical integration.

⁸² Bruce Bieweld et al., *Best Practices in Integrated Resource Planning* (Synapse Energy Econ. & Lawrence Berkeley Nat'l Lab. Nov. 2024), https://www.energy.gov/sites/default/files/2024-12/best_practices_irp_nov_2024_final_optimized.pdf.

this arrangement, a third-party company builds clean energy generation that is engineered to match the load from a new data center or another large load. The vertically integrated utility purchases the power from the third party and sells the electricity to the new large load at a rate that incorporates the cost of the electricity as well as the cost of supplying the electricity to the new large load customer.

Nevada enacted the first tariff of this kind in 2025 when the Nevada Public Utility Commission issued a commission order that created a clean transition tariff (CTT) that allowed the Nevada Power Company to purchase electricity from Fervo Energy's new advanced geothermal power plant. The plant was built specifically to supply electricity to a Google data center campus in the Reno Nevada area. Under the terms of the tariff, Nevada Power would supply electricity to Google from FERVO's plant to serve Google's data center campus.⁸³ Google has identified Nevada's CTT as a model and has tried to replicate it in Minnesota with battery storage and renewable energy.⁸⁴

In July 2026, the Minnesota Public Service Commission approved a similarly structured tariff that Google refers to as the "Clean Energy Accelerator Charge (CEAC)."⁸⁵ The CEAC builds on the tariff structure Google employed in Nevada. Under the CEAC, Google will partner with Xcel Energy and battery energy storage companies to support a portfolio of clean technologies to meet Google's power demand. Fees generated by the tariff are intended to finance the installation of additional wind, solar, and long-duration energy storage in Xcel's service territory.⁸⁶ Google has committed to paying a premium to purchase around-the-clock clean energy without shifting costs to standard ratepayers.⁸⁷

The tariff also formalizes an agreement between Google and Xcel to commit to a 15-year minimum contract length, with an 80 percent demand charge fee should Google exit the

⁸³ See Pub. Utils. Comm'n of Nev., Docket No. 24-05, (May 2024); Nev. Power Co. & Sierra Pac. Power Co., *2026 Joint Triennial Integrated Resource Plan*, vol. 8, *Narrative Supply Plan*, at 75, Docket No. 26-05 (Nev. Pub. Utils. Comm'n 2026), https://www.nvenergy.com/publish/content/dam/nvenergy/brochures_arch/about-nvenergy/rates-regulatory/recent-regulatory-filings/2026-irp/NPC-SPPC-Volume-8.pdf.

⁸⁴ Briana Kobor, *Google is Coming to Minnesota and Advancing Clean Energy Goals*, Google News (Feb. 24, 2026), <https://blog.google/innovation-and-ai/infrastructure-and-cloud/global-network/data-center-pine-island/>.

⁸⁵ *Xcel Energy's Petition for Approval of Large General Time of Day Service Customer and Large Peak Controlled Time of Day Service Tariffs*, Docket No. E-002/M-25-289, Order Approving Tariffs, Creating the Very Large Customer Class, and Establishing Other Requirements (Minn. Pub. Utils. Comm'n June 12, 2026), <https://efiling.web.commerce.state.mn.us/documents/%7B707ABC9E-0000-C111-942E-2E26AC6A3ADC%7D/download?contentSequence=0&rowIndex=43>.

⁸⁶ *Id.*

⁸⁷ Lisa Martine Jenkins, *With Form Energy Deal, Google's Clean Transition Tariff Is Growing Up*, Latitude Media (Feb. 25, 2026), <https://www.latitudemedia.com/news/with-form-energy-deal-googles-clean-transition-tariff-is-growing-up/>.

contract early.⁸⁸ The deal also includes \$50 million from Google to support Xcel's distributed capacity procurement program, which would place battery storage at strategic locations throughout the distribution system to serve all utility customers.⁸⁹ Finally, the agreement adds 1,400 MW of wind and solar energy to Xcel's system, as well as lithium-ion and iron-air long-duration energy storage.⁹⁰

For vertically integrated states where electricity must be provided by the incumbent utility, BYONCE tariffs are an emerging tool that regulators can use to incorporate large loads onto the grid affordably and reliably while also capitalizing on the opportunity to deploy more than a gigawatt of new clean energy.

Require regulated utilities to fully assess low-capital-expenditure options in those proceedings

Generally, vertically integrated utilities have a financial incentive to propose capital-intensive grid investments (e.g., large natural gas power plants) because their profits are tied to the value of their grid investments.⁹¹ As discussed in this paper, many utility companies are making multibillion dollar investments in natural gas facilities to meet new demand from large loads like data centers. In response, state PUCs can require utilities to demonstrate that their investments are the most cost-effective option for meeting new demand for electricity.

The Michigan Public Service Commission (PSC) has been a leader in this area. In March 2026, the Michigan PSC required regulated utilities to file a cost-benefit analysis for new generation that compared a proposed project to less capital-intensive projects like VPPs.⁹² Policymakers could go further and explicitly direct utilities to study the benefits of alternatives such as batteries to avoid utilities defaulting to traditional, capital-intensive projects such as new gas generation in integrated resource plans. Additionally, regulators may want to consider grid benefits that might fall outside of a straight dollar-to-dollar comparison such as resilience and demand flexibility capabilities.

⁸⁸ *Id.*

⁸⁹ *Id.*

⁹⁰ Brian Martucci, *World's 'Largest' Grid Battery Part of Google-Xcel Energy Agreement*, Utility Dive (Mar. 4, 2026), <https://www.utilitydive.com/news/worlds-largest-grid-battery-part-of-google-xcel-energy-agreement/813793/>.

⁹¹ Grayson Flood, *Governing the Grid*, Phenomenal World (Aug. 31, 2026), <https://phenomenalworld.org/analysis/governing-the-grid/>.

⁹² *Application of Consumers Energy Co.*, Case No. U-21870, Order at 494 (Mich. Pub. Serv. Comm'n Mar. 27, 2026), <https://mi-psc.my.site.com/sfc/servlet.shepherd/version/download/068cs00001rd2XbAAJ>.

The restructured regulatory system and what it means for battery deployment

What is a restructured state?

Restructuring refers to state regulatory reforms in the early 2000s that required utility companies to sell off some portion of their business, usually their generation assets, to reduce monopoly power.⁹³ Restructuring was not implemented uniformly from state to state.⁹⁴ In some cases, vertically integrated utilities that owned generation, distribution, and/or transmission were required to sell off some portion of their assets and become distribution utilities, or electric distribution companies (EDC).⁹⁵ In other states, existing utilities could remain vertically integrated but had to allow customers to select from a range of generation providers, an arrangement sometimes referred to as customer choice. These reforms created a complex regulatory landscape across the United States where electricity is delivered to customers through either vertically integrated utilities, EDCs, or some combination of the two. In total, 18 states chose to restructure their utilities' ownership models either partially or fully.⁹⁶

Barriers to deployment in the restructured context

In restructured states there is not a top-down relationship by which the state PUC can direct vertically integrated utilities to shift their generation mix to meet policy objectives in a single commission order. Instead, power is supplied by an array of generation owners, some of which may be independent power producers that sell electricity directly into the wholesale electricity market and fall outside the PUC's full regulatory authority. Under this regulatory arrangement, typically the relevant state agency oversees an annual EDC-led energy auction in which the EDC procures enough electricity from the wholesale electricity market and independent generators to supply all of its customers with electricity. In Illinois, a state agency may also procure energy on the behalf of EDCs and their customers.⁹⁷

Left undirected, the procurement process can deliver a generation mix that is not aligned with state policy goals. Many restructured states have less renewable energy generation per person

⁹³ Joshua Basseches, *Owning the Green Grid: The Political Economy of Renewable Energy Policy Design*, 13 (MIT Press, 2026).

⁹⁴ Restructuring is also sometimes referred to as deregulation, but the term is a bit of a misnomer, since these policy changes didn't necessarily result in less regulation of the utility system overall.

⁹⁵ *Id.*

⁹⁶ *Id.*

⁹⁷ *Illinois Power Agency Act*, Ill. Comp. Stat. 3855/1-75 (2025); *Public Utilities Act*, 220 Ill. Comp. Stat. 5/16-111.5 (2025).

than vertically integrated states.⁹⁸ That is the result of many factors, but restructuring does not inherently lead to clean energy deployment, and specific policies are required to align this regulatory structure with policy goals. System-wide planning is also more difficult, as increased renewable energy procured by EDCs needs to be accounted for in EDC investment plans, circuits may need to be upgraded, substations constructed or upgraded, and other factors.

Regardless of the process for generation procurement in each state, steering the generation mix toward a particular type of energy is more complex than it is in a vertically integrated context, and distinct policy solutions will be needed to ensure that batteries can meet the large loads challenge in restructured states.

Enabling factors for deployment in a restructured context

The barriers to battery deployment in the restructured regulatory context are not insurmountable. As explored in greater detail below, state policymakers across the country are exploring, or have already implemented, a wide array of solutions. From legislation to regulatory reforms, progress on state-led deployment of storage to meet the load growth moment is accelerating rapidly. Broadly speaking, some of the core enabling factors for storage deployment in the restructured context are:

- Specific and ambitious storage procurement goals.
- Integrated planning.
- Regulatory recognition of the full storage value stack.

What restructured states can do next

Energy storage procurement goals

Increasingly, restructured states have adopted ambitious battery storage procurement goals. Illinois and Maryland both have 3 GW procurement targets, while New York State has a procurement goal of 6 GW.⁹⁹ Given the recent establishment of these goals, it remains to be seen how useful they will be in leading to actual battery storage deployment. However, Massachusetts provides an instructive example of how battery storage procurement goals can spur deployment in restructured states. Although Massachusetts is not a hotspot for data center development, the policies Massachusetts has leveraged to deploy batteries could be used by restructured states that are experiencing significant large load-driven load growth to meet their electricity demand with clean, reliable, affordable power.

⁹⁸ Kenneth Rose et al., *Retail Electricity Market Restructuring and Retail Rates* 28 (Aug. 2022), <https://ssrn.com/abstract=3660974/>.

⁹⁹ *Energy Storage Program*, N.Y. State Energy Rsch. & Dev. Auth. (NYSERDA), <https://www.nyserda.ny.gov/All-Programs/Energy-Storage-Program>.

Massachusetts punches well above its weight in terms of storage deployment when compared to other restructured states. In total, Massachusetts has 131 battery storage projects deployed and 740 MW of capacity, behind only Texas and California among restructured states.¹⁰⁰ Massachusetts has enacted policy changes at both the grid-wide level and the project level to help the state reach storage deployment goals it set almost a decade ago. Massachusetts was an early adopter of procurement targets for battery storage, coming in behind California, which set the first battery storage procurement goal in 2013.¹⁰¹ In 2017, Massachusetts set its first battery storage procurement goal at 100 MW, then doubled it the following year to 200 MW.¹⁰² By 2025, when Massachusetts passed the state's landmark clean energy goal, the 2018 goal had long since been passed and the state raised the goal to 5 GW by 2030.¹⁰³ In short, Massachusetts has been setting, exceeding, and then raising battery storage procurement targets for almost a decade. It was also one of the first fully restructured states in the country to set such a procurement target.¹⁰⁴ Early adoption has given Massachusetts time to plan for new infrastructure, direct EDCs to procure it, and for that infrastructure to be purchased, built, interconnected, and deployed.

Integrated planning

Integrated planning is the missing middle between ambitious deployment goals and deployed grid infrastructure in restructured states. Increasingly, restructured states are adopting and refining their resource planning processes to align energy procurement with state policy goals. Illinois, Massachusetts, Maryland, and several other states all have overarching planning processes that help to make sure that EDC distribution system spending is aligned with state renewable energy goals.¹⁰⁵

For instance, Illinois has a unique regulatory process that allows the state to align state energy policy with energy procurement. The Illinois Power Agency (IPA) is solely responsible for

¹⁰⁰ *Operating Battery Storage Projects in Massachusetts*, Cleanview, <https://cleanview.co/power-projects/operating/battery-storage-projects/massachusetts>.

¹⁰¹ *Order Instituting Rulemaking Pursuant to Assembly Bill 2514 to Consider the Adoption of Procurement Targets for Viable and Cost-Effective Energy Storage Systems*, Decision No. 13-10-040, Rulemaking No. 10-12-007, Decision Adopting Energy Storage Procurement Framework and Design Program (Cal. Pub. Utils. Comm'n Oct. 17, 2013), <https://docs.cpuc.ca.gov/publisheddocs/published/g000/m079/k533/79533378.pdf>.

¹⁰² *Energy Storage Initiative (ESI) Goals & Storage Target*, Mass.gov, <https://www.mass.gov/info-details/esi-goals-storage-target>.

¹⁰³ *Id.*

¹⁰⁴ Mass. Dep't of Energy Res., *Guideline on Energy Storage* (revised Dec. 17, 2025), <https://www.mass.gov/doc/guideline-on-energy-storage-1/download>.

¹⁰⁵ *Id.*

procuring electricity for the state's EDCs.¹⁰⁶ This means that an independent state agency makes initial filings to the state PUC, not the EDCs themselves. Thus, state policy is built in from the start, not after EDCs have already presented energy procurement proposals to the commission. Once IPA completes an energy procurement plan, it submits that proposal each year to the Illinois Commerce Commission (ICC) for regulatory approval. In addition, IPA and the ICC work in concert every five years to produce a five-year plan for the state's energy infrastructure. IPA also produces separate plans for general service resource procurement, storage procurement, and renewable energy procurement, allowing the state to structure each procurement around the unique characteristics of each energy source. Together, these layered planning processes help to ensure that state procurement processes align with EDC investment plans as well as the public interest and Illinois's ambitious clean energy goals.

Importantly, creating a separate energy procurement agency is not an essential feature of Illinois's detailed energy planning processes. Rather, the replicable policies are Illinois's decision to separate long- and short-term planning and to have specific procurement planning processes for both storage and renewable energy.

Align procurement with the economic benefits of energy storage

Energy storage comprises a suite of solutions for a range of problems, from providing ancillary grid services, to resilience, to dispatching stored renewable energy at peak demand. Additionally, battery storage comprises many different types and arrangements of batteries responding to many different problems. In recognition of the use-case diversity of energy storage, PUCs in restructured states are modifying their procurement goals to align with the full breadth of energy storage benefits. For instance, in 2025, Maryland's Renewable Energy Certainty Act required the Maryland Public Service Commission to procure 150 MW of distribution-connected battery storage and 3 GW of transmission-connected battery storage.¹⁰⁷ Ensuring that EDCs procure storage for both the distribution and transmission systems will help unlock the full storage value stack by opening up distributed capacity and grid utilization on the distribution system as well as additional capacity on the transmission system that will help put downward pressure on record capacity prices in PJM.

In addition to procuring storage at different points of interconnection to the grid, it is also important to recognize the value of procuring different kinds of storage at different durations. For instance, in Illinois, IPA has announced an intention to explore procuring long- and medium-duration storage as well as hybrid or collocated storage that will count toward the state's 3 GW storage goal in future procurement tranches.¹⁰⁸ Virginia also calls out different

¹⁰⁶ *Illinois Power Agency Act*, Ill. Comp. Stat. 3855/1-75 (2025); *Public Utilities Act*, 220 Ill. Comp. Stat. 5/16-111.5 (2025).

¹⁰⁷ *Energy Storage*, Md. Pub. Serv. Comm'n, <https://psc.maryland.gov/regulated-utilities/electricity/renewable-energy/energy-storage/>.

¹⁰⁸ Ill. Com. Comm'n, Pub. Utils. Bureau, *Energy Storage Procurement Report to the Governor, the General Assembly, and the Illinois Commerce Commission* (May 1, 2025),

kinds of battery storage in a recently announced storage goal creating separate statutorily required procurement goals for both short- and long-duration storage.¹⁰⁹ A combination of short- and long-duration storage could allow short-duration storage to ramp up and down efficiently, performing energy arbitrage for renewable energy, while long-duration storage would provide the capacity and reliability services that grid operators need to keep the lights on, even when weather-dependent renewable energy is scarce.

New Jersey provides an interesting example of how states can use procurement processes to unlock the full energy storage value stack. In August of 2026, the New Jersey Board of Public Utilities (BPU) created the state's first VPP procurement straw proposal.¹¹⁰ Through its straw proposal, BPU seeks feedback from stakeholders and the public on how the state might create a procurement process for EDCs to contract for 150 MW of storage backed distributed grid capacity.¹¹¹ BPU's straw proposal notes that the state's VPP procurement will build on New Jersey's Garden State Energy Storage Program (GSESP), which has solicited 350–750 MW of transmission-connected storage, by seeking stakeholder comments on how New Jersey can ensure adequate battery storage capacity to meet BPU's 150 MW VPP procurement goal.¹¹² Ultimately, the coordination between New Jersey's VPP and battery procurement processes is a replicable policy that other states can use to ensure that battery storage deployment benefits both the transmission system and the distribution system.

The potential breadth of arrangements, points of grid interconnection, technologies, and durations of storage can be overwhelming, but that optionality is one of the strengths of energy storage. Restructured states can learn from one another and refine their procurement processes beyond just topline storage goals to unlock the multitude of benefits storage might provide. Future storage procurement processes can either stand up new procurement processes for new storage use cases — as New Jersey has done — or they could follow Illinois's strategy and focus their initial rounds of procurement on traditional 4-hour standalone storage, saving long-duration procurements for future procurement tranches.

Manage capacity market risk through battery incentive payment structures

Storage developers face significant risks in the restructured wholesale electricity markets, which can hamper deployment. This is particularly true in PJM, where the majority of fully restructured

<https://www.ilga.gov/documents/reports/ReportsSubmitted/5853RSGAEmail12781RSGAAttachEnergy%20Storage%20Procurement%20Report%205.1.2025.pdf>.

¹⁰⁹ *Virginia Targets a Long-Duration Energy Storage Future*, Ctr. for Climate & Energy Sols. (Apr. 15, 2026), <https://www.c2es.org/2026/04/virginia-targets-a-long-duration-energy-storage-future/>.

¹¹⁰ *NJBPU Advances Statewide Home Batteries Program with New Garden State Energy Storage Proposal*, N.J. Bd. of Pub. Utils. (Aug. 19, 2026), <https://www.nj.gov/bpu/newsroom/2026/approved/20260819.html>.

¹¹¹ N.J. Bd. of Pub. Utils. *Staff, Straw Proposal: Virtual Power Plant Program*, Docket No. QO26030099 (July 15, 2026), <https://nj.gov/bpu/pdf/publicnotice/VPP%20Straw%20Proposal%20Final.pdf>.

¹¹² *Id.*

states are located. In response, states like Illinois and Maryland have created incentive payments commonly referred to as indexed storage credits (ISC).¹¹³ ISCs help storage developers hedge against risk and uncertainty they may face in wholesale electricity markets, while also ensuring that customers reap the long-term benefits of battery storage deployment. In general, ICPs distribute a credit to storage providers that ensures they break even when capacity or energy market revenues are negative. However, when wholesale market revenues are positive, electricity customers receive a bill credit. This financial structure allows storage developers to overcome short-term revenue uncertainty while also locking in long-term benefits for all electricity customers. The savings for customers can be significant; in fact, IPA found that, in the long term, ratepayers would save approximately \$13 billion from this contracting structure.¹¹⁴ Getting the financing right helps to ensure that restructured states with ambitious storage procurement goals can help developers overcome short-term risks, while locking in long-term benefits for ratepayers.

Procure storage incrementally, alongside new large loads

Many hyperscale data centers and other large loads require enough electricity to upend even the most ambitious energy storage targets. Hyperscale data center proposals in places like Amazon's GW Ranch facility in Texas would require more than 200 percent of the storage capacity in Illinois's 3 GW storage goal. It may not be reasonable for the entirety of a particular state's storage procurement goal to serve one large customer. As a result, it may be necessary for restructured states to set up a regulatory process to procure storage incrementally alongside new large loads or to build flexibility into their procurement processes if a new large load customer substantially changes the load forecast for a particular state.

To ensure that new large loads are powered by clean energy, restructured states could direct their EDCs to procure a given share of battery storage relative to the total energy consumption of a new large load. For instance, if a hypothetical 1 GW data center is seeking grid interconnection in a restructured state, the relevant EDC might be required to ensure that a given share of that new load is matched with storage capacity, and the remainder by renewable energy generation. This could be done as part of a separate procurement process that allows state PUCs or power procurement agencies to be nimble and respond to new large load

¹¹³ States with indexed storage credit payments typically set limits on how much liability ratepayers are exposed to if wholesale electricity market revenues fall dramatically. In the case of New York's indexed storage credit payments, there is a total budget for how much money can be distributed to storage developers if the strike price exceeds the reference price. *See Energy Storage Deployment Program*, Case No. 18-E-0130, Order Establishing Updated Energy Storage Goal and Deployment Policy (NYSERDA June 20, 2024) <https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={F0ED3690-0000-CF12-BE4A-5B1CED3FF31F}&DocTitle=Order%20Establishing%20Updated%20Energy%20Storage%20Goal%20and%20Deployment%20Policy>.

¹¹⁴ Ill. Com. Comm'n, Pub. Utils. Bureau, *Energy Storage Procurement Report to the Governor, the General Assembly, and the Illinois Commerce Commission* 40 (May 1, 2025), <https://icc.illinois.gov/api/web-management/documents/downloads/public/Storage-Workshops/Energy%20Storage%20Procurement%20Report%205-1-2025.pdf>.

requests as they arise without interrupting or impeding their existing energy procurement processes for other electricity customers.

What all states can do next

There are a variety of policy reforms that fall outside of the scope of this paper. Not every policy solution that will enable battery storage to meet the large loads challenge is specific to state regulatory structure. Furthermore, federal and RTO policy will also be important to the effectiveness of storage deployment. RTO interconnection policy and wholesale market compensation for storage are essential to the viability of storage as a solution to the large loads challenge. States that want to unlock full value of storage might consider continuing to advocate in a forceful and coordinated manner with other states for regulatory reforms that align RTO policy with their state policy goals.

Additionally, states can continue to make progress on creating a predictable, streamlined permitting process for storage deployment. In recent years, states like Massachusetts, Michigan, Colorado, and others have passed updated laws that create a uniform permitting process for renewable energy developers with common standards and community engagement requirements.¹¹⁵ State governments are also beginning to build on the first iterations of their battery storage goals and update them as battery technology evolves. For instance, Virginia's state legislature recently created different categories for long-, medium-, and short-duration batteries.¹¹⁶ Whether it is in a battery procurement process or integrated resource plan, other states may want to consider how their existing storage goals might need to evolve as the technology and use cases of storage evolve.

¹¹⁵ See *Renewable Energy and Storage Facility Siting*, Mich. Pub. Serv. Comm'n, <https://www.michigan.gov/mpsc/regulatory/facility-siting/renewable-energy-and-storage-facility-siting>; *Siting Study*, Colo. Energy Off., <https://energyoffice.colorado.gov/siting-study>; *Energy Infrastructure Siting and Permitting Reforms*, Commonwealth of Mass., <https://www.mass.gov/info-details/energy-infrastructure-siting-and-permitting-reforms>.

¹¹⁶ S.B. 448, 2026 Gen. Assemb., Reg. Sess. (Va. 2026), <https://lis.virginia.gov/bill-details/20261/SB448>.

Conclusion

Energy storage is a rapidly evolving set of technologies that offer the potential to alleviate some of the major challenges associated with large load growth. However, the benefits will be realized only with an enabling policy environment that recognizes the value that batteries and other energy storage systems can provide to the grid. Policymakers and regulators who act proactively can capture the economic benefits of energy storage while using these solutions as tools to promote affordability and grid reliability.

The breadth and scale of the energy storage value stack is impressive. However, energy storage and renewables alone may not be able to feasibly power the several gigawatts of hyperscale facilities that AI data center companies are proposing. Rather, energy storage offers a pathway for policy makers to direct the design of hyperscale data centers in a different direction altogether. A combination of battery storage and renewable energy, for example, enables the construction of a more distributed computational infrastructure system where smaller hyperscale data centers participate in geographic and temporal load shifting, dramatically reducing the overall amount of electricity that hyperscale data centers will require. This design architecture should avoid upending decades of grid decarbonization progress. A 10 GW data center powered by behind-the-meter natural gas is a design choice, not an inevitability. It is up to policymakers to weigh the tradeoffs between speed and power for large loads, energy affordability, reliability, and clean energy.