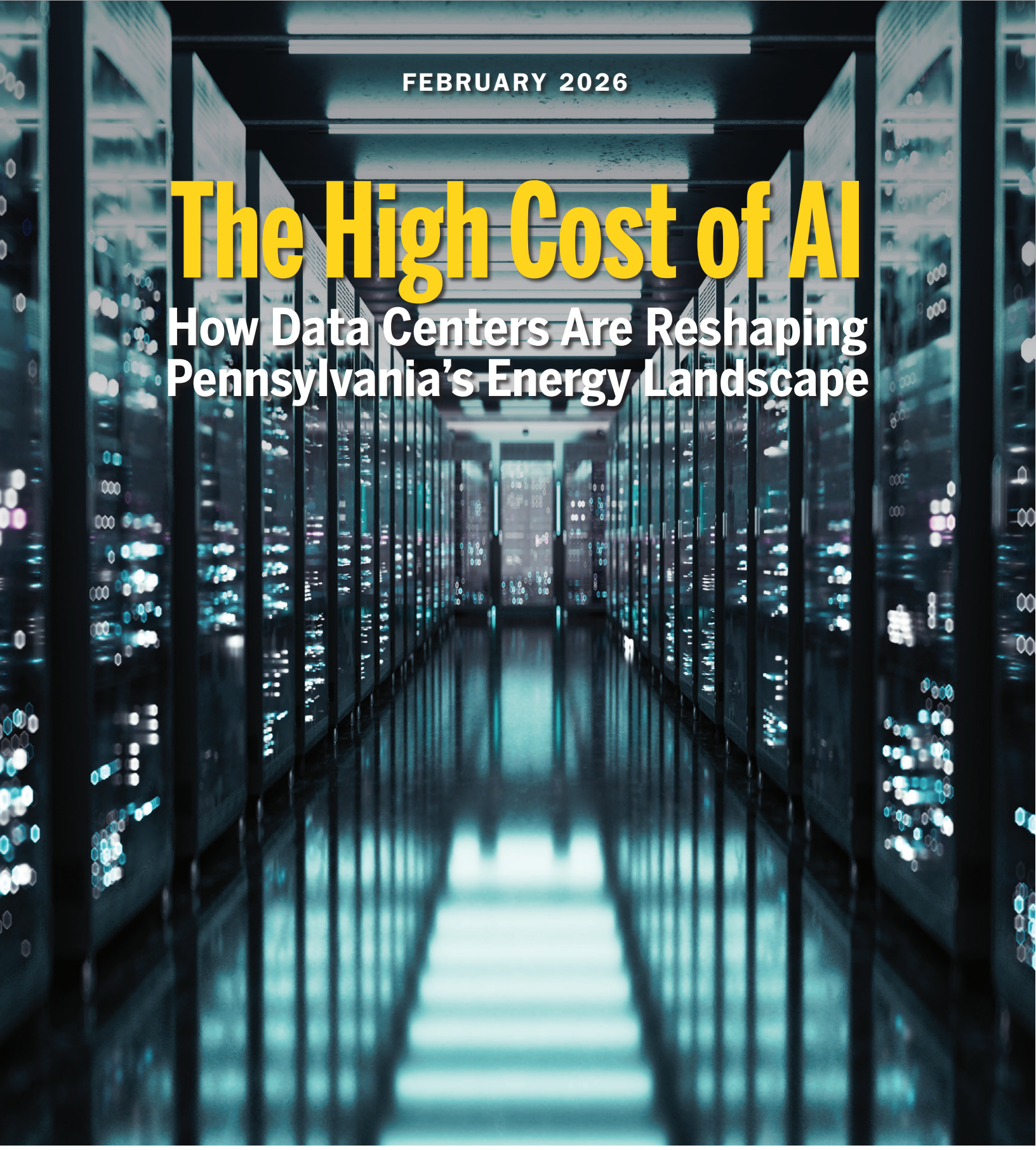

FEBRUARY 2026

The High Cost of AI

How Data Centers Are Reshaping Pennsylvania's Energy Landscape

CleanEnergy Group

CLEAN AIR COUNCIL

PSR Pennsylvania

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About This Report

Data centers are being proposed and built across the US to keep up with the massive amounts of computing power needed for artificial intelligence. Pennsylvania and surrounding states are experiencing a boom in data center development, placing increasing pressure on energy systems and land use. This report details the impacts of rising energy demand from data centers in Pennsylvania and explains how the current trajectory will increase fossil fuel-energy generation, raise energy costs, and worsen local air quality. The report includes recommendations for how community advocates and policymakers can push back against data center growth in their state.

Acknowledgements

This report was prepared by Abbe Ramanan and Eva Morgan at Clean Energy Group, with additional contributions by Eleanor Breslin at Clean Air Council and Matthew Shorraw at Physicians for Social Responsibility Pennsylvania. It was funded with the generous support of the Merck Family Fund. The authors would like to thank Seth Mullendore and Samantha Donalds at Clean Energy Group, Alex Bomstein at Clean Air Council, and Tonyehn Verkitus at Physicians for Social Responsibility Pennsylvania for their contributions to this report.

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Contents

Introduction and Background

PENNSYLVANIA HAS LONG BEEN A LEADER OF ENERGY PRODUCTION in the United States, second only to Texas as a net energy supplier to other states.[1] This legacy has come at a steep environmental cost, first through the mining, export, and combustion of coal, and then through the subsequent boom in fracked natural gas. Now, the limited progress that has been made towards meeting Pennsylvania's goal of reducing net greenhouse gas (GHG) emissions levels is being jeopardized by a new threat: unchecked load growth from data centers.

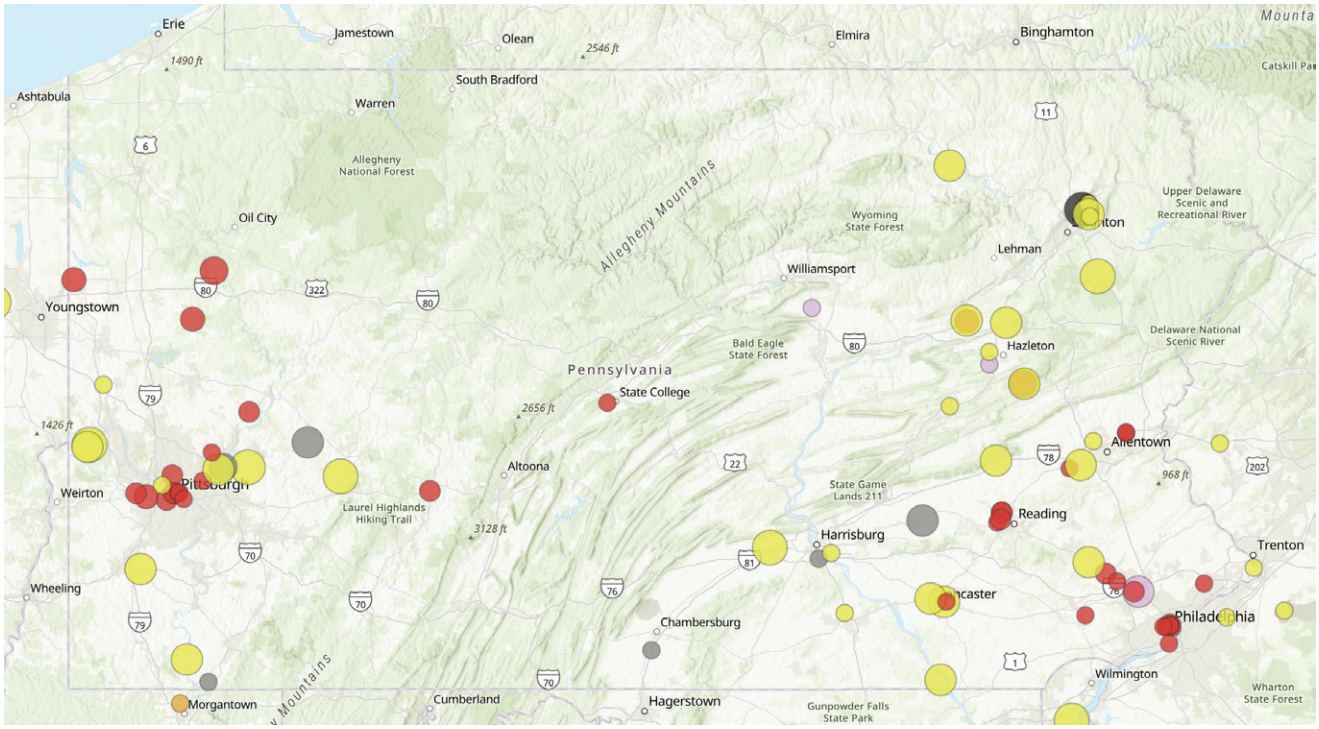
The recent boom in artificial intelligence (AI) has accelerated the pace, scale, and energy intensity of data center development. Data centers use a lot of land and energy, so they tend to be built in areas that have these resources available in abundance. As a net energy exporter with ample undeveloped land, Pennsylvania is currently home to 60 active data center proposals. Figure 1 (p. 6) shows proposed and operational data centers in Pennsylvania.

Data centers use a lot of land and energy, so they tend to be built in areas that have these resources available in abundance. As a net energy exporter with ample undeveloped land, Pennsylvania is currently home to 60 active data center proposals.

The PJM Interconnection region, which is the regional electricity grid serving 13 states plus DC, has experienced unprecedented growth in electricity demand from data centers in recent years. (See "What is the PJM Interconnection," p. 7.) Figure 2 (p. 6) shows proposed and operational data centers in the PJM Interconnection region. Many of the data centers in Pennsylvania and in the PJM region will be powered by energy generated in Pennsylvania. To meet this increased energy demand, Pennsylvania has proposed building new fossil-fuel power plants and delaying the retirement of aging power plants. The rapid pace of this load growth, combined with a lack of data to get an accurate picture of projected demand and an energy system designed around fossil fuels, has contributed to Pennsylvanians footing the bill for data centers not only with their wallets, but with their air quality.

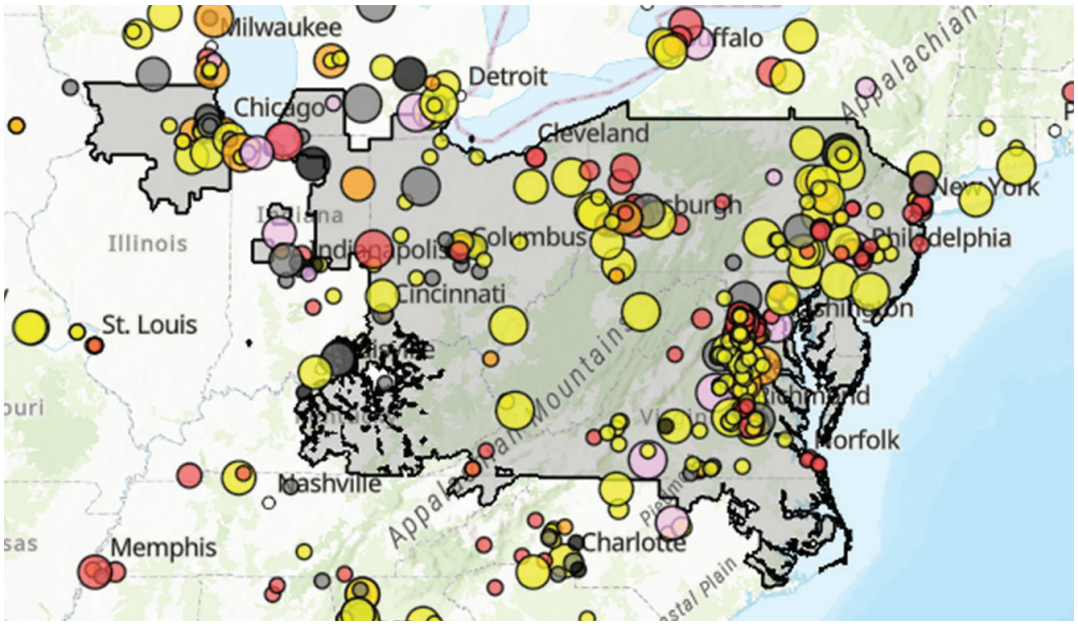
1 "Pennsylvania State Energy Profile," U.S. Energy Information Administration, www.eia.gov/state/print.php?sid=PA&os=a0, accessed October 16, 2025.

Figure 1: **Proposed and Operational Data Centers in Pennsylvania**



Source: FracTracker Alliance.

Figure 2: **Proposed and Operational Data Centers in the PJM Interconnection Region**



Source: FracTracker Alliance.

Figures 1 & 2 Key: Circle size represents the amount of energy that the facility will use.

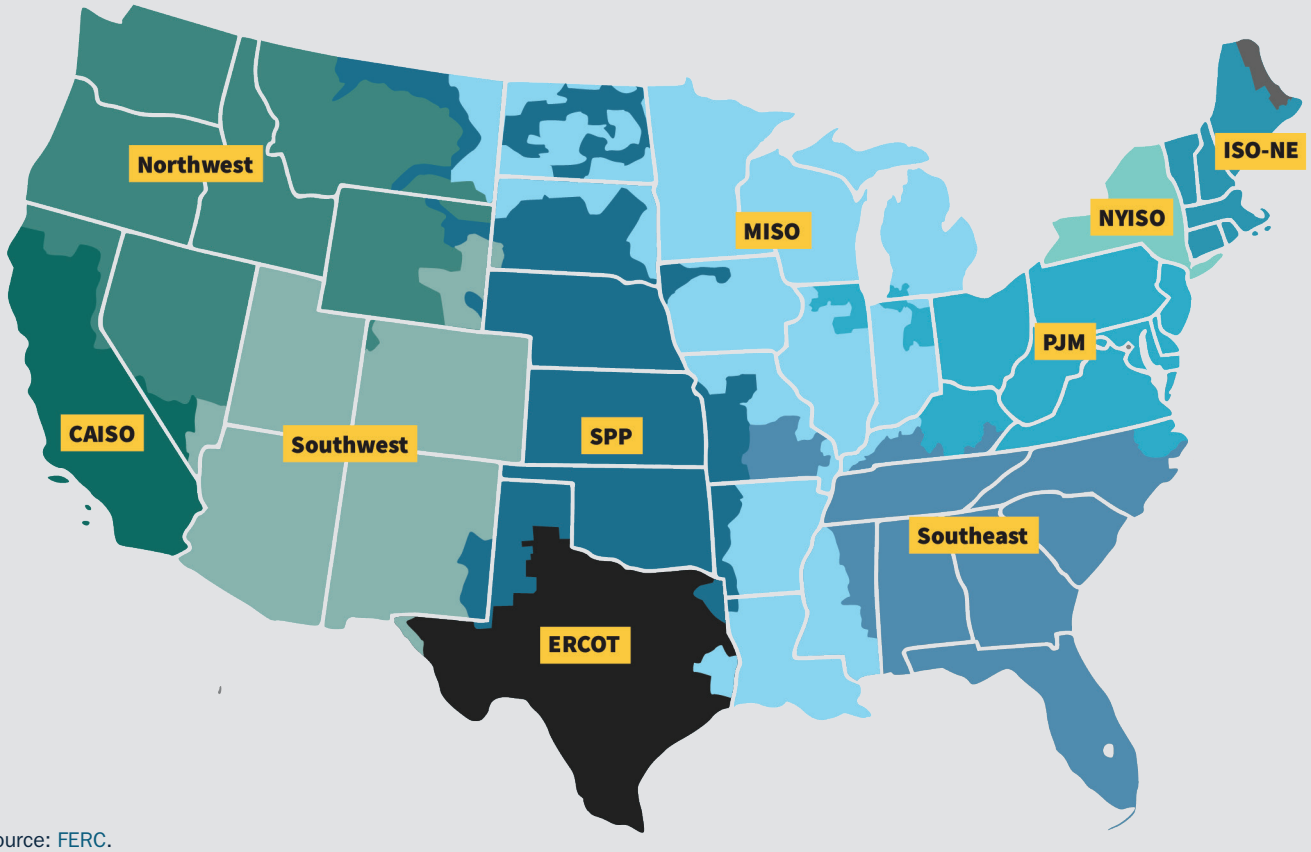
Operating | Approved/Permitted/Under Construction | Proposed | Suspended | Cancelled | Unknown

BOX 1

What is the PJM Interconnection?

The electrical grid in the continental US is broken up into regional energy markets operated by Independent System Operators (ISOs) and Regional Transmission Organizations (RTOs) (see Figure 3.) ISOs and RTOs are responsible for the interconnected network of power plants, transmission lines, and substations that deliver electricity from energy producers to customers. They are responsible for operating a region's electricity grid, administering a region's wholesale electricity markets, and providing reliability planning for the region's bulk electricity system.

Figure 3: **Map of ISOs and RTOs in the Continental US**



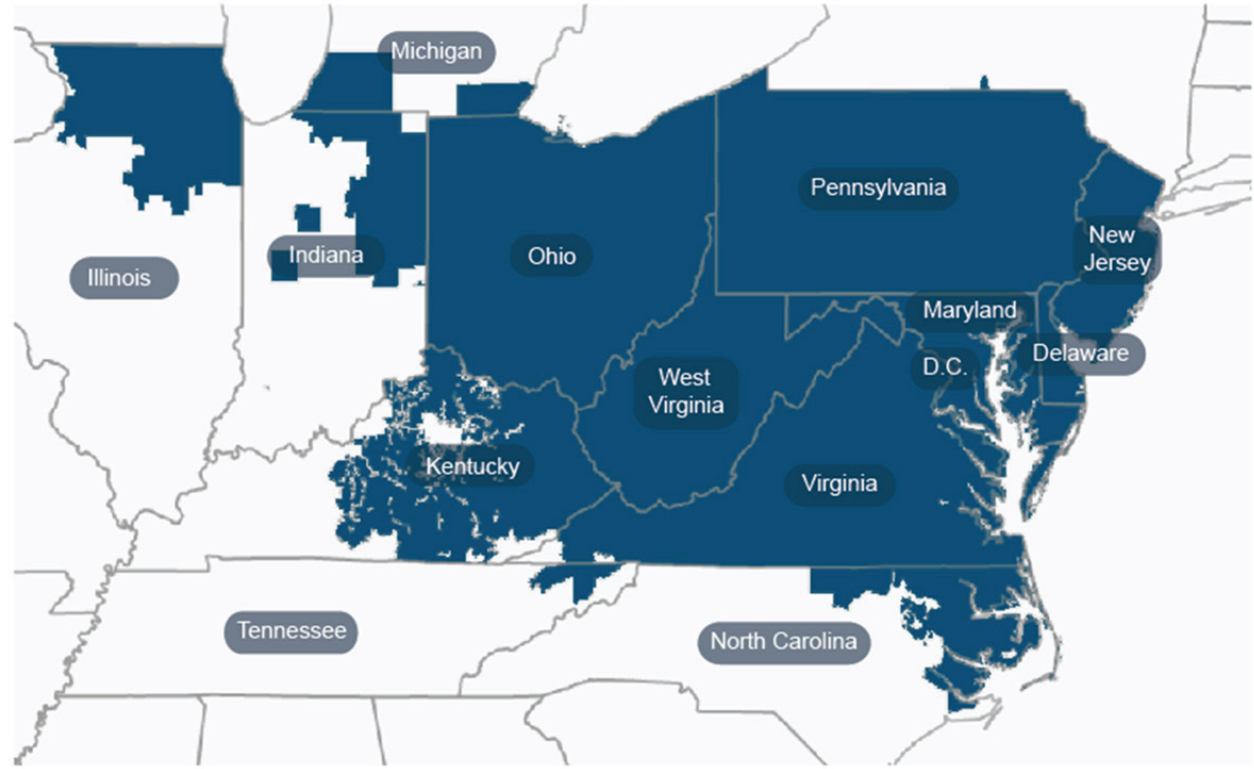
Source: FERC.

The PJM Interconnection is an RTO covering all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Washington, DC. See Figure 4 for a map of the states in the PJM region. The name PJM originally came from its core states: Pennsylvania, New Jersey, and Maryland.

PJM is the largest regional electricity market in the country, managing electricity delivery for 67 million people. PJM monitors and coordinates 1,400 energy generating sources and 88,333 miles of high-voltage transmission lines.[2]

Within the PJM Interconnection region, Pennsylvania is the top energy exporter, and Virginia is the top energy importer.

Figure 4: **Map of the States in the PJM Interconnection Region**



Source: Clean Energy Group.

2 "Fact Sheet: PJM At a Glance," PJM, https://learn.pjm.com/-/media/about-pjm/newsroom/fact-sheets/pjm-at-a-glance.ashx, accessed December 2025.

What is a Data Center?

Technology companies like Amazon, Google, Meta, and Microsoft have long used data centers—large facilities hosting computer servers, networking hardware, and cooling systems—to support cloud computing efforts. Data centers support many of the cloud-based activities, from financial transactions to social media posts, that have become a customary part of modern life. Typical data centers have moderate energy needs similar to other industrial processes, with demand around five to ten megawatts (MW).[3]

However, the recent boom in energy intensive AI processing has accelerated the pace and scale of data centers development. Many AI workloads, such as the training of AI algorithms, rely on high performance computing (HPC), which utilizes networked high-speed computer servers. Cloud-based HPC computing (sometimes referred to as HPC-as-a-service or HPCaaS) has lowered the barriers to access for high performance computing, and many data centers now offer this energy intensive service.[4] This increased access, paired with surging demand for energy-intensive computing workloads such as generative AI (gen AI) training models, has contributed to the prevalence of "hyperscale" data centers – massive data centers built to provide extreme scalability to respond to large-scale computing workloads.[5] These hyperscale data centers represent gigawatts of demand, with some set to consume as much power as entire cities.[6]

The recent boom in energy intensive AI processing has accelerated the pace and scale of data centers development. Hyperscale data centers represent gigawatts of demand, with some set to consume as much power as entire cities.

A study published by Lawrence Berkeley National Laboratory estimates that data centers could represent as much as 12 percent of US energy use by 2028.[7] Global risk firm DNV estimated that North American data centers could account for 16 percent of global electricity use by 2040, with 12 percent of that tied to AI applications.[8]

3 Thomas Spencer and Siddharth Singh, "What the Data Centre and AI Boom Could Mean for the Energy Sector – Analysis," International Energy Administration, October 18, 2024, www.iea.org/commentaries/what-the-data-centre-and-ai-boom-could-mean-for-the-energy-sector.

4 Stephanie Susnjara and Ian Smalley, "What Is High-Performance Computing (HPC)?" IBM, July 9, 2024, www.ibm.com/think/topics/hpc.

5 Phillip Powell and Ian Smalley, "What Is a Hyperscale Data Center?" IBM, March 21, 2024, www.ibm.com/think/topics/hyperscale-data-center.

6 Rich Miller, "Skybox Plans 300-Megawatt Campus South of Dallas," Data Center Frontier, November 20, 2023, www.datacenterfrontier.com/site-selection/article/33015268/skybox-plans-300-megawatt-campus-south-of-dallas.

7 Arman Shehabi et al., "United States Data Center Energy Usage Report," Lawrence Berkeley National Laboratory, 2024, https://eta.lbl.gov/publications/2024-lbnl-data-center-energy-usage-report.

8 "Energy Transition Outlook 2025," DNV, October 7, 2025, https://brandcentral.dnv.com/original/gallery/10651/files/original/ec419166-9ecc-40ef-9997-93a6ccb72335.pdf.

In Pennsylvania, data centers are poised to drive peak load growth—the amount of energy needed during times of highest demand—over the next 20 years. Synapse Energy Economics projected overall peak load to increase by 49 gigawatts (GW) in PJM by 2040, with total data center load projected to increase sevenfold, from 50 terawatt-hours (TWh) in 2023 to 350 TWh.[9]

Data Centers in PJM

The PJM region has experienced unprecedented growth in energy demand from data centers. This increased energy demand is reshaping Pennsylvania's grid, fueling higher costs for ratepayers throughout the region and jeopardizing the clean energy transition.

In 2023, PJM approved $5 billion in transmission projects, the costs of which would be shared among ratepayers throughout the region. PJM justified this expense due to both the retirement of existing generation sources and growth from data centers in the region, particularly Virginia.[10]

Virginia hosts approximately 35 percent of the world's hyperscale data centers, with more being proposed.[11] The approximately 200 data centers located in Loudoun County, Virginia have earned it the nickname "Data Center Alley."[12] Loudoun County's reputation as a valuable tech corridor continues to grow thanks to its high density of tech workers, proximity to Washington, DC, and streamlined permitting.[13]

The massive energy demand from data centers in Virginia is being met by imports of natural gas and coal from Ohio, Pennsylvania, West Virginia, New Jersey, Maryland, Delaware, and Washington, DC, along with parts of other surrounding states. Expensive transmission projects are needed to carry this electricity to Virginia, which has contributed to an increase in electricity rates of 24-40 percent over the past five years for PJM residents, including Pennsylvanians.[14]

9 Sabine Chavin, Pat Knight, Devi Glick, Tenzin Gyalmo, and Ida Weiss, "Risks of Rapid Data Center Growth in PJM," Synapse Energy Economics, 2024, www.synapse-energy.com/sites/default/files/Final percent20PJM percent20Data percent20Center percent20Modeling percent20Results percent20 percent2820241217 percent29 percent2024-089.pdf.

10 Sami Abdulsalam, "Reliability Analysis Update at Transmission Expansion Advisory Committee Meeting," PJM, December 5, 2023, www.pjm.com/-/media/DotCom/committees-groups/committees/teac/2023/20231205/20231205-item-15--reliability-analysis-update-2022-window-3.ashx percent20at percent202.

11 "Data Centers," Virginia Economic Development Partnership, www.vedp.org/industry/data-centers, accessed October 10, 2025.

12 Ibid.

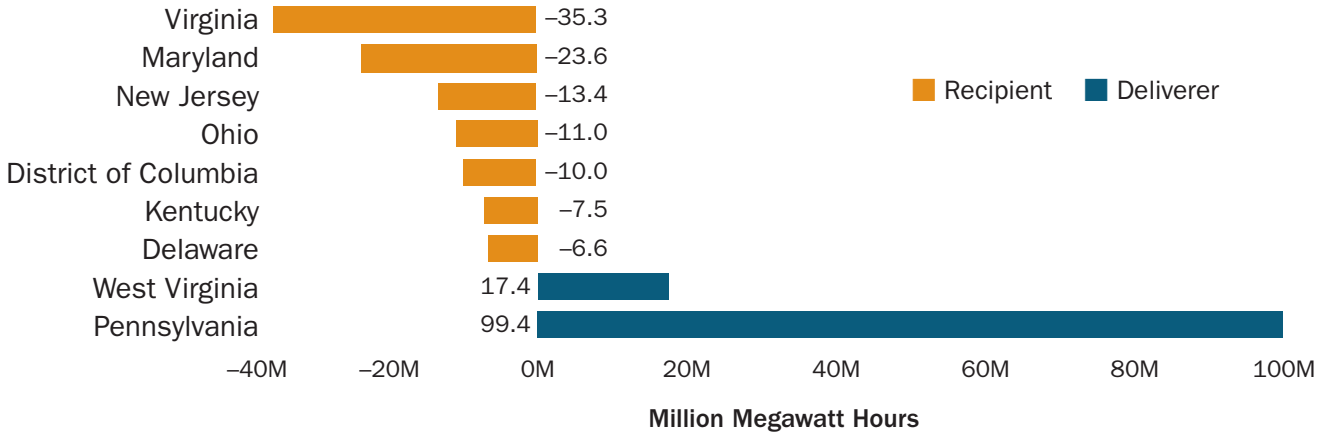
13 Ibid.

14 Cameron Wade, Mike Blackhurst, Joe DeCarolis, Anderson de Queiroz, and Jeremiah Johnson, "Electricity Grid Impacts of Rising Demand from Data Centers and Cryptocurrency Mining Operations," Carnegie Mellon University and North Carolina State University, June 2025, https://energy.cmu.edu/_files/documents/electricity-grid-impacts-of-rising-demand-from-data-centers-and-cryptocurrency-mining-operations.pdf.

This load growth is also contributing to rising emissions. Under current policies, an estimated 25 GW of aging—and costly—coal plants around the country will continue operating past their retirement dates to meet the energy demands of data centers.[15] US power sector emissions are projected to increase by 30 percent by 2030 because of this demand, reaching approximately 275 million tons of carbon dioxide (CO_2) annually.[16] The emissions intensity of grid electricity in PJM is projected to increase from 0.42 to 0.48 metric tons of CO2 per megawatt-hour (MWh) by 2030 because of more natural gas and coal-fired generation operating to meet demand from data centers and cryptocurrency mining, particularly in Virginia.[17]

As shown in Figure 5, Pennsylvania exported almost 100 million MWh of electricity in 2024, while Virginia imported over 35 million MWh of electricity. Because the vast majority of PJM's energy generation facilities are located in Pennsylvania, the increase in energy demand from data centers in PJM will have a disproportionate environmental and economic impact on Pennsylvania residents.

Figure 5: **Interstate Electricity Trade in PJM in 2024**



The states in orange are net energy importers, and the states in blue are net energy exporters. The top energy importer in PJM is Virginia, and the top energy exporter is Pennsylvania. Pennsylvania exported almost 100 million megawatt hours of electricity in 2024. In contrast, Virginia imported over 35 million megawatt hours of electricity.

Source: U.S. Energy Information Agency.

15 Ibid.

16 Cameron Wade, Mike Blackhurst, Joe DeCarolis, Anderson de Queiroz, and Jeremiah Johnson, "Electricity Grid Impacts of Rising Demand from Data Centers and Cryptocurrency Mining Operations," Carnegie Mellon University and North Carolina State University, June 2025, https://energy.cmu.edu/_files/documents/electricity-grid-impacts-of-rising-demand-from-data-centers-and-cryptocurrency-mining-operations.pdf.

17 Ibid.

In addition to powering out-of-state data centers, Pennsylvania will also be supplying significant amounts of electricity to data centers within the state. In its 2025 Long-Term Load Forecast Report, PJM projected a significant increase in peak load and net energy load in Pennsylvania over the next 20 years.[18] This increase is primarily driven by growth in data center energy demand.[19]

This projected increase in peak load and net energy load in Pennsylvania over the next 20 years is primarily driven by growth in data center energy demand, particularly in PPL Electric Utility Corporation's territory.

Addressing future peak demand is a major focus for the Regional Reliability Organizations which oversee Pennsylvania, including PJM as well as the North American Electric Reliability Corporation (NERC) and the Reliability First Corporation. NERC and PJM have expressed concerns about meeting future peak demand driven by the rapid deployment of large-load customers such as data centers, which drives up overall demand, combined with increased demand from ongoing electrification efforts such as the adoption of electric vehicles (EVs) and heat pumps. EVs and heat pumps will also shift when peak occurs and extend the duration of peak demand.[20] NERC recommended delaying the retirement of fossil fuel generators as one method of maintaining grid reliability considering future peak demand, despite the fact that many of the generators slated for retirement are coal plants that are too expensive and polluting to keep operating.[21]

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

19 Pennsylvania Data Center Proposal Tracker website, www.padatacenterproposals.com, accessed October 20, 2025.

20 "Electric Power Outlook for Pennsylvania 2024-2029," Pennsylvania Public Utility Commission, August 2025, www.puc.pa.gov/media/3586/final-draft-2025-epo-2024-2029-8-2025.pdf.

21 Ibid.

How Data Centers are Contributing to Fossil Fuel Expansion

MUCH OF THIS NEW ENERGY DEMAND IN PJM COULD BE MET BY CLEAN ENERGY. Solar, wind and battery storage projects currently make up 96 percent of the generation in PJM's interconnection queue, which is the line of projects waiting to be approved before they can become operational.[22] Unfortunately, these clean energy projects are being sidelined by a renewed focus on building new fossil fuel generation, delaying the retirement of existing fossil fuel generation, recommissioning already retired fossil fuel power plants, and running inefficient fossil fuel peaker power plants more often, turning them into baseload plants.

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Building New Fossil Generation

Early in 2025, PJM created the Reliability Resource Initiative (RRI) to fast track a certain number of "shovel ready" energy generation projects, moving them to the front of the interconnection queue. The RRI was approved by the Federal Energy Regulatory Commission (FERC), and in May 2025 PJM announced the approval of over 50 projects under this initiative. Sixty-nine percent of these accelerated projects are powered by fracked gas, either new builds or increasing the capacity of existing gas plants.[23] Five of the existing plants expanding their capacity are natural gas power plants in Pennsylvania. This RRI effectively allowed gas projects to bypass the clean energy projects in PJM's lengthy interconnection queue.[24] The PJM interconnection queue has been plagued with delays and year-long pauses, and some projects have been waiting in the queue for over five years.

22 "Maps of active interconnection requests by region, state, and county," Lawrence Berkeley National Laboratory, https://emp.lbl.gov/maps-projects-region-state-and-county, accessed January 2026.

23 Ethan Howland, "PJM fast-tracks 11.8 GW, mainly gas, to bolster power supplies," *Utility Dive*, May 5, 2025, www.utilitydive.com/news/pjm-resource-reliability-rri-gas-interconnection/747090.

24 John Quigley, "Smart Policies Can Halt the Stampede to New Gas Power Plants," Kleinman Center for Energy Policy, February 24, 2025, https://kleinmanenergy.upenn.edu/commentary/blog/smart-policies-can-halt-the-stampede-to-new-gas-power-plants.

PJM proposed an additional initiative in September 2025 called the Expedited Interconnection Track, which allows projects over 500 MW to jump the interconnection queue.[25] The vast majority of projects capable of qualifying for this will be natural gas.

Through these fast-track initiatives, PJM is prioritizing fossil fuel projects and keeping clean energy at bay, even though solar, energy storage, and wind projects have shorter development times than natural gas power plants. By freeing up the 103 GW of solar, 35 GW of wind, and 64 GW of storage capacity stuck in their interconnection queue, PJM could bolster their region's reliability in a much shorter timeframe.[26]

Delaying Power Plant Retirements

The projected increase in load due to proposed data centers has also delayed the retirement of fossil fuel plants in the PJM region. In Maryland, PJM requested that Talen Energy continue to run two plants that were slated for retirement in May of 2025. These coal and fuel oil plants were set to shut down due to economic reasons, but Talen Energy reached an agreement with PJM to keep operating them until 2029.[27] In July 2025, prompted by a PJM petition, the U.S. Department of Energy (DOE) issued an emergency order to allow one of these plants to run beyond their operating limits, which were set in place in 2020 to protect the surrounding neighborhoods from air pollution.[28]

DOE also got involved in a soon-to-be retired power plant in Pennsylvania, Eddystone Generating Station. Eddystone is an 820 MW gas and fuel oil power plant located in Delaware County, PA that was set to retire in May 2025.[29] In an emergency order, DOE mandated that Eddystone stay online until August 2025. An executive order in August extended that timeline for another 90 days.[30]

Power plants are typically retired when they become too expensive to operate within the confines of the state's air pollution guidelines. Forcing plants to continue to run after their scheduled retirement date not only increases emissions from the plant but also increases electricity bills. A study done by Grid Strategies found that the cost of federal orders to keep power plants online will be upwards of $3 billion, footed entirely by utility

25 Tim Horger, "Large Load Additions CIFP Update," PJM, October 1, 2025, www.pjm.com/-/media/DotCom/committees-groups/cifp-lla/2025/20251001/20251001-item-04—cifp—lla-updates—pjm-presentation.pdf.

26 "Maps of active interconnection requests by region, state, and county," Lawrence Berkeley National Laboratory, https://emp.lbl.gov/maps-projects-region-state-and-county, accessed January 2026.

27 Sean Wolfe, "Two fossil-fired plants get a life extension as part of PJM agreement," *Power Engineering*, January 30, 2025, www.power-eng.com/coal/two-fossil-fired-plants-get-a-life-extension-as-part-of-pjm-agreement.

28 "Secretary Wright Issues Emergency Order to Safeguard Mid-Atlantic Power Grid," U.S. Department of Energy, July 28, 2025, www.energy.gov/articles/secretary-wright-issues-emergency-order-safeguard-mid-atlantic-power-grid.

29 "Eddystone Generating Station," Constellation Energy, www.constellationenergy.com/our-company/locations/location-sites/eddystone-generating-station.html, accessed October 15, 2025.

30 "Federal Power Act Section 202(c): PJM Interconnection," U.S. Department of Energy, www.energy.gov/ceser/federal-power-act-section-202c-pjm-interconnection, accessed October 13, 2025; "Department of Energy Order No. 202-25-8," U.S. Department of Energy, www.energy.gov/sites/default/files/2025-08/202c%20Order%20No.%20202-25-8.pdf, accessed October 27, 2025.

customers.[31] Even before these federal orders, Reliability Must Run (RMR) agreements—agreements made between an RTO and power plant owners, in which the operator is paid to keep a power plant online, even if they wish to retire it, for reliability purposes— added significant costs to PJM ratepayers. The settlement reached by Talen Energy to keep their two plants online totals $180 million annually.[32]

Recommissioning Retired Power Plants

Power plants that have already retired and been decommissioned are being proposed to come back online to power new projected demand driven by data centers. Homer City Generating Station was the largest coal power plant in Pennsylvania and was permanently retired in 2023. The power plant is now proposed to come back to life as the largest

Homer City Generating Station in Indiana County, Pennsylvania.
Photo: A. L. Spangler/Shutterstock.

31 Michael Goggin, "The Cost of Federal Mandates to Retain Fossil-Burning Power Plants," Grid Strategies LLC on behalf of Earthjustice, 2025, https://earthjustice.org/wp-content/uploads/2025/08/grid-strategies_cost-of-federal-mandates-to-retain-fossil-burning-power-plants.pdf.

32 "Talen Energy, Other Parties Reach Reliability Must Run Settlement Agreement for Brandon Shores and H.A. Wagner Power Plants," Talen Energy, January 27, 2025, https://ir.talenenergy.com/news-releases/news-release-details/talen-energy-other-parties-reach-reliability-must-run-settlement.

natural gas generating station in the country, built to generate 4.4 GW of power, the majority of which would go directly to data centers.[33]

Another formerly retired coal plant in Pennsylvania, the Bruce Mansfield Power Plant, is also being proposed to come back online. Closed in 2019, this plant would be resurrected and converted to run on natural gas. Like Homer City, electricity generated by the plant would mostly be used to directly power data centers.[34]

Converting Peaker Power Plants

Power plant owners and new investors are also eyeing fossil fuel peaker power plants as a potential solution for the projected demand growth from data centers. Peaker plants only run when the grid is stressed. They typically operate for less than 15 percent of the year, often far less, usually firing up only on days where electricity demand is higher than normal. These plants tend to be old and inefficient, with fewer emissions controls in place. Some companies are proposing to convert these peaker plants into baseload power plants that run constantly. NRG, a Texas based company, purchased five power plants in Pennsylvania, including some peaker plants which they plan to run as baseload plants.[35] In the initial PJM RRI, LS Power proposed to upgrade two of their peaker plants, including the Armstrong plant in Pennsylvania, to run constantly, in addition to proposals for new gas plants.[36] These projects didn't end up getting approved for the fast-tracked timeline, but they can still enter the interconnection queue.

Peaker plants tend to be old and inefficient, with fewer emissions controls in place. Some companies are proposing to convert these peaker plants into baseload power plants that run constantly.

The Federal Push for Fossil Fuels and Data Centers

The push for fossil fuels in Pennsylvania is getting help from the Trump Administration. The skyrocketing energy demand from data centers in the PJM region is partially fueled by intensive global competition to develop newer, more sophisticated generative AI models, as well as innovative applications for AI. President Donald Trump announced a sweeping plan to boost the development of AI in the US at a technology summit held

33 Mark Levy, "Coal-fired power plant, now retired, to become massive gas-powered campus for AI, data centers," *AP News*, April 2, 2025, https://apnews.com/article/technology-ai-natural-gas-electricity-pennsylvania-450534992fab8dd3527b64b92614259e.

34 Ricky Sayer, "Bruce Mansfield plant in Beaver County to undergo $3.2 billion transformation into natural gas power plant," *CBS News*, July 16, 2025, www.cbsnews.com/pittsburgh/news/bruce-mansfield-plant-beaver-county-natural-gas.

35 Anya Litvak, "NRG buys 5 Pa. Gas plants to meet 'supercycle' of demand growth," *Post Gazette*, May 13, 2025, www.post-gazette.com/business/powersource/2025/05/13/nrg-data-center-gas-energy/stories/202505130085.

36 "LS Power Submits Proposal to Add New Generation Supply Across PJM," LS Power, March 14, 2025, www.lspower.com/news/ls-power-submits-proposal-to-add-new-generation-supply-across-pjm.

at Carnegie Mellon University in July 2025.[37] A subsequent executive order called for new exclusions under the National Environmental Policy Act (NEPA) for activities related to data centers that "normally do not have a significant effect on the environment."[38] The U.S. Environmental Protection Agency (EPA) has announced that it will "get out of the way and help speed up progress" on data center development, including fast-tracking review of new, potentially hazardous chemicals used in data centers.[39]

It was no coincidence that Trump's plan was launched in Pennsylvania, at a summit designed to showcase the state's potential to supply the massive amounts of energy needed to power such massive AI-fueled demand. At the same summit, Homer City Redevelopment, the company spearheading the redevelopment of Pennsylvania's largest coal plant into the country's largest natural gas-powered data center campus, announced plans to buy at least $15 billion of Pennsylvania fracked gas for use at the plant.[40] The EPA's new laissez-faire approach to environmental review has been paired with a renewed focus from the Trump Administration on promoting fossil fuels as means of maintaining grid reliability and meeting the energy demands of data center growth, at the cost of environmental, air, and water standards.

The EPA's new laissez-faire approach to environmental review has been paired with a renewed focus from the Trump Administration on promoting fossil fuels as means of maintaining grid reliability and meeting the energy demands of data center growth, at the cost of environmental, air, and water standards.

This view was highlighted by a series of executive orders, including one declaring an "energy emergency" and authorizing the Secretary of Energy to, among other things, prevent generation resources with more than 50 MW of nameplate capacity from exiting the market or converting their fuel sources.[41,42] Following these orders, DOE released a reliability study in the summer of 2025 warning that, if aging power plants retire as planned, much of the country could face hours of blackouts beginning as early as 2030.[43] This dire prediction is based off of what many electricity modeling and policy

37 "America's AI Action Plan," The White House, July 9, 2025, www.whitehouse.gov/wp-content/uploads/2025/07/Americas-AI-Action-Plan.pdf.

38 "Accelerating Federal Permitting of Data Center Infrastructure," The White House, July 23, 2025, www.whitehouse.gov/presidential-actions/2025/07/accelerating-federal-permitting-of-data-center-infrastructure.

39 "EPA Prioritizes Review of New Chemicals Used in Data Center Projects, Supporting American Manufacturing and Technological Advancement," U.S. Environmental Protection Agency, September 18, 2025, www.epa.gov/newsreleases/epa-prioritizes-review-new-chemicals-used-data-center-projects-supporting-american.

40 Paul J. Gough and Jake Dabkowski, "Energy/Innovation Summit: An Overview of the $90B plus in Investments Announced Tuesday," *Pittsburgh Business Times*, October 9, 2025, https://archive.ph/1DwqU.

41 "Declaring a National Energy Emergency," The White House, January 21, 2025, www.whitehouse.gov/presidential-actions/2025/01/declaring-a-national-energy-emergency.

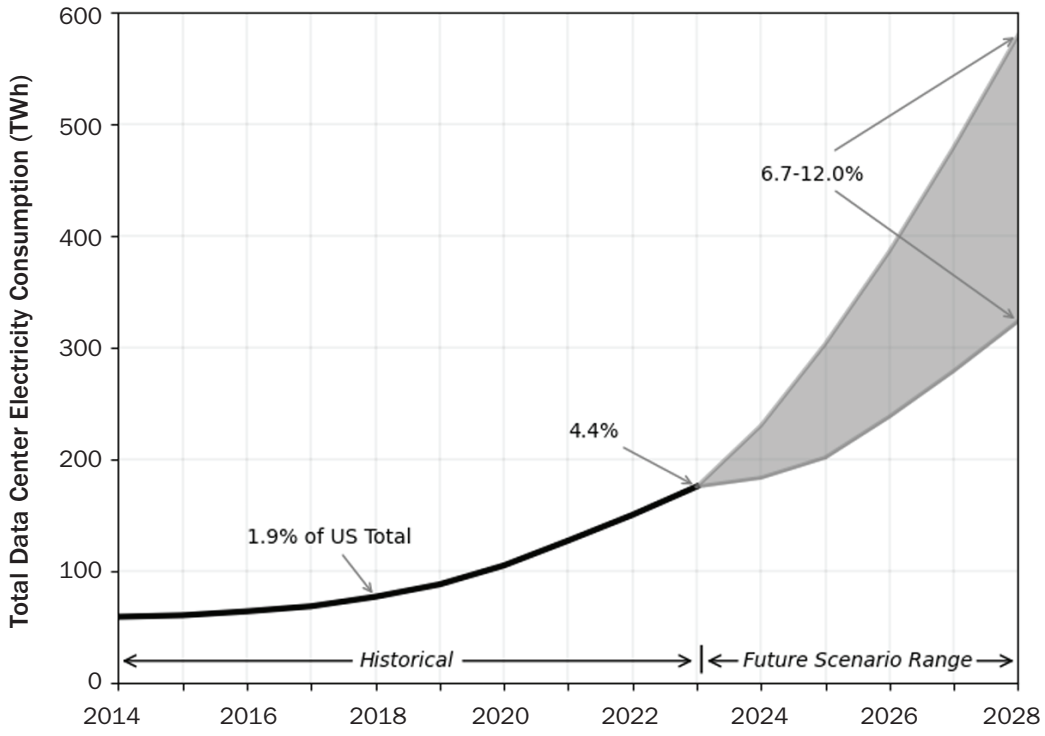
42 "Strengthening the Reliability and Security of the United States Electric Grid," The White House, April 8, 2025, www.whitehouse.gov/presidential-actions/2025/04/strengthening-the-reliability-and-security-of-the-united-states-electric-grid.

43 "Evaluating the Reliability and Security of the United States Electric Grid," U.S. Department of Energy, July 2025, www.energy.gov/sites/default/files/2025-07/DOE percent20Final percent20EO percent20Report percent20 percent28FINAL percent20JULY percent207 percent29_0.pdf.

experts have pointed out is flawed analysis.[44] The DOE study only accounts for generation resources already under construction or with signed contracts, thus assuming that the power sector will stop building new power resources after 2026, even as demand rises and older generators retire.[45]

Despite its flawed approach, the study has already been used by the Secretary of Energy to issue an emergency order keeping Constellation Energy's Eddystone power plant open after it was set to retire in May 2025.[46] In its order, DOE stated that the plant needed to be kept online due to an energy emergency in parts of PJM, despite PJM having approved Constellation's request to retire the plant in 2023, stating that its retirement would not

Figure 6: **Total US Data Center Electricity Use From 2014 Through 2028.**



US data center annual energy use remained stable between 2014 and 2016, and grew dramatically between 2017 and 2023. Predictions for future growth show that data centers could represent between 6.7 and 12 percent of all US energy use by 2028.

Source: Lawrence Berkeley National Laboratory.

44 Matthias Fripp and Brendan Pierpoint, "Energy Department's Flawed Grid Study Props up Expensive, Zombie Power Plants," *Utility Dive*, July 24, 2025, www.utilitydive.com/news/doe-grid-reliability-study-zombie-power-plants/753596.

45 "Evaluating the Reliability and Security of the United States Electric Grid," U.S. Department of Energy, July 2025, www.energy.gov/sites/default/files/2025-07/DOE percent20Final percent20EO percent20Report percent20 percent28FINAL percent20JULY percent207 percent29_0.pdf.

46 "Federal Power Act Section 202(c): PJM Interconnection," U.S. Department of Energy, www.energy.gov/ceser/federal-power-act-section-202c-pjm-interconnection, accessed October 13, 2025.

have an adverse effect on the grid.[47] Based on recent data, Eddystone has a capacity factor of approximately 0.3 percent, meaning it operates for only about 26 hours per year.[48]

Following DOE's actions in August, FERC approved a pathway for Constellation to recoup the costs of running Eddystone past its retirement date from PJM ratepayers.[49] While the cost allocation methodology for this process must be revisited each time the Eddystone plant's retirement is delayed, one analysis estimated the plant's delayed retirement will end up costing PJM ratepayers over $69 million annually.[50]

Is Data Center Demand Overblown?

Both DOE and PJM have cited massive load growth, much of it driven by data centers, as a key driver for delaying fossil fuel plant retirement and fast-tracking new fossil-generation. However, it is difficult to get an accurate picture of the projected demand from data centers, in part due to the rapid pace of AI development.

As seen in Figure 6, US data center growth from 2014 to 2017 was relatively stable at about 60 TWh. However, as the overall installed server base started growing and computer servers capable of hosting generative AI models became more ubiquitous, the speed of data center growth quickly took off, reaching 176 TWh by 2023.[51]

Predicting energy usage from data centers in the next few years is contingent on several factors, including operational practices, server availability from manufacturers, and variations in cooling energy use. These factors can lead to a wide range in demand predictions. As shown in Figure 6, the low-end prediction estimates data centers will represent 6.7 percent of all US energy use by 2028, while the high-end estimate is 12 percent—a difference of 255 TWh of energy, equivalent to the annual energy consumption of over 24 million households.[52]

While some of the difficulties with modeling data center energy usage can be attributed to the complex nature of data centers themselves, as well as the rapidly evolving AI landscape, additional factors are contributing to overblown data center demand projections.

47 Niina Farah, "Lawsuit Targets DOE Must-Run Order for Pennsylvania Power Plant," *E&E News*, October 1, 2025, https://subscriber.politicopro.com/article/eenews/2025/10/01/lawsuit-targets-doe-must-run-order-for-pennsylvania-power-plant-00588116.

48 "Eddystone Station," Power Plants and Neighboring Communities Tool, U.S. Environmental Protection Agency, May 29, 2024, https://experience.arcgis.com/experience/4d419ce790aa42e8b42228f824024cc4/page/uniform-buffers.

49 "Order Accepting Tariff Revisions Re PJM Interconnection, L.L.C. et al. under ER25-2653 et al.," Federal Energy Regulatory Commission, August 15, 2025, https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20250815-3094&optimized=false&sid=28f0fe1a-d2c0-4d6d-8176-9e80386b67ac.

50 Michael Goggin, "The Cost of Federal Mandates to Retain Fossil-Burning Power Plants," Grid Strategies, August, 2025, https://gridstrategiesllc.com/wp-content/uploads/Grid-Strategies_Cost-of-Federal-Mandates-to-Retain-Fossil-Burning-Power-Plants.pdf.

51 Arman Shehabi et al., "United States Data Center Energy Usage Report," Lawrence Berkeley National Laboratory, 2024, https://eta.lbl.gov/publications/2024-lbnl-data-center-energy-usage-report.

52 Ibid.

Data center developers have an incentive to submit duplicate interconnection requests. Most data center developers must consider a few factors when choosing a site: the availability of affordable land, access to fiber capacity, adequate latency (the delay in data transmission and processing within a network or system), water for cooling, and high-quality and cost-effective electricity service. Large portions of the US meet these criteria.[53] Most data center projects can be developed in two to three years, compared to the much longer process of developing energy infrastructure.[54] There is also a low barrier to submitting duplicate interconnection requests in many parts of the country. Most utilities require large load customers to sign a customer service agreement (CSA) or electricity service agreement (ESA). However, the terms of these agreements are only outlined after an interconnection request has already been submitted, thus incentivizing developers to "shop around" to various locations to identify the site that is most likely to meet their needs at the lowest cost.[55] These speculative interconnection requests across multiple utility service territories can artificially inflate demand which may never materialize. PJM has no way to check whether a data center in one service territory has made the same proposal in another. In a presentation at the Pennsylvania Environmental Law Forum, PJM's own Senior Manager of Government Services stated that companies are "pitching the same data center in different locations."[56]

Data center demand is often depicted as less flexible and higher capacity than it is. There is a widespread perception that data centers operate at a load factor of 90 percent or higher at all hours of the day.[57] However, this perception relies on the conflation of several metrics, which may overinflate how much demand a data center will have at any given time. Some of this is due to a lack of data: very few companies report actual data on their data centers' energy use, and almost none report it in the context of important computing-related characteristics, such as compute capacities, average system configurations, workload types, or infrastructure characteristics such as cooling loads.[58] In addition, many data centers are operated by third-parties who lease server space to customers. These third-party providers typically offer what's often called "five nines" or "99.999 percent" uptime to customers.[59] This customer facing metric can imply that

53 Billy Roberts, "Data Center Infrastructure in the United States, 2025 (Map)," NREL, 2025, https://research-hub.nrel.gov/en/publications/data-center-infrastructure-in-the-united-states-2025-map.

54 Ben Levitt, "AI and Energy: The Big Picture," S&P Global, 2024, www.spglobal.com/en/research-insights/special-reports/look-forward/ai-and-energy.

55 Marie Fagan and Victor Chung, "Uncertainty and Upward Bias Are Inherent in Data Center Electricity Demand Projections," Southern Environmental Law Center, July 2025, www.selc.org/wp-content/uploads/2025/07/LEI-Data-Center-Final-Report-07072025-2.pdf.

56 "FERC Docket No. EL25-49-000, Comments of Public Interest Organizations in response to PJM Interconnection, L.L.C.'s 03/24/2025 Answer to FERC's 02/20/2025 Order under EL25-49," April 23, 2025, https://elibrary.ferc.gov/eLibrary/filedownload?fileid=9D23F7BC-5484-CAA9-9030-96645FF00000.

57 Stacy Sherwood, "Review of Large Load Tariffs to Identify Safeguards and Protections for Existing Ratepayers," Energy Futures Group, January 28, 2025, https://energyfuturesgroup.com/wp-content/uploads/2025/01/Review-of-Large-Load-Tariffs-to-Identify-Safeguards-and-Protections-for-Existing-Ratepayers-Report-Final.pdf.

58 Arman Shehabi et al., "United States Data Center Energy Usage Report," Lawrence Berkeley National Laboratory, 2024, https://eta.lbl.gov/publications/2024-lbnl-data-center-energy-usage-report.

59 Baratunde Cola, "Data Center Uptime: What It Really Means," *Forbes*, July 23, 2025, www.forbes.com/councils/forbestechcouncil/2025/07/23/data-center-uptime-what-it-really-means.

the computational performance of the data center must always be available at maximum capacity. However, most providers use this metric to refer to the availability of equipment, not necessarily computational availability.[60]

Utilities are not subject to the risks to overestimating load growth, ratepayers are. While utilities do have some ability to cut down on speculative interconnection requests through mechanisms such as assigning probabilities to requests for service and requiring monetary commitments in ESAs and CSAs, they also stand to benefit financially from making investments to support new load growth. Pennsylvania is a deregulated state, meaning that utilities do not own energy generating assets like power plants, but they do own the transmission infrastructure to supply electricity. Large load customers, such as data centers, typically require costly transmission upgrades to receive service, particularly if new generation is being added to service them.[61] Utilities are guaranteed a healthy rate of return on these structural investments, which is borne by ratepayers. Even if the forecasted load does not eventually materialize, ratepayers are ultimately the ones paying the price for the system upgrade, not the utility or its shareholders.[62]

Estimating Data Center Demand

There is currently very limited data available to accurately predict demand from data centers. Some estimates use a "bottom-up" approach, which relies on gathering data on individual components of a specific data center, such as facility efficiency and the power draw from various servers. While this method can be highly accurate for a specific facility, it is very difficult to use the bottom-up method to extrapolate demand, since equipment and operations variations across facilities can make a significant impact on the result.[63] An alternative and less common approach is "top-down," drawing on existing data from industry organizations or governments, analyzing regional electricity consumption totals, and then using estimates of service or product demand to make a projection.[64] A third, newer approach, extrapolation, builds on existing estimates from either bottom-up or top-down approaches to then extrapolate a projected annual growth rate. However, this approach is heavily reliant on the accuracy of the input models.[65] Given the difficulties in accurately estimating demand and the structural benefits (and relatively few risks) that utilities experience for overestimating demand, it is easy to see why potentially inflated estimates have been able to proliferate.

Given the difficulties in accurately estimating demand and the structural benefits (and relatively few risks) that utilities experience for over-estimating demand, it is easy to see why potentially inflated estimates have been able to proliferate.

60 Ibid.

61 Fagan and Chung.

62 Ibid.

63 Jens Malmodin, et al., "ICT Sector Electricity Consumption and Greenhouse Gas Emissions—2020 Outcome," *Telecommunications Policy,* vol. 48, no. 3 (2024): 102701, https://doi.org/10.1016/j.telpol.2023.102701.

64 Shehabi et al.

65 Ibid.

Increased Energy Costs from Data Centers

Impacts on Ratepayers

PENNSYLVANIANS ARE SEEING THE CONSEQUENCES OF OVERESTIMATED ENERGY DEMAND and the pursuit of expensive fossil fuel infrastructure to meet it. In addition to the costs of keeping expensive fossil fuel plants like Eddystone open, Pennsylvanians will be subject to rising electricity bills from transmission upgrades to meet demand from data centers throughout PJM, as well as the costs of building new, expensive fossil fuel generation. The recent 2027/2028 PJM Base Residual Auction (BRA), the process PJM uses to procure enough generation capacity to meet projected demand, showed a nearly eleven-fold increase in capacity prices from the previous year, with the auction clearing at the legally mandated cap of $333.44 per MW per day, totaling $16.4 billion. The last two capacity auctions were similarly costly, bringing in $16.1 billion for the 2025/2026 auction and $14.7 billion for the 2023/2024 auction.[66]

Pennsylvanians will be subject to rising electricity bills from transmission upgrades to meet demand from data centers throughout PJM, as well as the costs of building new, expensive fossil fuel generation.

While these results could be attributed to several factors, including generator retirements and updated FERC market rules, an analysis by the independent market monitor for PJM found that data center load growth was the primary driver, with data center demand alone resulting in over $9 billion in increased costs.[67] Despite these record prices, the capacity of resources acquired by the 2027/2028 auction is short of PJM's reliability requirement. This means that PJM does not have adequate capacity to meet the RTO's reserve margin and should the PJM grid experience an unexpected generator failure or extreme weather, there is a serious risk of blackouts.[68]

66 "PJM Auction Procures 134,479 MW of Generation Resources," PJM, December 18, 2025, www.pjm.com/-/media/DotCom/about-pjm/newsroom/2025-releases/20251217-pjm-auction-procures-134479-mw-of-generation-resources.pdf.

67 "Analysis of the 2025/2026 RPM Base Residual Auction - Part G—Revised," Monitoring Analytics, 2025, https://www.monitoringanalytics.com/reports/reports/2025/IMM_Analysis_of_the_20252026_RPM_Base_Residual_Auction_Part_G_20250603_Revised.pdf.

68 PJM Interconnection.

These unprecedented circumstances have led PJM's independent market monitor to file a complaint with FERC, stating that PJM should stop connecting new large data center loads until it can serve the capacity reliably.[69]

Regardless of what PJM decides, electricity customers throughout the region can expect higher electricity bills because of increased load growth, which is compounded by the pursuit of new, expensive generation to meet demand. The Homer City Generating Station redevelopment project is reporting a capital cost of $2,222 per kilowatt (kW), making it one of the most expensive power plants in the country.[70] Costs for gas turbines are increasing overall, driven by rising global demand to meet increasing electricity consumption and increases in the costs of nearly all key components.[71] Capital costs for new gas combustion turbine (CT) and combined cycle (CC) power plants have gone from $1,116/kW for projects slated for completion in 2026, to over $2,000/kW on average for recent projects. These costs are expected to persist or increase.[72] All of these factors are expected to increase residential energy bills in PJM by over 10 percent in the near-term.[73]

Transmission Costs

In addition to the costs from the development of new, expensive fossil fuel resources, Pennsylvanians will see higher energy bills from the transmission upgrades required to serve many large data center customers. Proposals to improve existing power lines, build new ones, and add substations and switchyards tend to follow wherever data center development goes. The costs for these expensive projects pose an additional threat to ratepayers' wallets as they are typically spread out across the utility's customers. In 2024, over $4.3 billion was paid by ratepayers in the PJM region to fund transmission expansions that were only needed to connect data center customers. In Pennsylvania alone, that number was close to $500 million. This pattern is expected to continue, incurring similar costs in 2025 and beyond.[74] Currently there is no mechanism to ensure that utility costs incurred by one large load customer are directly allocated to that customer, although some proposals are being explored.

Pennsylvania is no stranger to controversial transmission projects spurred by data centers. In Hazle Township, a 1,238-acre data center development called Project Hazle-

69 "Complaint of Independent Market Monitor for PJM v. PJM Interconnection, L.L.C. under EL26-30," FERC, November 2025, https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20251125-5275&optimized=false&sid=53de8368-82a1-4e72-a2c3-b9a3fbc0073c.

70 Phil Besuner, "The New Reality of Power Generation: An Analysis of Increasing Gas Turbine Costs in the US," Gridlab, 2025, https://gridlab.org/portfolio-item/gas-tubine-cost-report.

71 Ibid.

72 Ibid.

73 "Risks of Rapid Data Center Growth in PJM," Synapse Energy Economics, December 2024, www.synapse-energy.com/sites/default/files/PJM%20Data%20Center%20Modeling%20Factsheet%2024-089.pdf.

74 Mike Jacobs, "Connection Costs: Loophole Costs Customers Over $4 Billion to Connect Data Centers to Power Grid," Union of Concerned Scientists, September 2025, www.ucs.org/sites/default/files/2025-09/PJM%20Data%20Center%20Issue%20Brief%20-%20Sep%202025.pdf.

nut triggered significant electrical system upgrade proposals from the local utility, PPL. To supply power to the data center, PPL proposed a twelve-mile high-voltage power line running through four different townships. A switchyard and substation built on the data center site are also part of the plans.[75] The proposal has prompted significant community backlash, as the expensive project would expand the utility's existing right-of-way, potentially using eminent domain to build on private property.[76] The estimated expense of the project hasn't been made public yet. However, PPL recently proposed a rate hike that would increase the average residential customers' bills by 7 percent, citing increased costs related to capital investments like Project Hazlenut. The increase is currently being investigated by the Pennsylvania Public Utilities Commission (PUC).

Tax Breaks for Data Centers

The emissions and cost burdens being placed on Pennsylvanians by data centers are not being offset by the economic benefits. Data centers cost the state millions of dollars every year. Like most states, Pennsylvania grants data center developers a sales tax exemption for their equipment. "Equipment" in this case has a very broad meaning, including equipment used for the transformation, generation, or management of electricity; equipment to cool data centers; software used within the data center; monitoring and security devices; and other property essential for operations. The state program allowing these exemptions, the Computer Data Center Equipment Exemption Program, was created in 2019. At that time, data centers were much smaller on average compared to the hyperscale status that many data centers reach today, so the eligibility criteria for the exemption program is shockingly minimal. To apply, companies must promise a $75–$100 million investment and the creation of just 25–45 jobs depending on the population of the county, criteria that most data centers built today far exceed.[77]

The emissions and cost burdens being placed on Pennsylvanians by data centers are not being offset by the economic benefits. Data centers cost the state millions of dollars every year.

State sales tax across Pennsylvania is 6 percent, but counties can add their own sales tax on top of that, generating revenue for both the state and county. This revenue is put towards government programs and services.

75 Kent Jackson and Dave Janosk, "Powering Hazelnut: What to expect from one of NEPA's largest data centers," Standard Speaker, September 18, 2025, www.standardspeaker.com/2025/09/15/powering-project-hazlenut-what-to-expect-from-nepas-largest-data-center.

76 Kent Jackson and James Esposito, "Residents face eminent domain if PPL power line project proceeds," Standard Speaker, May 16, 2025, www.standardspeaker.com/2025/05/16/residents-face-eminent-domain-if-ppl-power-line-project-proceeds.

77 "Computer Data Center Equipment Exemption Program," Pennsylvania Department of Revenue, www.pa.gov/content/dam/copapwp-pagov/en/revenue/documents/incentivescreditsprograms/computerdatacenterequipprog/documents/computer_data_center_equip_exemption_program_guidelines.pdf, accessed October 15th, 2025.

The total amount of tax money lost to the data center sales tax exemption program is unknown. There is no cap on the number of purchases that qualify for this exemption, and the law doesn't require either the buyer or the seller to report how much was purchased under this program. While the losses are estimated in the governor's budget, there is no way to tell how accurate these estimations are. In 2022, then-Governor Tom Wolf estimated that the program would cost the state $75 million in the 2025-2026 fiscal year. Recent projections from current Governor Josh Shapiro predict that the state will lose $43 million this year.[78] In states where these tax losses are required to be reported, like Virginia and Texas, aggregate losses from data center sales tax exemptions have reached $1 billion per year, bringing into question the validity of Pennsylvania's comparably low estimate.[79]

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Data center developers may also be able to apply for property tax exemptions through programs such as Pennsylvania's Local Economic Revitalization Tax Assistance Act (LERTA), which authorizes local government bodies to offer property tax abatements. Property taxes typically fund local public services and infrastructure, like public schools and libraries.

Project Hazlenut developer Northpoint applied for a LERTA real estate tax exemption in February of 2025 to support their planned investment. The county granted the exemption, allowing them to pay significantly reduced property taxes on new construction for the next decade. In the first seven years, Northpoint will pay only 10 percent of the property tax on the added value of the property, 20 percent in year eight, and 30 percent in year nine.[80]

Amazon also received a LERTA property tax break on their data center development in Salem Township, Pennsylvania, authorizing them to pay just 30 percent of the tax on the added value on the property for the first 10 years.[81]

78 Stephen Caruso and Kate Huangpu, "The unknown costs of Amazon's $20B promise to build 2 data centers in Pennsylvania," *Spotlight PA*, June 30, 2025, www.spotlightpa.org/news/2025/06/amazon-data-centers-pennsylvania-tax-break-energy-grid.

79 Greg Leroy and Kasia Tarczynska, "Cloudy With a Loss of Spending Control: How Data Centers Are Endangering State Budgets," Good Jobs First, April 2025, https://goodjobsfirst.org/wp-content/uploads/2025/04/Cloudy-with-a-Loss-of-Spending-Control-How-Data-Centers-Are-Endangering-State-Budgets.pdf.

80 Michael P. Buffer, "Property tax break on new development in Hazle for 10 years," *The Citizen's Voice*, March 26, 2025, www.citizensvoice.com/2025/03/26/property-tax-break-on-new-development-in-hazle-twp-approved-for-10-years.

81 Michael Tanenbaum, "Amazon gets zoning approval for massive data center campus in Luzerne County," *Philly Voice*, May 30, 2024, www.phillyvoice.com/amazon-pennsylvania-data-center-salem-luzerne-county.

The argument driving these tax breaks is that programs like the Computer Data Center Equipment Exemption Program and LERTA help bring data centers, and the supposed economic growth that follows, into Pennsylvania. This assertion may not be accurate, as a Microsoft executive recently revealed that he "can't think of a site selection or placement decision that was decided on a set of tax incentives."[82] Data center site selection is more likely to be based on energy and land availability, two resources that data centers require in abundance. Pennsylvania's popularity with developers hinges on the vast extraction of natural gas from the Marcellus Shale within their borders, and abundant land ready to be industrialized.

The reality is that most of the jobs created by data center development are short-term construction jobs. After the doors open on a data center, only a handful of jobs remain, mainly in security, landscaping, and monitoring.

Data centers are unlikely to create many long-term or high-paying jobs in the communities where they are sited. When Amazon announced their $20 billion investment into data centers in Pennsylvania, Governor Shapiro claimed that the investment would bring in thousands of high-paying tech jobs.[83] The reality is that most of the jobs created by data center development are short-term construction jobs. After the doors open on a data center, only a handful of jobs remain, mainly in security, landscaping, and monitoring. One analysis found that large data centers typically employ fewer than 150 people, with some employing just 25.[84] Even these jobs may be at risk, as data centers aren't guaranteed to be around long-term. Due to the potential for new AI models that use less computing power, like China's DeepSeek model, uncertainties regarding whether these data centers are financially viable, and the vast amounts of debt that companies are leveraging to pay for data centers, there is risk that data center buildings may be abandoned before they even reach full operation.[85]

82 Karen Weise, "A.I., the electricians and the boom towns of Central Washington," *The New York Times*, December 25, 2024, www.nytimes.com/2024/12/25/technology/ai-data-centers-electricians.html.

83 Michael P. Buffer, "Shapiro boasts about workforce opportunities, AI data center in Salem twp," *The Citizens Voice*, August 15, 2025, www.citizensvoice.com/2025/08/15/shapiro-boasts-about-workforce-opportunities-ai-data-center-in-salem-twp.

84 Hannah Beckler, Rosmarie Ho, Ellen Thomas, and Daniel Geiger, "Big Tech Promised Jobs. Cities Gave Millions. Where Are the Workers?" *Business Insider*, June 20, 2025, www.businessinsider.com/data-centers-tax-subsidies-jobs-ohio-2025-5.

85 Ian Frisch, "What Wall Street Sees in the Data Center Boom," *The New York Times*, September 20, 2025, www.nytimes.com/2025/09/20/business/dealbook/data-centers-ai.html.

Proposed Solutions to Address Data Center Issues

PENNSYLVANIANS ARE BECOMING INCREASINGLY CONCERNED ABOUT THE POTENTIAL IMPACTS OF DATA CENTER EXPANSION. While it is unlikely that data center development will slow down, particularly with AI growth continuing to be a focus for the Trump Administration, there are many opportunities for action at the state, municipal, and community level.

Regulatory Solutions

At the regulatory level, the Pennsylvania PUC is looking into measures to protect ratepayers from potential cost shifting from data center users. The PUC held a special hearing in June 2025 to discuss enacting a large load tariff for data center customers. Similar discussions are being held across the country, particularly in states like Pennsylvania that are experiencing high demand from data centers. While large load tariffs have existed for some time, these were designed for customers like manufacturing facilities, which do not share the characteristics of data centers that can make them so uniquely harmful to ratepayers, such as the difficulty in accurately modeling demand, site speculation, and rapid development timelines. To address these challenges, the Pennsylvania PUC should create a model tariff that incorporates several key features that have been enacted in similar tariffs in other states:

Require minimum demand charges.

This would require data center customers to pay for a minimum percentage of their contracted capacity, even if actual energy usage dips below that amount. This would ensure that fixed system costs can be recovered, whereas under the current system these costs would potentially be spread out across all ratepayers. Similar models have already been enacted in Indiana and Ohio.[86,87]

86 "In the Matter of the Verified Petition of Indiana Michigan Power Company for Approval of Modifications to its Industrial Power Tariff: Hearing before the Indiana Utility Regulatory Committee, Docket Number 46097," Indiana Utility Regulatory Commission, 2024, https://iurc.portal.in.gov/docketed-case-details/?id=b8cd5780-0546-ef11-8409-001dd803817e.

87 "Application for Tariff Approval—Ohio Power Company: Hearing on 24-0508-EL-ATA before the Ohio Public Utilities Commission," Ohio Public Utility Commission, 2024, https://dis.puc.state.oh.us/CaseRecord.aspx?CaseNo=24-0508&x=0&y=0.

Establish early exit fees.

These fees should be calculated to cover the cost of the remaining value of any infrastructure investments the utility would have to make to meet the data center customer's needs, even if the data center terminates the contract prematurely. These fees would guard against costs being unfairly socialized across all ratepayers for "but-for" investments such as transmission upgrades, that are only necessary due to a large load customer connecting to the grid. Early exit fees are also a valuable deterrent against the submission of speculative interconnection requests. The Michigan Public Service Commission recently passed a tariff requiring early exit fees.[88]

As highlighted earlier in this report, data center loads are not as inflexible as they are commonly depicted. Load flexibility can offer benefits for both the customer and the grid by reducing the need for expensive interconnection upgrades and new generation.

Incentivize demand flexibility—and model it.

As highlighted earlier in this report, data center loads are not as inflexible as they are commonly depicted. Load flexibility can offer benefits for both the customer and the grid by reducing the need for expensive interconnection upgrades and new generation.[89] Several utilities, including Pacific Gas and Electric, have introduced programs to allow large loads that agree to flexible interconnection (sometimes known as interruptible service) to interconnect sooner.[90]

Data centers specializing in AI are prime candidates for participation in demand response programs, in which grid operators can send a signal to energy customers to reduce their electricity usage during times of high energy demand on the grid. Energy intensive AI-specific tasks, such as training models, can easily be deferred during periods of peak demand. These workloads can also be easily distributed across one or more data centers in different geographic locations to shift demand away from stressed portions of the grid. Dynamic voltage and frequency scaling, which reduces power consumption or frequency at the expense of processing speeds, can also be deployed to reduce demand. Finally, cooling systems typically account for 30 to 40 percent of data center energy consumption, and minor adjustments to temperature can make a significant impact on overall demand.[91]

88 Kelly House, "Michigan OKs Landmark Regulations That Push Up-Front Costs to Data Centers," Bridge Michigan, November 6, 2025, https://bridgemi.com/michigan-environment-watch/michigan-oks-landmark-regulations-that-push-up-front-costs-to-data-centers.

89 Tyler H. Norris, Tim Profeta, Dalia Patino-Echeverri, and Adam Cowie-Haskell, "Rethinking Load Growth: Assessing the Potential of Large Flexible Loads in US Power Systems," Duke University, Nicholas School of the Environment, 2025, https://hdl.handle.net/10161/32077.

90 Maeve Allsup, "PG&E Is Laying the Groundwork for Flexible Data Center Interconnection," Latitude Media, November 15, 2024, www.latitudemedia.com/news/pg-e-is-laying-the-groundwork-for-flexible-data-center-interconnection.

91 Norris et. al.

Researchers at Duke University calculated that if this type of load curtailment was implemented for large load customers like data centers, up to 23.6 GW of new large loads could be added to PJM without building any new generation.[92] Another study found that increasing data center demand flexibility resulted in more anticipated buildout of solar and battery storage, and reduced the modeled buildout of natural gas resources.[93]

Suppliers in Pennsylvania are beginning to address the value of demand flexibility. Constellation Energy, which owns several fossil fuel peaker power plants and nuclear facilities throughout Pennsylvania, recently launched a demand response pilot in partnership with GridBeyond, an AI-driven predictive analytics platform to help commercial customers in PJM reduce their energy demand during times of peak load.[94] In order to realize the full benefit of demand flexibility to reduce ratepayer costs, the PUC should require utilities to model this demand flexibility. If utilities continue to treat data centers as no more than large, inflexible loads during their resource planning processes, Pennsylvanians will continue to see the buildout of massive fossil fuel power plants like Homer City to meet overinflated demand.

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Prioritize renewable generation.

While incentivizing demand flexibility can provide valuable capacity headroom to PJM's grid, it is important to note that this capacity is still primarily being met by fossil fuel resources, including highly polluting peaker power plants. Without the increased buildout of renewable energy resources, or dispatchable energy storage resources to meet peak demand, it is unlikely that Pennsylvania will meet its goal of a 50 percent reduction in GHG emissions by 2030, and local air pollutants are likely to increase as peakers run more frequently.

Many data centers claim to provide demand response by running diesel backup generators during times of peak demand, which generates significant local air pollution. One study estimated that the public health costs from this increase in local air pollutants in Virginia alone could amount to hundreds of millions of dollars, even if the generators are only operating at 10 percent of permitted levels.[95] The PUC should require that data centers only deploy backup power from zero-emission resources such as battery storage.

92 Norris et. al.

93 Chris Cox, Aaron Schwartz, and Derek Stenclik, "Data Center Flexibility NV Energy Case Study," GridLab, September 2025, https://gridlab.org/portfolio-item/data-center-flexibility-nv-energy-case-study-report.

94 Paul Adams, David Snyder, and Alvin Jordan, "Constellation and GridBeyond Launch AI-Powered Demand Response Program in PJM to Improve Grid Flexibility and Save Customers Millions," Constellation Energy, July 31, 2025, www.constellationenergy.com/newsroom/2025/constellation-and-gridbeyond-launch-ai-powered-demand-response-program-in-pjm.html.

95 Yuelin Han, Zhifeng Wu, Pengfei Li, Adam Wierman, and Shaolei Ren, "The Unpaid Toll: Quantifying the Public Health Impact of AI," UC Riverside, Caltech, and RIT, December 2024, https://arxiv.org/pdf/2412.06288.

Several data centers are already exploring the use of energy storage resources to meet their reliability needs.[96,97] Additionally, a "bring your own generation" model incentivizing data center customers to supply their own clean energy resources would reduce strain on the grid, lower ratepayer costs, and reduce emissions. A tariff is already being deployed by Nevada Energy to incentivize dispatchable clean energy resources for large energy users.[98]

These proposed state regulatory solutions may be complicated by a recent Advanced Notice of Proposed Rulemaking (ANOPR) issued by the US Secretary of Energy, directing FERC to develop standardized rules for large load customers such as data centers. FERC has not typically had jurisdiction over large load interconnection. The ANOPR laid out several principles to govern this rulemaking process, including expediting interconnection studies for large load customers that agree to demand flexibility, as well as facilities with co-located generation.[99] It remains to be seen how FERC's future rulemaking will intersect with state-level regulations.

Legislative Solutions

The Pennsylvania General Assembly is already considering legislation directing the PUC to implement some of the regulations discussed above. House Bill 1834 would direct the PUC to draft regulations for commercial data centers with electricity demand of 25 MW or higher. The bill includes the establishment of a Data Center Low-Income Heating Energy Assistance Program (LIHEAP) Enhancement Fund, which would require data centers to contribute to the state energy assistance program based on their peak demand.[100] The bill also includes regulations requiring provisions for implementing early exit fees, load ramping schedules to ensure infrastructure adequacy, deposits or other financial collateral requirements, and utility tracking of all costs to serve commercial data center customers. It would also establish provisions for limiting what costs utilities can recover from ratepayers, including costs directly attributable to delivering electric service to a commercial data center. Finally, the bill requires public utilities entering contracts with data center customers to ensure that no less than 25 percent of electricity supplied under the contract is generated from renewable energy sources.[101] While the bill has yet to be

96 Zachary Skidmore, "Prometheus Hyperscale Partners with XL Batteries to Deploy Long Duration Battery Storage across US Data Centers," Data Center Dynamics, May 16, 2025, www.datacenterdynamics.com/en/news/prometheus-hyperscale-partners-with-xl-batteries-to-deploy-long-duration-battery-storage-across-us-data-centers.

97 Julian Spector, "In a First, a Data Center Is Using a Big Battery to Get Online Faster," *Canary Media*, October 24, 2025, www.canarymedia.com/articles/batteries/aligned-data-center-get-online-faster.

98 Emma Penrod, "NV Energy Seeks New Tariff to Supply Google with 24/7 Power from Fervo Geothermal Plant," *Utility Dive*, June 21, 2024, www.utilitydive.com/news/google-fervo-nv-energy-nevada-puc-clean-energy-tariff/719472.

99 Chris Wright, "Secretary of Energy's Direction That the Federal Energy Regulatory Commission Initiate Rulemaking Procedures and Proposal Regarding the Interconnection of Large Loads Pursuant to the Secretary's Authority Under Section 403 of the Department of Energy Organization Act," October 23, 2025, www.energy.gov/sites/default/files/2025-10/403%20Large%20Loads%20Letter.pdf.

100 "Data Center Act, House Bill 1834," General Assembly of Pennsylvania, 2025. www.palegis.us/legislation/bills/text/PDF/2025/0/HB1834/PN2257.

101 Ibid.

enacted, it is a promising start to regulating data center customers and mitigating some of the harms of data center load growth.

Local Solutions

Local governments have significant power in either supporting or hindering data center development in their jurisdiction. Through zoning ordinances, building permits, and environmental permits, local elected officials can limit harm from data centers.

Local governments possess broad authority under their police powers to enact ordinances that protect public health, safety, and welfare, including regulating environmental nuisances such as noise, light, air emissions, and vibration. Environmental nuisance control ordinances function by establishing clear, enforceable standards that prevent unreasonable interference with residents' quality of life and hold large-scale operations (such as data centers) accountable for the impacts of their activities. These ordinances are legally grounded in longstanding nuisance law and municipal authority to address localized harm, providing communities with a proactive, legally defensible tool to mitigate environmental and public health risks. By tailoring regulations to the specific needs and conditions of the municipality, local nuisance ordinances are an effective means to ensure that industrial or high-energy-use facilities can only operate in a way that is compatible with the community's well-being.

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From a legal standpoint, environmental nuisance ordinances in Pennsylvania rest on solid statutory and case law foundations. Under the Pennsylvania Constitution, municipalities (including boroughs, townships, and cities) derive their powers from the Commonwealth and may exercise authority consistent with state law, home rule charters notwithstanding. The Pennsylvania Municipalities Planning Code ("MPC," Act 247 of 1968, 53 P.S. § 10101 et seq.) explicitly empowers municipalities to regulate land use and enact zoning and other ordinances "for the promotion of the public health, safety, morals, and welfare."[102] Under Section 603(b) of the MPC, municipalities may adopt zoning ordinances that regulate structure size, location, erection, maintenance, use, etc.—so long as they do not conflict with state or federal law.[103] Case law confirms that where municipal ordinances irreconcilably conflict with state statutes or regulations, state law preempts local law. For example, in *Liverpool Township v. Stephens*, a township ordinance

102 "Local Land Use Planning Controls in Pennsylvania," We Conserve PA Library, 2025 https://library.weconservepa.org/guides/58-local-land-use-planning-controls-in-pennsylvania

103 "Pennsylvania Supreme Court, J-5-2022, Charlestown Zoning Hearing Board v. Charlestown Outdoor LLC (Appeal)," August 2022, www.pacourts.us/assets/opinions/Supreme/out/J-5-2022do1 percent20-percent20105241505194744012.pdf.

imposing more stringent geological standards than those the Pennsylvania Department of Environmental Protection had promulgated under state law was held preempted.[104] The MPC also provides for uniformity and conflict preemption: municipal regulation must not prohibit what state law permits, nor permit what state law forbids.[105] Thus, properly drafted environmental nuisance ordinances (addressing noise, emissions, vibration, etc.) that stay within those bounds are highly defensible and effective at the local level under Pennsylvania law.

Most zoning ordinances created before the data center development boom are outdated and don't specifically address data centers, or when they do, they don't distinguish between small and large developments. This means that many data center proposals are addressed on a case-by-case basis, giving even more power to local authorities. Some towns have used this power to speed up data center approval, updating their ordinances to streamline the process and omit discretionary review or public hearings. In Fairfax County, Virginia, local zoning ordinances were updated to allow data centers to be developed "by-right" in certain industrial and commercial zones with no discretionary approval needed. Other counties in northern Virginia have been more cautious, removing the "by-right" designation and requiring special permits.[106] In Pennsylvania, Limerick Township supervisors added a "data center overlay" requiring additional processes to approve data centers in specific industrial zones.[107]

As residents become increasingly wary of data centers, seeing the effect that they have on surrounding towns, elected officials are feeling the pressure to adhere to local sentiment or risk losing re-election. In 2021, Warrenton, Virginia council members changed the zoning ordinance to allow for data centers, almost immediately attracting the attention of Amazon Web Services.[108] Against the urging of local residents and the planning commission, the council approved an application for the special building permit needed for the 42-acre data center.[109] Residents took matters into their own hands, and just a year later all four council members that approved the data center were voted out and replaced by data center opponents.[110] While the council can't go back and rescind the special permit approval, it is putting up barriers to the new power lines and substation

104 Ibid.

105 Ibid.

106 "Community Strategies to Address Data Center Development and Operation," National League of Cities, EPI Center, and AAAS, September 2025, www.nlc.org/wp-content/uploads/2025/09/Data-Centers-Fact-Sheet-3.pdf.

107 Evan Brandt, "Data center zoning being adopted in Limerick," *The Mercury*, October 4, 2024, www.pottsmerc.com/2024/10/04/data-center-zoning-being-adopted-in-limerick.

108 Robin Earl, "Amazon 'very interested' in building a data center in Warrenton," *Fauquier Times*, September 28, 2021, www.fauquier.com/news/amazon-very-interested-in-building-a-data-center-in-warrenton/article_af1cc386-cece-11eb-b303-b73b33a69352.html.

109 Robin Earl, "Warrenton Town Council approved Amazon data center special use permit," *Fauquier Times*, February 15, 2023, www.fauquier.com/news/warrenton-town-council-approves-amazon-data-center-special-use-permit/article_26dcc3ee-ad17-11ed-8db1-6bb7d802d95e.html.

110 Tate Hewitt, "Town Council election results a 'referendum on Amazon'," *Prince William Times*, November 13, 2024, www.princewilliamtimes.com/news/warrenton-town-council-election-results-were-referendum-on-amazon/article_3addfcaa-4ef5-59f2-af36-1d36d78f6ad9.html.

needed to connect the data center to the local grid. These hurdles, combined with a lawsuit filed by local residents, has left the plot of land vacant with no indication of when or if the data center will come to fruition.[111] Similar situations have played out in multiple communities across the country, with pro-data center authorities being recalled and replaced with people that better reflect the interests of residents.

Strong community opposition can stand in the way of data centers, and equipped with information on the environmental, energy, and noise risks, residents in Pennsylvania are pushing back. Local protests in Blakely, Pennsylvania caused a developer to withdraw their proposal for a 400 MW data center in September 2025.[112] Prompted by a 300-signature petition and public hearing, commissioners in Hampden Township unanimously voted against a revision in their zoning ordinance that would allow data centers in office park zones.[113] In Anthony Township, Pennsylvania, the Concerned Citizens of Montour County are pushing the county's board of commissioners to deny a rezoning request from Talen Energy that would allow them to build a data center.[114]

Community advocates gather outside of the AI Horizons Summit in Pittsburgh, September 2025.
Photo: Phoebe Reese, Breathe Project.

111 Peter Cary, "Amazon data center stalled for another year," *Fauquier Times,* February 12, 2025, www.fauquier.com/news/amazon-data-center-stalled-for-another-year/article_09b4f68c-e939-11ef-b19e-8bb3c1458eb8.html.

112 "Proposed Blakely Data Center Project," Blakely Data Center, https://blakelydata.com, accessed November 3, 2025.

113 Jon Hurdle, "Pennsylvania Community Groups Urge Officials to Restrict Data Center Development," *Inside Climate News*, October 15, 2025, https://insideclimatenews.org/news/15102025/pennsylvania-communities-restrict-data-center-development.

114 Ibid.

Advocacy Solutions

Many local ordinance-based solutions have been galvanized by grassroots advocacy. Advocates should take a community-led approach and use lessons learned from communities facing similar challenges across the country. Messaging should focus on the tangible ways residents will feel the presence of a data center in their community. This includes the rising cost of electricity due to the demand of data centers; data centers' strain on local water supplies and their impact on local water quality; potential noise pollution from server warehouses; the occupation of land needed for other community priorities, such as affordable housing development; and the lack of transparency from the companies purchasing or leasing land.

Data centers need significant water resources to cool down their computing equipment. A single data center can consume as much as five million gallons of water a day, most of which cannot be recycled back into the local water supply.

Water use

Data centers need significant water resources to cool down their computing equipment. A single data center can consume as much as five million gallons of water a day, most of which cannot be recycled back into the local water supply.[115] For regions facing water scarcity, this can pose a significant problem. "Companies often prioritize building their facilities in places with cheap power, even if the area is drought stricken," a Stanford hydrologist told *The New York Times*.[116] In one Georgia county, following the buildout of a $750 million data center by tech giant Meta, "local wells have been damaged, the cost of municipal water has soared, and the county's water commission may face a shortage of the vital resource."[117]

Noise pollution

Some people who live near data centers have become frustrated by noise pollution, which can cause sleeplessness and headaches. Data center equipment can create levels of noise that could cause permanent hearing damage for those working inside.[118] They might also emit a constant hum (from the combination of servers, air conditioning units, and other maintenance equipment running around the clock) that is a nuisance to nearby residents, as has been noted by residents in Loudoun County, Virginia, otherwise known as Data Center Alley.[119]

115 Miguel Yañez-Barnuevo, "Data Centers and Water Consumption," Environmental and Energy Study Institute, June 25, 2025, www.eesi.org/articles/view/data-centers-and-water-consumption.

116 Eli Tan, "Meta Built a Data Center next Door. the Neighbors' Water Taps Went Dry," *The New York Times*, July 14, 2025, www.nytimes.com/2025/07/14/technology/meta-data-center-water.html.

117 Ibid.

118 Kelly Richardson, "Understanding the Impact of Data Center Noise Pollution: TechTarget," Search Data Center, TechTarget, December 3, 2024, www.techtarget.com/searchdatacenter/tip/Understanding-the-impact-of-data-center-noise-pollution.

119 Rosalie Chan, "Virginia's 'Data Center Alley' Residents Say an Eerie Hum Is Keeping Them up at Night," *Business Insider*, November 27, 2023, www.businessinsider.com/data-center-noise-disruptions-loudoun-county-virginia-2023-11.

Housing

Loudoun County also highlights how the proliferation of data centers can impact land and housing access. As property values have risen, affordable housing developers keep being outbid by tech companies.[120] In an effort to deal with the housing affordability crisis, the county is exploring land banking and establishing a housing authority.[121]

Transparency

In 2024, The *New York Times* reported that "Residents rarely learn how data centers may affect their lives until it's too late. Big tech operators are aggressively deploying nondisclosure agreements to force local officials, construction workers and others to keep these projects under wraps."[122] The article goes on to describe instances around the country where residents struggled to learn the details of upcoming projects as local governments worked secretly with data center developers. The return on investment of the tax rebate programs used to lure these projects is also often unclear to residents. In some instances, taxpayers may end up on the hook if a project is cancelled or delayed. In Wisconsin, taxpayers paid $50 million for a failed Foxconn data center project,[123] while Virginia residents are paying skyrocketing property taxes due to a proposed data center that is stuck in legal battles.[124]

It is critical that advocates create opportunities to inform the public and provide them with educational resources about data centers and their potential harms. The best time to start a conversation with local elected officials about data centers is before they have been proposed. Topics to discuss include where such a facility could be built, and how to adequately protect the health, safety, and welfare of residents. Most municipalities do not have a zoning ordinance specifically for data centers, which could leave them unnecessarily vulnerable to harmful developments. Encouraging local elected officials to be proactive by deciding in advance where such a facility could be built and then urging them to pass an ordinance to make this the local law is an important way advocacy organizations can help support and protect their communities.

It is critical that advocates create opportunities to inform the public and provide them with educational resources about data centers and their potential harms. The best time to start a conversation with local elected officials about data centers is before they have been proposed.

120 Matt Vincent and David Chernicoff, "The Future of Property Values and Power in Virginia's Loudoun County and 'Data Center Alley,'" Data Center Frontier, Endeavor Business Media, February 14, 2025, www.datacenterfrontier.com/site-selection/article/55266317/the-future-of-property-values-and-power-in-virginias-loudoun-county-and-data-center-alley.

121 Ibid.

122 Sean Patrick Cooper, "Noisy, Hungry Data Centers Are Catching Communities by Surprise," *The New York Times,* September 15, 2024, www.nytimes.com/2024/09/15/opinion/data-centers-ai-amazon-google-microsoft.html.

123 Joe Schulz, "Local Leaders See Data Centers as Revenue Boon, but Critics Say Subsidy Programs Undermine Those Efforts," WPR, May 16, 2025, www.wpr.org/news/wisconsin-data-centers-revenue-tax-subsidy-microsoft.

124 Shirleen Guerra, "Data Center Delay, Tax Shock in Prince William County," *The Center Square*, May 15, 2025, www.thecentersquare.com/virginia/article_6955d3a3-e9a2-4f16-a94b-2b88e7c4e8f2.html.

If a data center has already been proposed in a community, there are several strategies that have been effectively deployed by community groups. Typically, a community will use as many of these tactics as possible as part of a coordinated effort.

1. Organizing at the grassroots level, connecting with other concerned residents and local leaders, and learning about the community's concerns (i.e., the affordability of electricity, impacts on water quality and quantity, and the effects of excessive noise and vibrations on overall quality of life);
2. Increasing visibility of decision-making processes within the community by taking and sharing videos of public meetings;
3. Soliciting news coverage and submitting op-eds and letters to the editor of local papers about a proposed data center helps to inform and bring a community together quickly;
4. Hosting in-person or virtual meetings to share the knowns and unknowns of a proposed data center, share community concerns, and identify where more information and transparency is needed;
5. Engaging in every stage of local zoning or other decision-making process, to ensure that elected officials hear community concerns; and,
6. Creating, distributing, and displaying yard signs with short, clear messages or names of local groups organizing on the issue.

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Conclusion

LOAD GROWTH FROM DATA CENTERS IS UNLIKELY TO SLOW DOWN IN THE COMING YEARS, and Pennsylvania and the broader PJM region will continue to be a hotbed of development. However, there are ways to manage this growth responsibly to ensure that it does not come at the expense of climate action, or generate undue environmental, economic, or public health burdens for Pennsylvanians. The Pennsylvania PUC, state legislature, local municipalities, and community advocates all have an opportunity to set forth guardrails and reforms that can minimize the negative impacts of data center development. Such measures include critically examining projected demand from data centers, limiting ratepayer cost-sharing of expensive infrastructure upgrades, prioritizing the buildout of renewable energy generation, limiting the use of unnecessary tax incentives, setting higher standards for local engagement and environmental protections, and promoting community-level education and engagement. By enacting these types of practical safeguards, Pennsylvania could set a vital precedent for other states experiencing similar levels of data center development and load growth.

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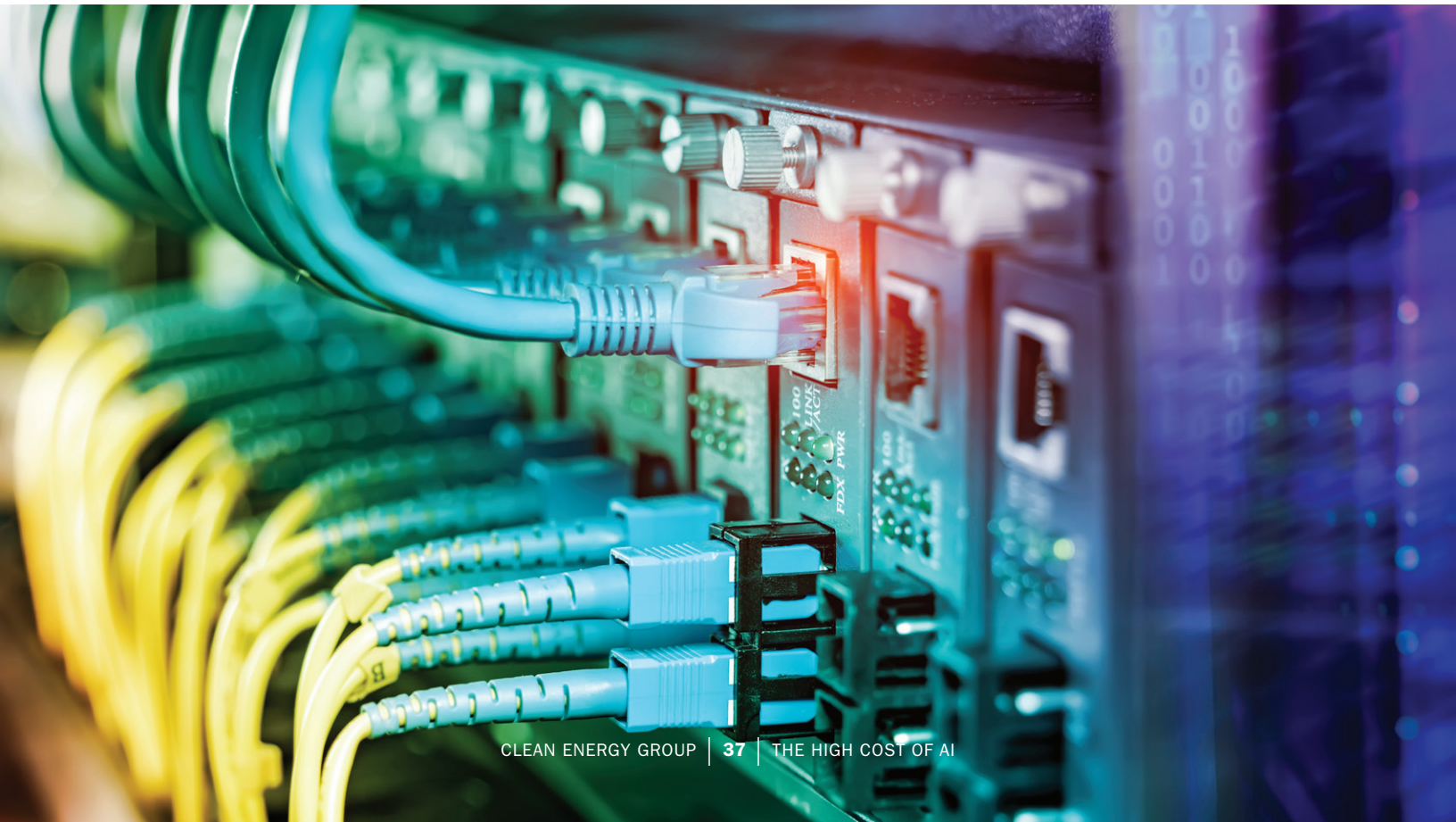

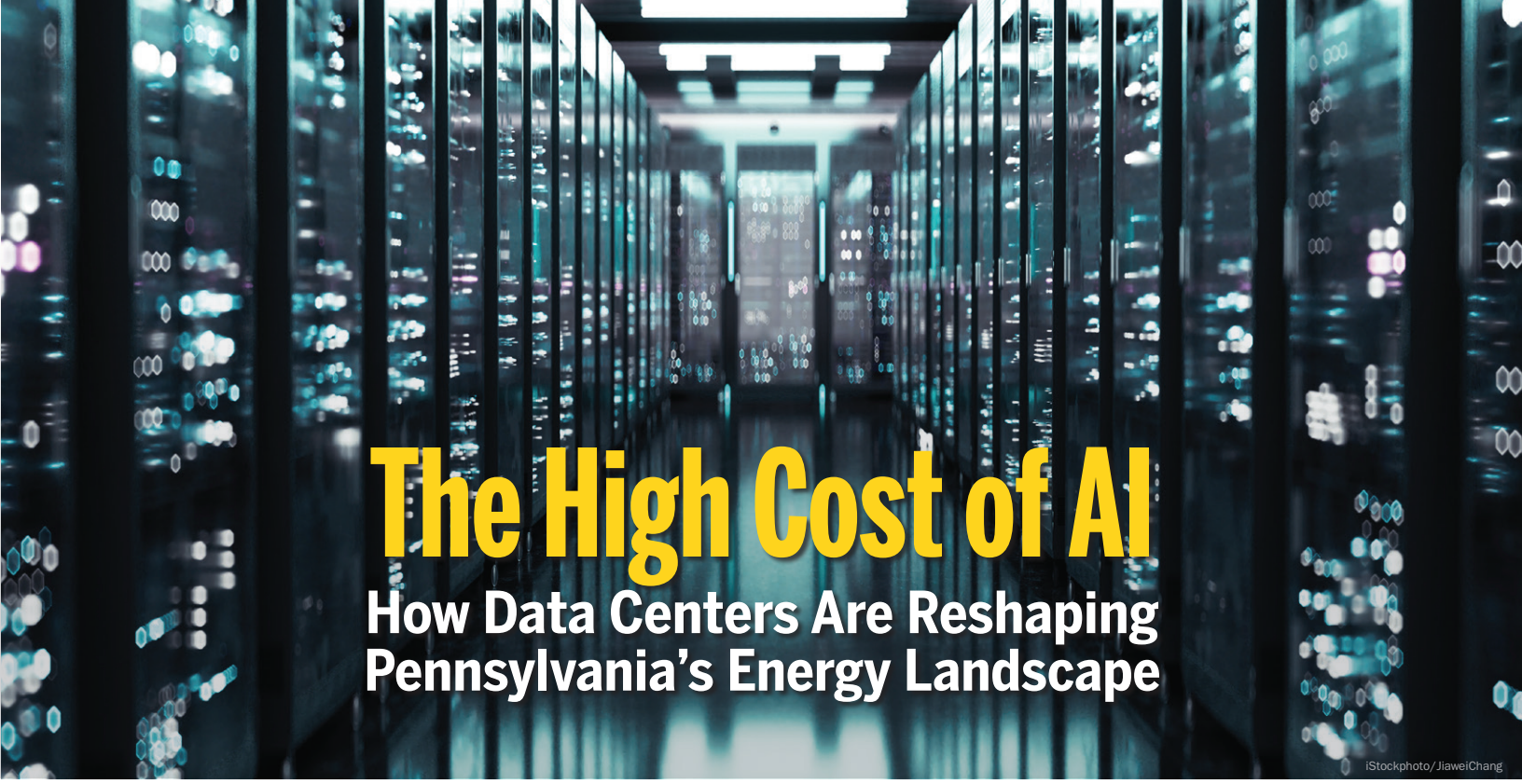

The High Cost of AI

How Data Centers Are Reshaping Pennsylvania's Energy Landscape

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