A collaboration among Geisinger Commonwealth School of Medicine, Johnson College, Keystone College, King's College, Lackawanna College, Luzerne County Community College, Marywood University, Misericordia University, Penn State Hazleton, Penn State Scranton, Penn State Wilkes-Barre, The Wright Center for Graduate Medical Education, University of Scranton, Wilkes University, and the business community

The Institute

Turning Information into Insight

THE INSTITUTE FOR PUBLIC POLICY & ECONOMIC DEVELOPMENT

Exploring the Dynamics Surrounding Data Centers in Northeastern Pennsylvania

January 2026

The Institute

Turning Information into Insight

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This report is not intended to reflect endorsement of or opposition to data centers by The Institute, its Board of Directors, or funders. This report is meant to educate and inform the community about data centers and their pros and cons, share case studies on communities that have experienced data center development and their lessons learned; and provide suggestions on public policy to oversee development and present Pennsylvania fairly and equitably for development while reaping the economic benefits of data centers and mitigating their adverse effects.

Information for this report was gathered through Q4 2025. An addendum with updates will be prepared and released in Spring 2026.

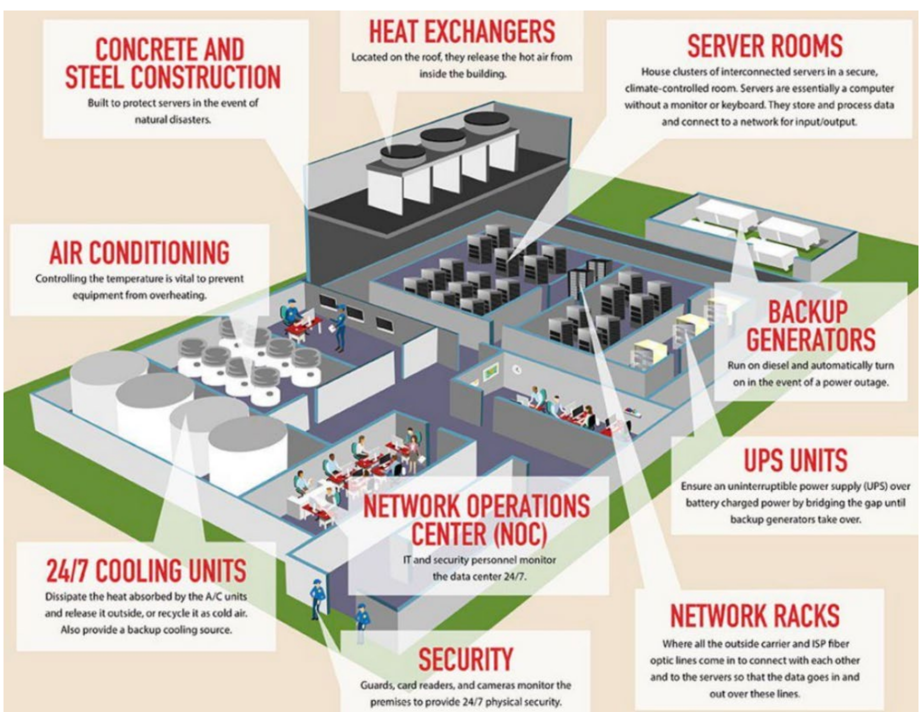
Introduction

Data centers are often discussed as uniform infrastructure projects, yet their real-world impacts vary significantly based on design, siting, governance, and integration with local systems. Community outcomes are not inherent to the technology itself, but rather to the policies, standards, and planning frameworks that guide development. Factors such as energy sourcing, cooling systems, land-use strategy, regulatory oversight, and community benefit structures determine whether a facility functions as a regional asset or a local burden. As such, data center development should be understood not as a fixed outcome, but as a set of choices that can be intentionally shaped to align with long-term community, economic, and environmental goals.

What Is a Data Center?

A data center is a facility designed to house computer systems components such as servers for processing data, data storage systems to store and maintain digital information, and networking equipment that link these components into an integrated system. Servers are computers that process and store end user data. Servers and other components are linked through a network of interconnections, boosting computing speeds. They have even been virtualized, so multiple virtual servers can run on a single physical server. These servers must always be operational, so most data centers have secondary power supplies such as battery power or generators.

Servers create a significant amount of heat. Many environmental factors must be controlled in order for them to run properly. These factors include the temperatures of the air and the servers themselves, humidity, and static electricity. Data center types include enterprise (on-premises), public cloud, and managed or colocation facilities.[i]



Source: GA Consulting[ii]

Servers are the core components of any data center, functioning as the backbone for storing, processing, and sharing information. A server can be defined as a specialized device or computer system that manages, saves, and distributes data across networks. There are many types of servers, including web-based servers that host websites and online applications, virtualized servers that allow multiple systems to run on a single physical machine, and gaming servers that support online multiplayer environments.[iii]

Server Types		
Server Type	**Description**	**Function**
Web server	Serves web content over HTTP	Delivers web pages to browsers
Proxy server	Acts as intermediary between client and host	Adds security, filters or anonymizes requests
Virtual machine (VM)	Software-based server running on physical hardware	Enables virtualization and efficient resource sharing
FTP server	Facilitates file transfers between systems	Uploads/downloads files via FTP protocol
Application server	Hosts and runs applications accessible by clients	Provides back-end logic and service to apps
File server	Stores and provides file access for multiple users	Centralized file storage and retrieval
Database server	Manages and serves databases	Runs database software and handles requests
Mail server	Stores and delivers email	Handles sending, receiving, and storing email data
Print server	Manages printing across networked computers	Shares printers and queues print jobs
DNS server	Resolves domain names into IP addresses	Translates human readable domains to machine addresses
Collaboration server	Supports data/application sharing among users	Enables teamwork, file sharing, collaboration tools
Gaming server	Hosts multiplayer online games	Manages game sessions, user connections
Monitoring & management server	Observes network health, logs, and performance	Tracks, reports, and sometimes intervenes in system operations

Source: Indeed

Server racks, which house and organize servers, are also central to data center functionality. Multiple types of server racks are available, and they can accommodate factors such as size and weight capacity, alignment for optimal airflow and accessibility, and effective cable management to ensure organization, safety, and ease of maintenance.[iv]

Server Racks	
Concept	**Description**
Choosing a rack	Types of IT racks for housing essential systems: open vs closed, preconfigured vs custom,and other factors including access, ventilation, security, environmental protection
Rack mechanical characteristics	Includes dimensions, rack unit (U) sizing, weight capacity, rail adjustability, and custom sizing
Rack power	Elements to ensure safety and uninterrupted IT operations: bus bar systems, dual power paths (A / B), internal rack PDUs, static transfer switches, load balancing, grounding
Rack thermal loading & management	Cooling strategies, handling heat from IT devices, rising densities, liquid cooling, etc.
Rack alignment	Precise placement, hot/cold aisle configuration, overhead bus bars, alignment with facility layout
Rack optimization & scalability	Cable management, airflow, "zero U" hardware, modular growth, density planning
Cable management	Labeling, bundling, routing, separation of power/data, use of trays/patch panels, documentation
Security & access control	Lockable panels, ensure rack stability, and implementing tailored security protocols
Rack management & DCIM	Using DCIM tools for layout planning, live monitoring, equipment replacement, reporting, capacity planning

Source: Device42

More than half the data centers in the world are located in the United States.[v] They vary in size based on their total square footage, the number of racks that can fit within that space, and the number of servers that can fit on these racks (the rack yield). Mega data centers represent the largest category of data centers, encompassing facilities over 225,000 square feet with a rack yield exceeding 9,000. An average data center, spanning about 165,000 square feet, can require an initial capital investment of up to $215 million—approximately $1,305 per square foot. Annual operating expenses are a fraction of that amount, averaging $18.5 million per year, or less than 10 percent of the initial capital cost.[vi]

Data Center Classifications		
Class	**Compute Space (sq ft)**	**# of Servers (rack yield)**
Mega	> 225,000	> 9,000
Massive	75,001 - 225,000	3,001 - 9,000
Large	20,001 - 75,000	801 - 3,000
Medium	5,001 - 20,000	201 - 800
Small	251 - 5,000	11 - 200
Mini	1 - 250	1 - 10

Source: Source: U.S. Chamber of Commerce Technology Engagement Center

The economic impact of an investment is shaped by the *multiplier effect*. This concept explains how money spent in an economy creates additional activity beyond the original purchase. As dollars are spent and re-spent, they circulate through local businesses and workers, generating more revenue, production, and jobs. As a result, the total economic benefit is greater than the primary project activities alone. As such, the figures displayed below regarding jobs, wages, economic activity, and tax revenue encompass the indirect and induced impacts in addition to the direct impacts.

Furthermore, although operational staffing levels are lower than construction-phase employment, data centers function as high-skill anchor facilities within regional labor markets. Their long-term economic value lies in workforce quality rather than workforce volume, supporting careers in IT infrastructure, cybersecurity, electrical systems, facilities engineering, network operations, and advanced building management. These positions offer transferable technical skills, wage stability, and career mobility, reinforcing regional higher education and technical training pipelines. In this way, data centers contribute to long-term economic resilience and workforce modernization, rather than short-term employment spikes tied solely to construction activity.

Initial Capital and Operating Expenditures of an Average Data Center	
Net rentable square feet (NRSF)	165,141
Capital Expenditure per NRSF	$1,305
INITIAL CAPITAL EXPENDITURES	**$215.5 M**
Land acquisition (6.2%)	$13.4 M
Construction building (20.9%)	$45.0 M
IT equipment (72.9%)	$157.1 M
ANNUAL OPERATING EXPENDITURES (8.6% OF CAPEX)	**$18.5 M**
Power (40.0%)	$7.4 M
Staffing (15.0%)	$2.8 M
Real estate taxes and insurance (5.5%)	$1.0 M
Maintenance, administration, and others (39.5%)	$7.3 M

Source: U.S. Chamber of Commerce Technology Engagement Center

Economic Impacts of a Typical 165,141sq ft Data Center	
Construction Phase 18-24 Months	**Operation Phase Annually**
1,688 Local Jobs	157 local jobs
$77.7 million wages	$7.8 million wages
$243.5 million local economic activities	$32.5 million local and economic activities
$9.9 million state & local taxes	$1.1 million state & local taxes

Source: U.S. Chamber of Commerce Technology Engagement Center

Data centers are reported to increase job opportunities throughout their supply chain, strengthen infrastructure development, boost tax revenue, foster a data-centric business ecosystem, and create demand for skilled workers. With proper measures in place, they can also be managed in an environmentally sustainable way.[vii]

Areas with mature data center sectors offer meaningful examples of economic potential. Data centers in Loudoun County, Viriginia generated $875 million in 2024, accounting for 38.0 percent of the county's overall revenue. The region's data centers require use of three percent of its land. Data centers in Prince William County, Virginia generated $166 million in 2024, an increase of 50.0 percent from the prior year. Over half this revenue supports local schools, and the remaining balance is used for priorities such as public transportation, libraries, parks, and public safety.[viii]

Resource Use

Modern data center development increasingly reflects a shift toward community-integrated infrastructure models. Facilities that adopt closed-loop water systems, climate-based free cooling, renewable energy procurement, and high-efficiency design standards demonstrate that large-scale digital infrastructure can operate with materially reduced environmental footprints. When paired with transparent reporting, third-party certifications, and regulatory accountability, these models provide a framework for data centers to function as responsible industrial neighbors rather than extractive infrastructure users.

Computing consumption, defined by the U.S. Energy Information Administration (EIA) as energy consumption from data center servers, desktop and laptop computers, and monitors in commercial spaces, was estimated to consume eight percent of commercial sector electricity consumption in 2024 and is projected to grow to 20 percent by 2050.[ix]

To accommodate computing consumption, data centers in turn consume large amounts of energy to operate – primarily due to their need for continuous, 24-hour operation that ensures uninterrupted data processing and storage.[x] Energy consumption in data centers is primarily driven by servers, storage systems, network equipment, and supporting infrastructure. The Lawrence Berkeley National Laboratory projects significant load growth in the coming years, with data centers accounting for 1.9 percent of total U.S. energy use in 2018, 4.4 percent in 2023, and an estimated 6.7 to 12.0 percent by 2028.[xi] Total usage for data centers totaled 58 TWh in 2014 and increased substantially to 176 TWh in 2023, with anticipated needs between 325 to 580 TWh by 2028.[xii]

Resource demands are expected to rise dramatically with the increased use of artificial intelligence (AI). According to the EIA, a typical AI-centric data center consumes as much electricity as 100,000 households, while the largest facilities may use up to 20 times more. This surge in consumption is intensified by the regional concentration of data centers, with nearly half of all U.S. facilities located within five major clusters (Northern Virginia; Dallas-Fort Worth, Texas; Phoenix, Arizona; Atlanta, Georgia; and Chicago, Illinois).

Despite its high energy requirements, AI also holds promise for improving energy management. It can enhance grid efficiency by optimizing power generation and transmission, improving renewable energy forecasting and integration, reducing emissions and energy waste, identifying grid faults, and maximizing the capacity of existing transmission infrastructure.[xiii]

Data Centers can use large amounts of water to operate as well. Servers and other operating equipment generate large amounts of heat, and to run efficiently the data center must employ cooling techniques such as air or liquid cooling. Additionally, 80 percent of water used by a data center evaporates, with the remaining being discharged to wastewater facilities. The volume of resources consumed by data centers depend largely on the climate as well as the size and type of technology used at each facility. For instance, closed-loop cooling systems can reduce the use of freshwater up to 70.0 percent, because they harvest rainwater and recycle wastewater.

Data centers are typically estimated to use approximately 300,000 gallons of water daily (similar to 1,000 households). Large data centers may use five million gallons daily (similar to a town with 50,000 residents),[xiv] though 2024 report regarding data centers in Virginia found that 83.0 percent of the facilities in the state used amounts of water similar to those of large office buildings – about 6.7 million gallons per year or 18,400 gallons daily (enough to fill a family-size swimming pool).[xv]

Temperature Control

Electronic equipment in data centers generates substantial heat, making efficient cooling essential to maintain performance and reliability. Cooling systems can account for up to 40 percent of a data center's total energy consumption. Data center cooling involves managing temperature, humidity, and airflow to ensure optimal operating conditions for equipment. According to the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), ideal temperature and humidity levels range from 64°F to 81°F and 40 percent to 60 percent, respectively. Effective cooling not only prevents overheating and costly downtime but also extends the lifespan of equipment. Common cooling methods include:

- Server cooling, which removes heat from highly localized server components
- Humidity control, which uses dehumidifiers or humidifiers to maintain humidity levels within the data center
- Computer room cooling, which ensures consistent and uniform cooling to maintain temperature and humidity in the computing space
- Fluid conditioning, which includes tempering, filtering, treating, and managing of cooling fluids such as water, refrigerants, or glycol used to absorb and transfer heat
- Heat rejection, which uses a heat exchanger to move heat from the warm air within the data center to a cooling medium – often water or refrigerant – which then releases the heat outside the facility
- Airflow management, which manages airflow direction, velocity, and quality through HVAC systems to balance the distribution of cold air and removal of hot air. Solutions for keeping hot and cold air separate include containment strategies, raised floors, ceiling return plenums, blanking panels, and specialized ventilation systems.

A combination of methods can be used to cool data centers, including traditional air conditioning systems, advanced airflow management techniques, and liquid cooling solutions. These methods are implemented with consideration of ambient temperature – the actual temperature of the surrounding environment.

Traditional Cooling Methods	
Cooling Method	**Description**
Air Conditioning Systems	
CRAC (Computer Room Air Conditioning)	Air-based coolant (often refrigerant, glycol, or water) cools air surrounding the servers (often equipped with humidifiers); cooled air is distributed through raised floor systems or ducting. High pressure areas force cold air into hot equipment and low pressure areas draw warm air back into the cooling system
CRAH (Computer Room Air Handler)	Uses chilled water (rather than refrigerants) to regulate temperature and humidity; warm air passes over chilled coils, and cool air is recirculated distributed through raised floor systems or ducting.
Airflow Management Methods	
Hot-Aisle / Cold-Aisle Containment	Racks are arranged so that “cold aisles” (front of servers) and “hot aisles” (rear exhaust) are separated, often with physical barriers (doors, walls) to prevent mixing of cold/hot air.
In-Row & In-Rack Cooling	Cooling units are placed between racks (in-row) or within the rack itself (in-rack) to deliver cooling closer to heat sources, reducing air travel and mixing.
Water Cooling Systems	
Chilled Water Systems / Chillers	Use a loop of chilled water to absorb heat from the data center; water is then cooled by chillers (air-cooled, water-cooled, or glycol) and re-circulated.
Source: Dgtl Infra	

CRAC systems are generally more expensive and require more complex infrastructure, making them suitable for smaller data centers. In contrast, CRAH systems are less costly and less complex, making them more practical for larger data center operations.

CRAC vs CRAH Cooling Methods		
Feature	**CRAC Units**	**CRAH Units**
Cooling Medium	Refrigerant, glycol	Chilled water
Energy Efficiency	Generally less efficient	Generally more efficient
Temperature Control	Direct control of temperature	Depends on chilled water temperature
Humidity Control	Better control	Less control
Complexity	More complicated system	Simpler system
Cost	Generally more expensive	Generally less expensive
Applicability	Smaller data centers	Larger data centers
Source: Dgtl Infra		

Alternative cooling methods include liquid cooling, free cooling, evaporative cooling, adiabatic cooling, and geothermal cooling. The Commonwealth is particularly well-positioned to benefit from free cooling techniques due to its lower regional temperatures.[xvi]

Alternative Cooling Methods	
Cooling Method	**Description**
Liquid Cooling (Direct, Immersion)	Uses a liquid medium (often dielectric fluids or water/glycol) to absorb heat directly from components to cold plates or immerse servers in a fluid bath.
Free Cooling / Economization	Uses ambient external conditions (cool air or water) to assist or replace mechanical cooling. Two modes: air-side economization (bring in cool outside air) or water-side economization (use cool ambient water or fluid loops).
Evaporative Cooling	Water is sprayed or used in pads; as it evaporates, it absorbs latent heat, cooling the air that passes over it. Two versions: direct (air itself is cooled) and indirect (a separate air or water stream is cooled, which then cools the primary air).
Adiabatic Cooling	Air is cooled by expansion or pressure change without exchanging heat with an external body.
Geothermal Cooling	Uses stable subsurface (earth) temperatures via buried loop systems to absorb heat from the data center. The fluid circulates underground to transfer heat away.
Source: Dgtl Infra	

Sustainability

Data centers require substantial resources, including electricity and water, to operate, making it essential for these facilities to adopt eco-friendly practices to reduce their carbon footprint. A common approach for sustainability-conscious buildings is to engage third-party vendors to assess and certify overall efficiency, resource use, and environmental impact. Some widely recognized third-party sustainability certifications include:

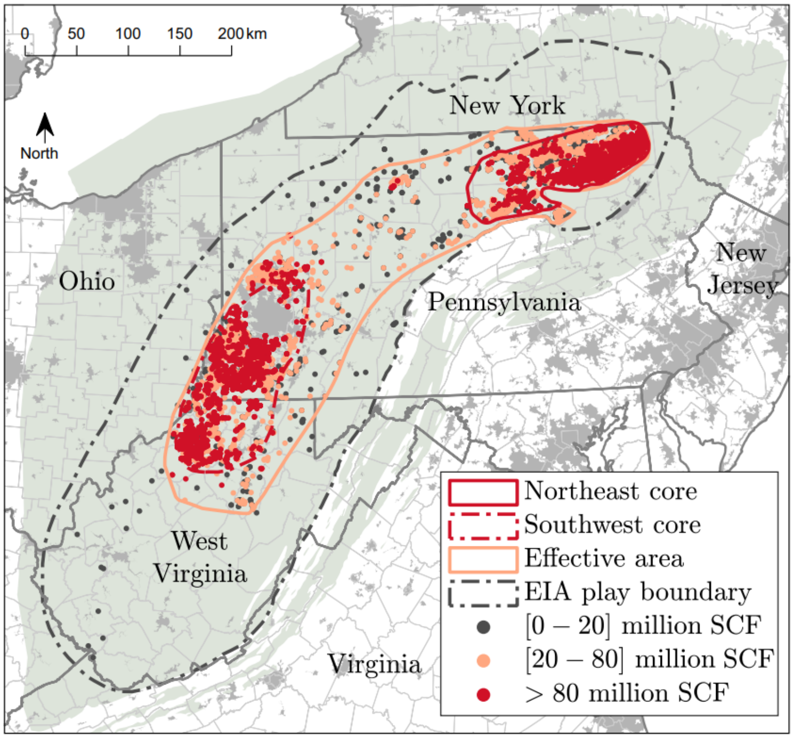
- Energy Star Certification, which recognizes buildings that meet high standards of energy efficiency
- Leadership in Energy and Environmental Design (LEED), which evaluates the overall sustainability of a building, including design, construction, and operations
- Uptime Institute Efficient IT (EIT) Stamp of Approval, which focuses on evaluating energy efficiency and sustainable practices in both facilities and IT equipment
- ISO 50001, which is an international standard that provides a framework for implementing an energy management system aimed at improving energy performance
- Building Research Establishment Environmental Assessment Method (BREEAM), which assesses metrics such as energy efficiency, water management, and use of construction materials.

In addition to third-party certifications, data centers can assess their own sustainability using metrics such as Power Usage Effectiveness (PUE) and Carbon Usage Effectiveness (CUE). Eco-conscious data centers benefit from lower operating costs, reduced environmental impact, and a positive influence on the surrounding community.[xvii]

Why Pennsylvania?

Pennsylvania – and more specifically, Northeastern Pennsylvania (NEPA) – is a desirable location for data centers because the region offers the accommodations necessary for their operations. With appropriate infrastructure, resources such as are abundant. The area also offers education and workforce development, a temperate climate, legislative support, and increased connectivity and proximity to major markets.[xviii]

The Marcellus Shale makes NEPA an attractive place for data centers. A study published in January 2024 found that the primary areas of natural gas development are located in the northeast and southwest parts of the region. The existing 12,406 wells are projected to produce 85 TSCF of natural gas by 2040. Production could increase to between 150 and 180 TSCF with the addition of 3,864 to 7,896 new wells.[xix]



Source: Geo Science World

Furthermore, Northeastern Pennsylvania is home to a robust network of higher education institutions. They are well positioned to support this growing industry by developing a highly trained workforce. Several local colleges – led by the Pennsylvania Commission for Community Colleges (PACCC), and including Luzerne County Community College, Lehigh Carbon Community College, Northampton Community College, and Bucks County Community College – have formed a consortium to prepare workers for careers in this expanding sector. These institutions will play a pivotal role in training skilled professionals to build and operate data centers.

Three main focuses of this partnership include:

- **Career & Technology Academy:** Establishes a student pipeline from career and technology education to postsecondary credentials in fields such as technology and skilled construction trades.
- **MicroCredential Academy:** Offers flexible micro-credentialing programs to make upskilling more accessible.
- **Construction & Trade Pre-Apprenticeship Academy:** Provides a pre-apprenticeship pathway to prepare students for union apprenticeship programs.

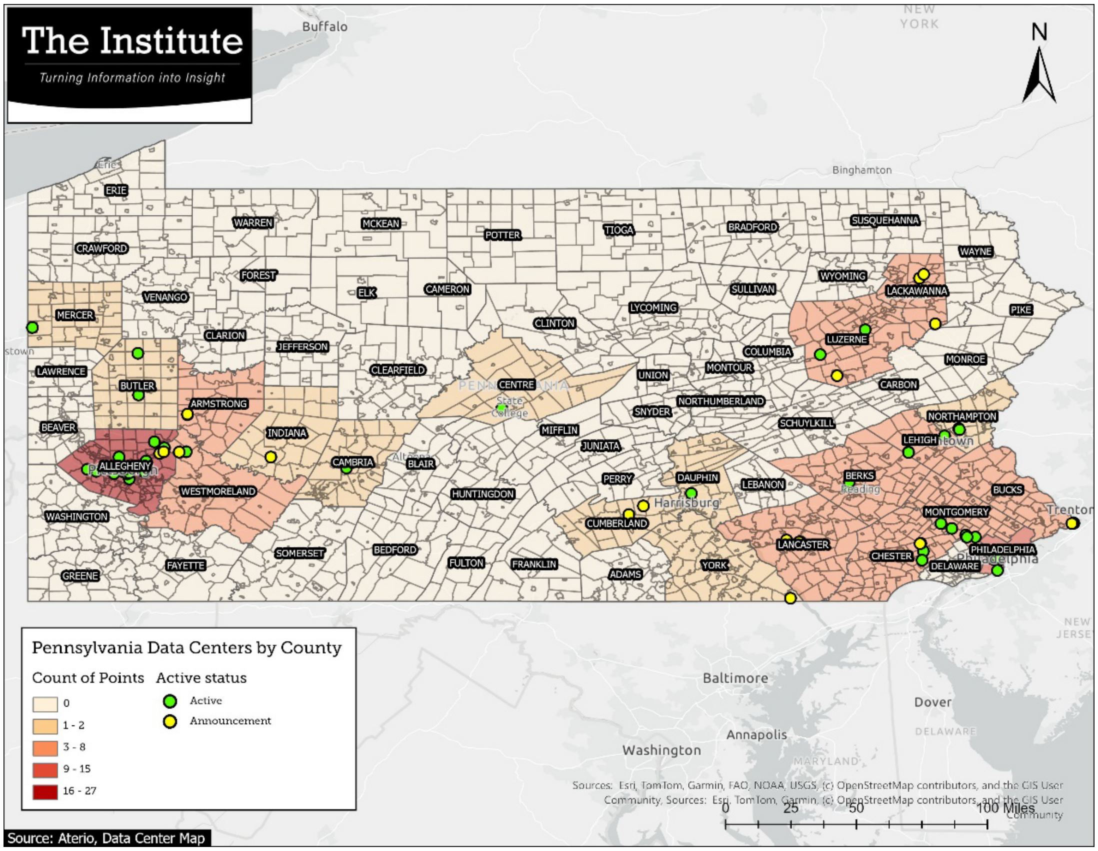
Together, these academies aim to create a strong workforce pipeline to meet the needs of the emerging data center industry in the region.[xx] Many area universities also offer programs that support workforce development for both the construction and operational phases of data center growth.

Programs Aligned with Increasing Data Center Work Force		
College / University	**Data Center Programs**	**Construction Programs**
Johnson College	Computer Information Technology Associate Degree, Cybersecurity Analytics and Operations Certificate Program	Welding Technology, Architectural Drafting & Design Technology, Civil Design Technology, Electrical Construction Technology, Heating Ventilation and Air Conditioning
Keystone College	Information Technology Minor, Information Technology A.S.	B.S., Computer Science B.S.
King's College	Computer and Information Systems Degree, Computer Science Degree	Engineering (3 programs)
Lackawanna College	Computer Information Systems: Intro to Computer Applications, Hospitality Computer Applications, Spreadsheets for Business. Cyber Security: Introduction to Cyber Security, Operating System Fundamentals, Networking Fundamentals, Scripting & Programming Essentials, Cyber Security Internship, Cyber Security Design Principles. Pre-College Programs: Dual Enrollment, Level Up, and SOAR.	Construction Safety, Tools / Rigging / Measurement, Construction Math, Communication for Construction, Capstone for Construction
Luzerne County Community College	Cybersecurity and Networking A.A.S., Computer Science A.S., Computer Information Systems A.A.S./A.S., Computer Programming Certificate, Computer Applications Diploma, Office Information Technology A.A.S.,	Electrical Construction Technology, Heating and Air Technology, Industrial Maintenance, Plumbing / Heating / Air Conditioning Technology, Welding, Pre-engineering A.S.
Marywood University	Bachelor of Science in Computer Science (BS), Bachelor of Science in Information Security (BS)	Bachelor of Science in Construction Management (BSCM), Associate of Applied Science in Surveying (AAS)
Misericordia University	Bachelor of Science in Computer Science (5 programs), Information Technology program (4 programs)	—
Penn State Scranton	Information Sciences and Technology Associate Degree, Information Sciences and Technology B.S., Bachelor of Science Degree in Information Technology	Design and Construction Certificate Courses
Penn State Wilkes-Barre	B.S. in Information Technology, Information Sciences and Technology (IST) Associate Degree, IST Minor	B.S. in Electrical Engineering Technology (EET), B.S. in Surveying Engineering, Associate Degree in Surveying Engineering Technology
Penn State Hazleton	B.S. in Computer Science, B.S. in Information Technology, A.S. in Information Sciences & Technology, IST Minor	—
University of Scranton	Cybercrime Investigation and Cybersecurity M.S.	—
Wilkes University	Cloud Computing (Major/Minor), Computer Engineering Minor, Computer Science (Major/Minor)	Engineering Management M.S
Source: Respective University Website		

Additionally, Pennsylvania offers an ideal climate for data centers, with average annual temperatures of about 47 degrees in the north-central region and 57 degrees in the far southeast.[xxi] Data centers generate significant heat, so they require continuous cooling. Facilities in cooler climates can take advantage of a method called *free cooling*, which uses outside air to reduce temperatures instead of relying entirely on expensive mechanical systems. While backup cooling is still necessary during warmer periods, advances in free cooling technology now enable efficient operation even at temperatures up to 80 degrees.[xxii]

Pennsylvania is ideally located to provide data center services to six bordering U.S. states and major cities such as New York, Philadelphia, and Washington D.C. Not only is the Commonwealth well positioned, the region itself is highly accessible. After the events of 9/11, project Wall Street West was enacted to provide data security to New York based financial institutions housing critical data. The program found that nine counties in the northeastern Pennsylvania region would provide moderate operating costs, affordable energy costs, substantial tax incentives, and a wide selection of commercial sites and technology parks. Additionally, the region is within a 60-mile radius of New York, but not over 125 fiber miles away (providing synchronous data transmission). It is on a separate power grid, within a different watershed, and with different transportation systems – meeting the requirements of a disaster recovery site. Due to these factors, $40 million was invested in new fiber optic lines connecting the regions.[xxiii]

At the time of publication, 93 data center projects were either active or planned across the state. Allegheny (27), Philadelphia (15), and Montgomery (eight) Counties contain the largest quantities of data centers in the state.



Fiber optic cable carries data as pulses of light through thin strands of glass or plastic, allowing information to travel long distances at very high speeds. A single cable can hold hundreds of individual fibers within one protective casing, making it far more efficient than most other data-transmission technologies.[xxiv] Operational fiber optic lines in Northeastern Pennsylvania are primarily owned and operated by a mix of major telecommunications corporations and expanding regional providers. For instance, FirstLight's network covers much of Wayne County and portions of Lackawanna and Susquehanna Counties. Windstream's lines run through Monroe, Lackawanna, and Susquehanna Counties. Together, these systems span roughly 144.8 miles and pass through key cities such as Carbondale, Honesdale, New Milford, Scranton, and Stroudsburg. [xxv]

Electric grid generation refers to the production of electricity by power plants that will supply the electrical grid. Electric grid capacity is the maximum amount of power a grid can supply to customers at any given time via transmission and distribution networks. While available power is determined by the power plants available, transmission capacity limits overall output of distribution. Electric grid generation and capacity rely heavily on transmission capacity. Transmission lines are cable conductors that carry electricity from generation companies to distributors and then to consumers. Transmission lines come in several forms, including overhead lines that carry voltages from 69 kV up to 765 kV, sub-transmission lines that range from 34.5 kV to 69 kV and link major transmission systems to regional distribution substations, and underground transmission lines used where overhead construction is impractical. Across all types, transmission lines are defined by their high voltage levels, their ability to move large amounts of electricity, and their capacity to span long distances.[xxvi] Transmission line voltages greater than 230 kV are rated as high voltage lines.[xxvii]

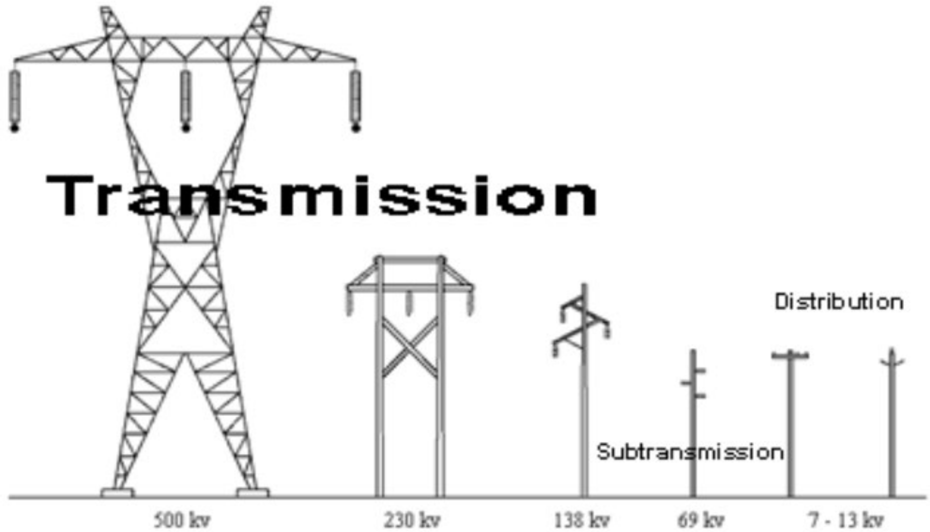
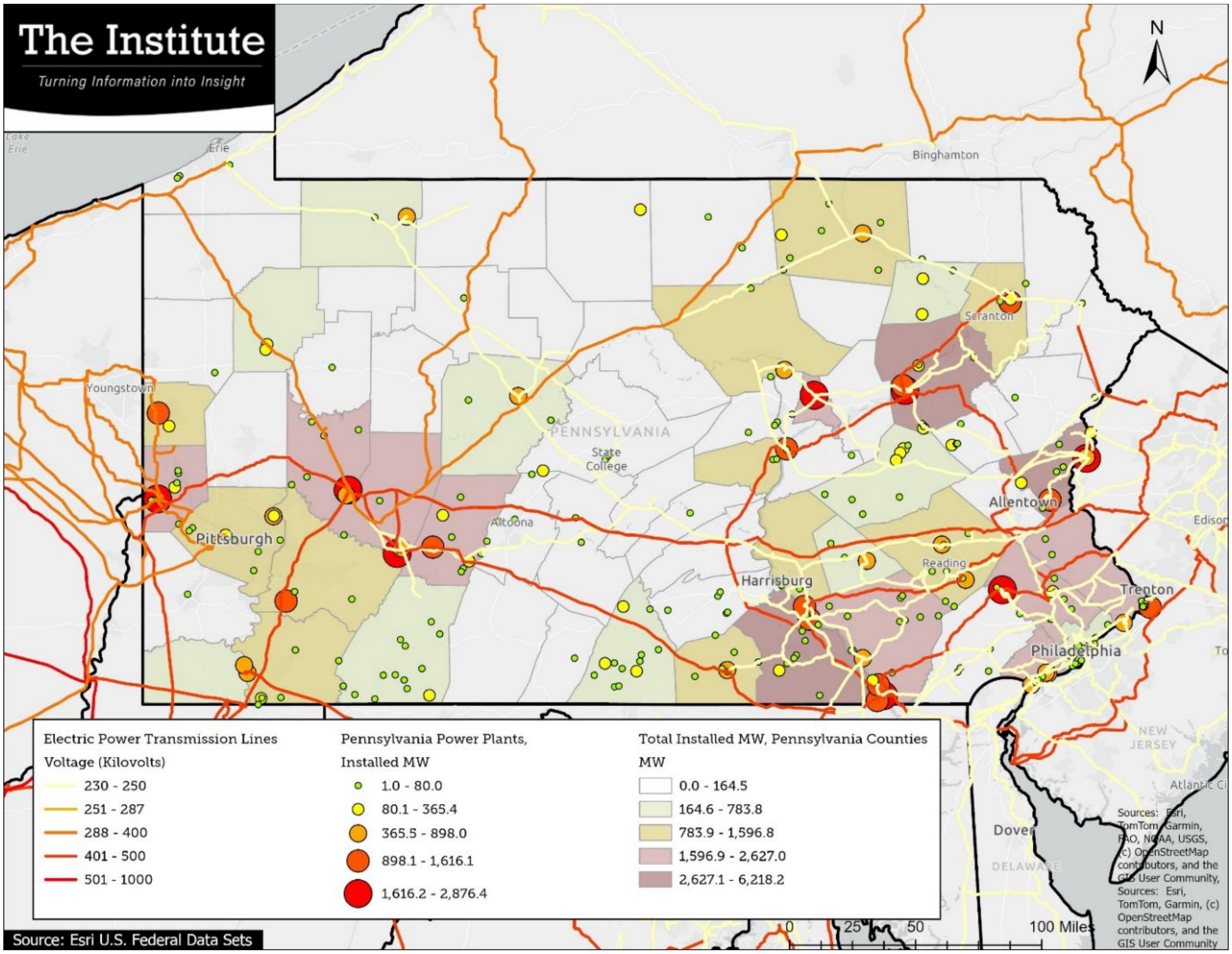


Image Source: U.S. Department of Labor

Across Pennsylvania, there are 6,496.9 miles of high-voltage transmission lines at 230 kV or above. Of this total, 58 percent (3,761.5 miles) operate at 230 kV, 14 percent (905.4 miles) at 345 kV, and 28 percent (1,829.9 miles) at 500 kV. In Lackawanna, Luzerne, and Wayne Counties, high-voltage lines span 557.4 miles, representing 8.6 percent of the statewide network. About 74 percent of these local lines (416.6 miles) are rated at 230 kV, while the remaining 25 percent (140.7 miles) operate at 500 kV.[xxviii] Luzerne County ranks second in Pennsylvania for electricity generation at 4,044.2 MW, while Lackawanna County ranks 13th with 1,596.8 MW and Wayne County 41st with 64.5 MW. Together, the three counties draw from a diverse energy mix that includes natural gas (3,057 MW), nuclear (2,532 MW), wind (88.5 MW), hydroelectric (40 MW), other sources (20 MW), petroleum (5.4 MW), and solar (1.8 MW).[xxix]



Major investments supporting data center development are underway across the Commonwealth. At the inaugural Pennsylvania Energy and Innovation Summit held at Carnegie Mellon University on July 15, 2025, Senator Dave McCormick announced the following:

- Anthropic committed to investing $1 million for cybersecurity education at the middle school and high school levels, as well as $1 million to support energy research at the university.
- Blackstone will invest $25 billion data center and energy infrastructure development in Northeast Pennsylvania, and partner with PPL Corporation for power generation, creating approximately 6,000 construction 3,000 permanent jobs.
- Brookfield will invest $3 billion over two decades, working with Google to repower two hydropower facilities and create approximately 300 new jobs.
- Capital Power will invest $3 billion over one decade to upgrade and expand a gas facility in Shamokin Dam; this investment will include $2 billion gas purchases in the Commonwealth and approximately 30 jobs.

- Constellation Energy will invest $2.4 billion in the Limerick nuclear power plant, creating approximately 3,000 jobs.
- CoreWeave will invest $6 billion to develop a data center in Lancaster, creating approximately 600 new construction jobs and 175 operational jobs.
- Energy Capital Partners announced a $5 billion plan to develop a data center in York, creating 2,500 construction jobs; Energy Capital Partners also plans to develop 51 community solar projects designed to power 24,000 homes.
- Energy Innovation Center Infrastructure Academy intends to build training facility for energy and AI infrastructure workers.
- Enbridge will invest $1 billion to expand gas pipelines into the Commonwealth.
- Equinor will invest $1.6 billion into natural gas production, exploring options for linking gas to flexible power generation and creating approximately 1,000 direct and indirect jobs.
- First Energy will invest $15 billion in expanded power distribution and grid infrastructure in 56 counties, and support the expansion of an apprenticeship program for electrical workers.
- Frontier Group will invest $3.2 billion to transform a coal power plant in Shippingport into a natural gas power station, creating approximately 15,000 construction jobs and approximately 300 permanent jobs.
- GE Vernova will invest up to $100 million and create approximately 250 jobs through the expansion of power grid equipment manufacturing in Charleroi.
- Google will work with Brookfield over two decades to repower two hydropower facilities; Google also launched the 'AI Works for PA' initiative and awarded a grant to train electrical workers and new apprentices in the use of AI.
- Homer City Redevelopment intends to purchase $15 billion of the Commonwealth's natural gas, creating approximately 1,000 jobs along with approximately 10,000 construction jobs.
- Meta is granting $2.5 million in partnership with the Schwartz Center for Entrepreneurship at Carnegie Mellon University, which will support a small business community accelerator along with startups in rural areas of the state.
- PA Data Center Partners and Powerhouse Data Centers will develop a $15 billion data center hub spanning three campuses near Carlisle.
- PPL Corporation will invest $6.8 billion to expand grid capacity and improve transmission across multiple counties, creating 3,400 jobs; this is in addition to the corporation's aforementioned partnership with Blackstone.
- TC Energy plans to invest $400 million in a gas pipeline network in the Commonwealth.
- Westinghouse Electric Company is constructing 10 large nuclear power plant reactors in southwest Pennsylvania, generating an estimated $6 billion in economic impact that includes 15,000 jobs.

Relevant Legislation

Legislative and regulatory requirements are continually evolving, and multiple entities assert overlapping jurisdiction. When their directives conflict, it creates significant challenges in navigating the regulatory and policy landscapes.

A variety of policy measures impact the development and operations of data centers in Pennsylvania. For instance, Act 84 of 2016 – amended in 2019 and 2021 under Acts 13 and 25, respectively – established the Computer Data Center Sales and Use Tax Exemption Program. It allows for sales tax refunds for the purchase and use of computer data center equipment. This legislation was specifically designed to attract data centers to the state.[xxx]

Senate Bill 939, introduced during the 2025–2026 regular session, aims to expedite the permitting process for data centers by reducing the number of required approvals and aligning regulatory conditions with those of other industrial sectors. On July 14, 2025, the bill was referred to the Senate Communications and Technology Committee for review.[xxxi]

On November 19, 2024, Governor Shapiro launched the PA Permit Fast Track Program, designed to streamline permitting for high-impact economic development and infrastructure projects that require approvals from multiple agencies.[xxxii] In Northeastern Pennsylvania, Project Hazelnut, Salem Township Data Center Development, and Century Development Industrial Park have been designated by the Commonwealth as parts of the Fast Track program.[xxxiii]

Act 54, Streamlining Permits for Economic Expansion and Development (SPEED), was enacted in July 2024. It is designed to accelerate the permitting process for economic development projects.[xxxiv]

As part of Governor Shapiro's Lightning Plan, House Bill 502 (HB 502) aims to support data center development by establishing the Reliable Energy Siting and Electric Transition (RESET) Board. The board would streamline the permitting process for new energy infrastructure, ensuring reliable power access for energy-intensive industries like data centers.[xxxv] As of March 23, 2025, HB 502 was referred to the House Energy Committee for consideration.[xxxvi] Critics of HB 502 argue that the bill would "fast-track" fossil fuel projects, increasing the risk of pollution in nearby communities. In response, more than two dozen environmental groups have written to state representatives opposing the legislation and urging greater consideration of its potential environmental impacts.[xxxvii]

It is possible that data centers may be developed on contaminated land, including land affected by the mining industry, which is abundant in the region. House Bill 109 (HB 109) would aid these efforts by allowing permits to be issued for projects located in environmental justice areas. This approach could help address any issues with available land space by reincorporating previously contaminated land that has gone unused. As of April 7, 2025, HB 109 was returned from the House Environmental and Natural Resource Protection Committee and is currently awaiting further consideration.[xxxviii]

Regulatory Oversight

Legislative and regulatory requirements are continually evolving, and multiple entities assert overlapping jurisdiction. When their directives conflict, it creates significant challenges in navigating the regulatory and policy landscapes.

As data centers continue to expand, implementing regulations to protect ratepayers from increased energy costs is becoming increasingly important. In November 2025, the Federal Energy Regulatory Commission (FERC) issued a ANOPR (Notice of Proposed Rulemaking), with final action anticipated prior to the close of April 2026. Also in November 2025, the PA Public Utilities Commission (PUC) issued a Tentative Order regarding large electric load customers.

Several states have already adopted measures to shield consumers from higher utility expenses associated with data center operations.[xxxix] These regulations include measures to manage energy consumption, reduce environmental impacts, and protect ratepayers from rising utility costs associated with data center operations. Actions to address increasing customer costs caused by data centers include:

- Oregon's HB 3546, regarding a special rate class, mandates that utilities classify data centers separately to prevent cost-shifting.
- Georgia's SB 34, regarding cost pass-through prohibition, bars infrastructure costs from being distributed to general ratepayers.
- Virginia's HB 2084, a regulatory special rate mandate, requires utilities to develop data center-specific rate categories.
- New Jersey's A5462, a rate structure mandate, implements a tariff on data centers to protect customers from increased costs.
- Ohio's AEP tariff, a demand-based tariff with guarantees, requires large users to pay minimum demand fees and long-term commitments.
- California's SB 57 and AB 222, regarding tariff and transparency requirements, mandate clean energy procurement and public energy reporting.
- South Carolina's utility authority for special rates empowers utilities to set higher rates for megawatt-level users.
- Texas's SB 6, regarding interconnection regulation, assigns fees and project accountability for large-load connections.

Georgia faces similar circumstances to the Commonwealth, with just over 150 data centers statewide – 144 of which are located in the city of Atlanta.[xl] Leadership is actively considering legislation to protect ratepayers from rising costs associated with data centers. Senate Bill 34 (SB 34) aims to safeguard consumers from higher utility expenses, while Senate Bill 94 (SB 94) would establish an Office of Utility Counsel to advocate for the public and help prevent ratepayers from bearing increased costs resulting from data center operations.[xli, xlii] While state leadership is actively pursuing measures to protect residents from the impacts of large-load data centers, it is also accelerating data center construction. In May 2024, lawmakers vetoed a bill that would have temporarily suspended a key tax break for two years while the effects on the power grid were assessed. This decision highlights how states, even as they seek to safeguard local communities, continue to welcome and incentivize data center development.[xliii]

On July 25, 2025, Pennsylvania Senator Katie Muth (D-44) issued a memo to all Senate members announcing her intent to introduce the Pennsylvania Ratepayer Protection Act. This legislation aims to shield residents and small businesses from rising energy costs associated with large data centers. Modeled after Oregon's POWER Act (HB 3546), the bill would establish a dedicated rate class for high-load data centers with a peak demand of 20 MW or more. It would also require these facilities to assume the costs of infrastructure buildout and ongoing operations through cost responsibility contracts—long-term service agreements lasting at least 10 years—to ensure expenses are fully covered. Additionally, the legislation would mandate annual reporting of electricity and water usage, promoting transparency and accountability. If enacted, the measure could help eliminate or significantly ease many concerns raised by community members regarding the impact of large-scale data center operations. It was yet to be introduced at the time of this publication.[xliv]

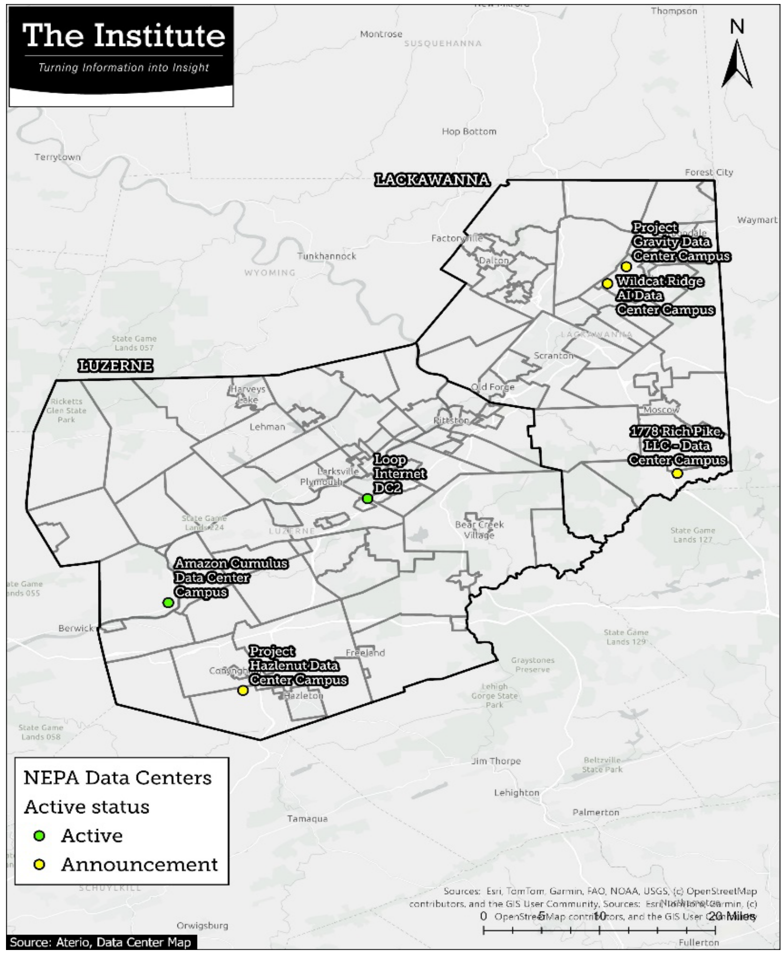
Pennsylvania House Bill 1834 (HB 1834), introduced on September 4, 2025, would grant the Pennsylvania Public Utility Commission (PUC) regulatory authority over data centers if enacted. The proposed regulations would address several key areas, including cost recovery, contributions to the Low-Income Home Energy Assistance Program (LIHEAP), and the creation of a Data Center LIHEAP Enhancement Fund. The bill would also establish renewable energy requirements, along with related filing and enforcement provisions, to ensure accountability and sustainable operations within the industry.[xlv]

On April 24, 2025, the Pennsylvania Public Utility Commission (PAPUC), along with stakeholders from technology and consumer advocacy groups, held an en banc hearing to examine the impact of data centers on the Commonwealth. The primary goal was to develop a model tariff that ensures fair access to utility services, protects consumers from stranded costs, provides certainty for both customers and utilities, and promotes transparency.

During the hearing, stakeholders highlighted several key concerns, including equitable cost allocation for infrastructure, opposition to special treatment for data centers, generation and grid reliability, and adherence to standard tariff processes.[xlvi]

Data Centers in NEPA

Data center development was tracked from July 6, 2025 to September 5, 2025. The following information may not reflect projects proposed, approved, or denied since that period. Lackawanna and Luzerne Counties, at the heart of the NEPA region, are emerging as a hotspot for planned data center development. Currently, two active data centers operate in the area: the Loop Internet DC2 facility in Hanover (sold to Greenlight Networks) and the first building of Amazon's multi-building Cumulus Data Center Campus in Salem Township. The second building of this 15-building campus is under construction, with activation scheduled for November 30, 2026, and the remaining 13 buildings planned for completion by June 30, 2029. Each facility on the 1,200-acre site will span 300,000 square feet with an estimated power capacity of 48 MW per building.



Project Hazlenut, another 15-building campus, is planned to begin construction in January 2028, with completion in May 2029 and full activation by August 2030. In Lackawanna County, three additional data center campuses are planned. Project Gravity will feature six buildings, each 135,000 square feet, while Wildcat Ridge will include 14 buildings, each 379,500 square feet.[xlvii, xlviii] An unnamed campus proposed by 1778 Rich Pike, LLC, on the borders of Covington and Clifton Townships in lower Lackawanna County, could include up to 35 buildings, each up to three stories tall, totaling between 4.4 million and 9.4 million square feet on a 1,000-acre site.

Although data centers offer community benefits, their locations can create significant challenges for nearby residents. This is particularly evident in lower Lackawanna County, where rural communities have expressed strong opposition to data centers being built near their neighborhoods. Residents have raised concerns about environmental damage, water, light, and noise pollution, as well as the potential strain on local resources. These worries have intensified following the announcement of plans for a 35-building data center campus on the borders of Clifton and Covington Townships, near State Highway 435 and Clifton Beach Road. The proposed campus could include up to 35 buildings, each up to three stories tall, totaling between 4.4 million and 9.4 million square feet of floor space on a 1,000-acre site. Plans also call for the construction of a gas-fired power plant to support the facilities.[xlix]

Implications

The rise of data centers in the NEPA region has wide-ranging impacts beyond data processing. Resource consumption is a concern, because facilities that do not use measures such as closed-loop technology may require vast amounts of energy to operate 24 hours per day and significant volumes of water for cooling equipment. Meeting this demand places additional pressure on electricity generation, which must keep pace using a mix of resources, including natural gas and renewable energy.

Although data centers are at the forefront of the technological revolution, some say that demand is not as high as initially thought. Overstated demand could present a significant challenge for the data center industry.[l] For example, China has invested approximately $3.3 billion in 2024 to build out several data center clusters across rural parts of the western country, but the data centers actually only create $20 billion in annual revenue with operating costs around $55 billion (64 percent higher) and utilization rates ranging from 20 percent to 30 percent.[li] Prices have declined due to data center demand.

Potential for a bubble-popping phenomenon will depend on balance between investments and revenues, efficiency of data center construction, rates of AI adoption and price, competition, and public trust.[lii]

Resource Adequacy

Understanding the Commonwealth energy landscape can aid in making competent decisions when considering data centers and their potential locations. In 2021, Pennsylvania was rated as the largest exporter of electricity, and in 2023 was cited as the second largest producer of natural gas. [liii] These abundant resources position the keystone state as a prime location for data center operation.

Electricity

The PaPUC and jurisdictional electric distribution companies, as required under Public Utility Code sections 524(a) and 524(b), submits plans and projections for meeting future customer demand and provides periodic reports summarizing this data. The PaPUC's August 2025 report concludes that PJM has sufficient generation, transmission, and distribution capacity to meet consumer electricity needs in the short term, but notes PJM's long term load forecast predicts much higher peak loads and risk from the lack of load growth and new generation to keep pace with scheduled generation retirements. PJM's Reliability Resource initiative (RRI) aims to address potential energy shortages from large load customers by offering a one-time opportunity for imminently executable resources. The RRI initiative was approved February 11, 2025, and has approved 51 projects totaling more than 9,300 MW of unforced capacity. The new sources are projected to be 90 percent operational by 2030 and completed in 2031.[liv]

RRI Approved Generation Sources					
Source	Uprates (MWE)*	No. of Projects	Construction (MWE)*	No. of Projects	Combined Total
Battery	0	0	2,275	5	2,275
Coal	14	1	0	0	14
Gas CC	1,613	20	6,143	6	7,756
Gas CT	365	13	0	0	365
Nuclear	496	4	887	1	1,383
Onshore Wind**	0	1	0	0	0
TOTAL (Energy)	2,488	39	9,305	12	11,793
TOTAL (unforced capacity)	2,108		7,253		9,361

Source: PJM Inside Line.
*NOTES: *Megawatts energy (MWE) reported in submitted summer values. **Onshore wind is a ~20 MW increase in Capacity Interconnection Rights (CIR) only.*

Nonetheless, experts have expressed concerns regarding an unavoidable energy gap due to retiring power plants and rising energy demands. The PJM service area is predicted to reach an energy shortfall in 2034, with anticipated reserve margins falling below reference margin levels by 0.8 percent.[lv] PJM predicts potential operational risks early as 2026 depending on extreme cold weather and natural gas availability.[lvi] This incongruency of supply and demand is reported to be a result of the competitive generation market in the Commonwealth, pertaining to the Electricity Generation Customer Choice and Competition Act (Act 138) of 1996. This Act allows customers to choose their power suppliers, but requires utility companies to separate their generation, transmission, and distribution services assets.[lvii] This issue is exacerbated by the legal obligation placed on utility companies to provide adequate and reasonably priced services, while the electricity generation companies have none.[lviii]

In 2023, the Commonwealth generated 17.81 TWh more than it did in 2005 and increased electricity exports by 57.8 percent over that same period. Consumption declined by 3.9 percent, and despite higher generation levels, estimated losses decreased by 38.0 percent from 2005 to 2023.[lix]

Electricity Generated, Consumed, and Exported in Pennsylvania (TWh)											
	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023
Electricity Generated	218.09	229.75	214.57	215.07	213.64	215.39	229.00	230.14	241.33	239.26	235.90
Electricity Consumed	151.56	151.75	150.67	150.53	148.33	154.37	150.40	144.86	149.08	151.43	145.66
Estimated Losses	9.91	9.20	7.30	7.58	7.78	7.68	7.89	7.78	6.74	7.85	6.14
Unnaccounted	0.00	1.31	2.28	1.80	1.00	0.93	0.36	-0.21	0.92	-0.26	0.70
Electricity Exported	52.86	68.26	54.86	55.43	56.52	52.46	70.34	77.71	84.59	80.24	83.42

Source: Pennsylvania Department of Environmental Protection

Energy usage across the commonwealth will increase due to data centers activities. Increased usage will drive the need for new generation sources or continued use of sources that were previously planned for retirement. Average annual growth of residential energy usage is projected to increase nearly 1.1 percent by 2029. Commercial usage will decline by almost 0.6 percent, and industrial consumption will increase by 14.8 percent from 2025 to 2029. Overall consumption is projected to increase by 6.17percent over the interval.[lx]

Pennsylvania's Energy Usage Projections (GWh)				
Year	Resedential	Commercial	Industrial	Total
2025	52,367	37,956	47,119	137,442
2026	52,569	37,735	50,116	140,420
2027	53,019	37,786	59,163	149,968
2028	53,700	38,011	75,006	166,717
2029	54,080	37,959	93,402	185,441
Average annual growth (%)	1.08%	-0.58%	14.77%	6.17%
Source: Pennsylvania Public Utility Commission (PA PUC)				

The PaPUC's 2023,[lxi] 2024,[lxii] and 2025 Electric Power Outlooks offer several recommendations to ensure reliability of services going forward. They involve:

- Reducing risks from reliance on 'just in time' fuel
- Distributed energy resources should be focused on as they are deployed
- Maintain reliable services as changing variable energy resources are introduced
- Risk evaluations that address energy risks from all hours of the day and all seasons
- Consideration of electrification's impact on future energy demand and infrastructure in many sectors
- Increased collaboration between stakeholders and policymakers to address growing generation reliability
- A framework should be implemented to address the gas-electric energy system operating and planning needs
- Remove barriers that exist in the siting and permitting process for resource and transmission development to keep up with demand
- Institute resource and system planning that includes extreme weather scenarios, and addresses performance and grid integration issues
- Expanding transmission networks to connect new energy resources and ensure reliable services during the evolution of the energy landscape
- Managing the retirement of generators to match the pace of newer energy solutions, allowing for a smooth transition between energy providing services
- Adaptation of bulk power system planning, operations, and resource procurement markets to handle the complexities involved with variable energy resources and retiring power plants
- New generation with needed reliability attributes, and strengthening current resources to handle inverter-based resource issues as well as generator and fuel vulnerabilities to extreme temperatures

Additionally, recommendations were included for areas that rely heavily on natural gas and variable energy resources. These include:

- Reliability standard requirements to better assess risks
- The power to postpone generator retirement due to energy shortfalls
- An all-hours energy availability analysis to establish resource adequacy
- Aid from policy setting organizations to increase produce enough energy to match the retired facilities.

PJM Projections

Regional transmission organizations (RTOs) manage the electrical grid and wholesale markets. PJM Interconnection is the regional transmission company for Pennsylvania and several other states (Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Tennessee, Virginia, West Virginia, and the District of Columbia). The RTO covers 36,9054 square miles and coordinates the operations of 88,333 miles of transmissions lines to more than 65 million customers. Additionally, PJM coordinates the operation of electric power generators with an estimated generating capacity of more than 182,000 MW. The 2024 summer forecast estimated that PJM could serve a summer peak demand of 154,000 MW, but reliability studies reveal a generating capacity exceeding 164,000 MW.[lxiii]

Total internal demand in the PJM service area is forecasted to increase by 23,329 MW or 15.2 percent from 2025 to 2034, with an average increase of 2,592 MW or 1.6 percent every year. Conversely, anticipated reserve margins are projected to decrease 51.9 percent over this period with an average decrease of 7.7 percent. In 2034, anticipated reserve margins fall below reference margin levels by 0.8 percent.

PJM Forecasted Demand, Resources, and Reserve Margins

Quantity	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Total Internal Demand	153,493	156,803	159,859	162,972	165,681	167,873	170,008	172,109	174,366	176,822
Demand Response	7,554	7,693	7,808	7,913	8,000	8,083	8,162	8,230	8,312	8,400
Net Internal Demand	145,939	149,110	152,051	155,059	157,681	159,790	161,846	163,879	166,054	168,422
Additions: Tier 1	11,056	17,047	17,139	17,784	17,911	18,155	18,155	18,155	18,155	18,155
Additions: Tier 2	55,112	93,845	112,827	122,781	127,059	131,113	131,287	133,652	133,652	133,652
Additions: Tier 3	0	0	0	0	0	0	0	0	0	0
Net Firm Capacity Transfers	4,502	4,347	0	0	0	0	0	0	0	0
Existing-Certain and Net Firm Transfers	185,828	185,270	180,552	180,552	178,577	178,577	178,577	178,577	178,577	178,577
Anticipated Reserve Margin (%)	34.9%	35.7%	30.0%	27.9%	24.6%	23.1%	21.6%	20.0%	18.5%	16.8%
Prospective Reserve Margin (%)	72.4%	98.3%	104.7%	103.3%	100.5%	96.5%	94.1%	92.9%	82.1%	79.5%
Reference Margin Level (%)	17.7%	17.7%	17.6%	17.6%	17.6%	17.6%	17.6%	17.6%	17.6%	17.6%

Source: NERC

Projected generating capacities for coal (36.2 percent) and petroleum (7.9 percent) indicated decline over the next several years, assuming planned retirement comes to fruition. Major growth in consumption of solar (33.0 percent), hybrid (32.2 percent), and wind (16.2 percent), totaling 5,319 MW of new generation, will not satisfy capacity lost from planned retirements of coal (14,270 MW) and petroleum (693 MW).[lxiv]

PJM Projected Generating Capacity by Energy Source in Megawatts (MW)					
Type	2025	2026	2027	2028	2029
Coal	39,735	39,735	39,325	39,325	37,747
Coal*	39,394	39,394	33,313	28,240	25,124
Petroleum	8,810	8,514	8,514	8,514	8,117
Natural Gas	85,541	87,245	87,245	87,245	87,245
Natural Gas*	85,541	87,245	87,228	87,228	87,228
Biomass	928	928	928	928	928
Solar	13,349	16,770	16,908	17,621	17,754
Wind	3,017	3,512	3,507	3,507	3,507
Conventional Hydroelectric (dam, diversion, & pumped storage)	2,934	2,922	2,934	2,934	2,944
Pumped Storage	5,189	5,189	5,189	5,189	5,189
Nuclear	32,535	32,535	32,535	32,535	32,535
Hybrid	1,315	1,742	1,739	1,739	1,739
Battery	393	982	982	994	994
Total MW	193,747	200,074	199,807	200,532	198,699
Total MW*	193,406	199,733	193,779	189,430	186,060

*Source: NERC, * Capacity with additional generator retirements. Generators that are forecasted to retire by PJM are removed from the resource projection where marked.*

Summer peak loads for the majority of PJM zones are projected to be on the rise through 2046 as well as 20-year annual growth rates. PJM zones including DOM (123.2 percent), PPL (95.8 percent), and AEP (88.2 percent) are projecting large summer peak load growths over the span. Talen Energy operates in several of the listed markets, including AEP.

Summer Peak Load (MW) and Growth Rates for Each PJM Zone and Geographic Region (2026 - 2046)													
	Metered 2025	Unrestricted 2025	2026	2027	2028	2029	2030	2035	2040	2045	2046	Growth Rate (10 yr)	Growth Rate (20 yr)
AE	2,710	2,716	2,563	2,551	2,536	2,524	2,517	2,555	2,738	2,923	2,956	0.1%	0.7%
BGE	6,585	6,612	6,471	6,436	6,412	6,445	6,484	6,669	6,941	7,271	7,325	0.4%	0.6%
DPL	4,199	4,236	4,008	3,986	3,971	3,958	3,949	3,986	4,128	4,311	4,346	0.0%	0.4%
JCPL	6,274	6,286	6,044	6,034	5,997	5,997	6,060	6,573	7,265	7,899	8,021	1.0%	1.4%
METED	3,000	3,037	3,013	3,019	3,022	3,048	3,130	3,487	3,794	4,100	4,169	1.6%	1.6%
PECO	8,380	8,476	8,539	8,571	8,718	8,908	9,190	10,160	10,531	11,035	11,104	1.8%	1.3%
PENLC	2,885	2,917	2,820	2,805	2,781	2,773	2,778	2,803	2,942	3,092	3,121	0.1%	0.5%
PEPCO	6,016	6,026	6,003	5,992	5,980	5,989	6,143	7,137	7,640	8,087	8,170	2.0%	1.6%
PPL	7,366	7,508	7,359	7,568	8,434	9,041	12,155	13,556	13,933	14,334	14,411	6.4%	3.4%
PS	10,230	10,259	10,046	10,098	10,284	10,560	11,029	12,556	13,552	14,458	14,606	2.4%	1.9%
RECO	423	423	406	402	397	394	391	395	425	454	459	-0.2%	0.6%
UGI	218	218	202	201	199	199	198	198	206	215	218	-0.1%	0.4%
AEP	23,338	23,564	24,635	26,176	27,530	29,145	30,869	39,221	44,952	46,104	46,354	5.3%	3.2%
APS	8,996	9,081	8,814	8,926	8,947	9,253	9,904	11,584	12,101	12,751	12,848	2.9%	1.9%
ATSI	12,658	12,890	12,770	12,769	12,851	12,986	13,677	14,987	15,650	16,273	16,413	1.7%	1.3%
COMED	20,714	20,714	20,847	21,077	21,707	23,035	24,644	30,359	30,742	31,113	31,227	3.9%	2.0%
DAYTON	3,397	3,397	3,357	3,478	3,594	3,721	4,259	5,568	5,683	5,826	5,863	5.2%	2.8%
DEOK	5,190	5,256	5,323	5,330	5,332	5,346	5,371	5,583	5,921	6,266	6,337	0.6%	0.9%
DLCO	2,695	2,738	2,674	2,663	2,655	2,656	2,705	2,800	2,956	3,145	3,184	0.6%	0.9%
EKPC	2,162	2,348	2,124	2,127	2,127	2,132	2,135	2,185	2,286	2,408	2,434	0.4%	0.7%
OVEC	78	78	80	80	80	80	80	80	80	80	80	0.0%	0.0%
DOM	23,826	24,271	25,193	27,008	28,696	29,966	31,939	40,855	50,730	55,383	56,242	5.4%	4.1%
PJM RTO	159,660	160,709	156,373	160,451	165,567	171,530	183,008	216,872	238,817	250,760	253,077	3.6%	2.4%

Source: PJM

Total Net Energy for the PJM RTO is projected to almost double from 2026 to 2046, with a slightly declining annual growth rate from 5.3 percent to 3.4 percent.[lxv]

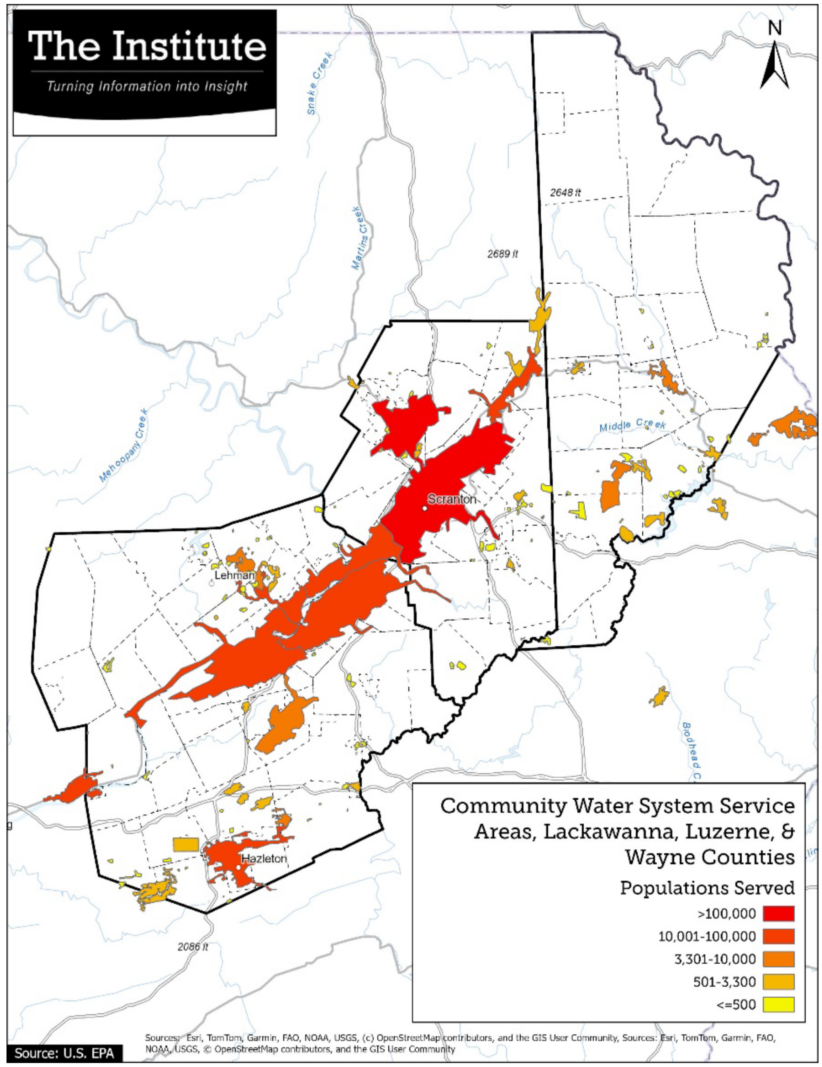
Annual Net Energy (GWh) and Growth Rates for Each PJM Zone and Geographic Region (2026 - 2046)											
	2026	2027	2028	2029	2030	2035	2040	2045	2046	Annual Growth Rate (10yr)	Annual Growth Rate (20yr)
AE	9,717	9,706	9,732	9,698	9,690	9,947	11,091	12,232	12,469	0.4%	1.3%
BGE	30,988	31,050	31,334	31,777	32,322	34,418	36,648	39,161	39,685	1.2%	1.2%
DPL	18,770	18,744	18,813	18,724	18,670	18,800	19,590	20,499	20,722	0.1%	0.5%
JCPL	22,569	22,686	22,895	23,018	23,669	27,578	32,040	36,165	36,998	2.3%	2.5%
METED	16,009	16,151	16,369	16,562	17,261	20,054	22,134	24,142	24,608	2.5%	2.2%
PECO	39,182	39,876	41,738	43,692	46,344	55,080	57,436	59,819	60,417	3.6%	2.2%
PENLC	17,297	17,320	17,420	17,377	17,417	17,909	18,979	19,850	20,068	0.5%	0.7%
PEPCO	28,552	28,642	28,850	28,885	29,708	38,092	41,436	43,768	44,305	3.3%	2.2%
PPL	41,931	44,341	51,060	56,576	75,674	96,595	99,054	100,971	101,478	8.8%	4.5%
PS	43,586	44,542	46,740	49,339	53,270	66,231	72,409	77,814	78,974	4.5%	3.0%
RECO	1,446	1,449	1,457	1,455	1,460	1,520	1,691	1,849	1,884	0.7%	1.3%
UGI	1,077	1,079	1,084	1,079	1,079	1,082	1,139	1,197	1,211	0.2%	0.6%
AEP	149,405	164,799	177,996	190,844	205,478	277,797	326,588	332,599	334,203	7.0%	4.1%
APS	51,158	52,691	53,569	55,658	60,344	76,867	80,917	85,281	85,983	4.3%	2.6%
ATSI	68,479	69,168	70,747	71,952	76,404	89,568	94,748	98,702	99,702	2.9%	1.9%
COMED	97,576	100,854	107,863	119,434	133,795	185,773	190,743	193,814	194,887	6.8%	3.5%
DAYTON	17,579	18,623	19,866	20,893	24,021	37,025	37,853	38,579	38,807	7.8%	4.0%
DEOK	26,963	27,104	27,363	27,440	27,597	28,898	30,970	32,933	33,402	0.9%	1.1%
DLCO	13,211	13,251	13,342	13,354	13,660	14,655	15,724	16,864	17,143	1.2%	1.3%
EKPC	11,870	11,963	12,106	12,126	12,186	12,613	13,408	14,257	14,463	0.8%	1.0%
OVEC	320	320	320	320	320	320	320	320	320	0.0%	0.0%
DOM	148,390	163,804	179,105	189,974	205,893	279,927	362,310	398,471	405,346	7.2%	5.2%
PJM RTO	856,075	898,163	949,769	1,000,177	1,086,262	1,390,749	1,567,228	1,649,287	1,667,075	5.3%	3.4%

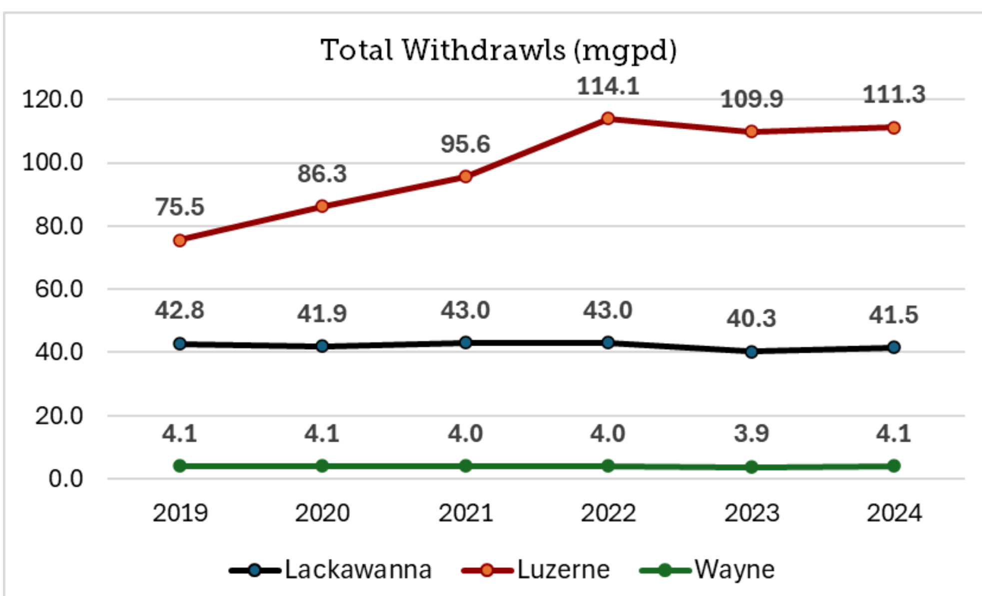
Source: PJM

Water

The Pennsylvania Department of Environmental Protection monitors water resources in the state.[lxvi] A total of 160 providers of water exists in Lackawanna, Luzerne, and Wayne counties, serving a total population of 485,877 as of September 2025.[lxvii]

Total water withdrawals in Lackawanna, Luzerne, and Wayne Counties highlight differing consumption patterns across the region. Luzerne County reached a peak in 2022 at 114.1 million gallons per day (mgpd) and remained only slightly below that level in 2024. In contrast, Lackawanna County's withdrawals have remained relatively stable, ranging between 40.3 and 43.0 mgpd. Wayne County withdrawals have held relatively steady over the series, averaging four mgpd.[lxviii]





The region's annual precipitation averaged 51.2 inches annually for the two counties. Mean precipitation for the previous decade averaged 42.6 inches. Average annual rainfall is higher than most surrounding states including Ohio (36.3 in annually), West Virginia (41.6 in annually), Virginia (43.3 in annually), Maryland (38.5 in annually), Delaware (44.4 in annually), and New York (45.4 in annually).[lxix]

Oil

Oil plays an indirect role in the function of data centers, largely as a backup resource, for on-site generation, and by supporting the broader grids that sustain the facilities. The Commonwealth purchases crude oil at $54.96 per barrel, $7.09 below the national average. Other than domestic crude oil purchases and commercial electricity, the Commonwealth's commodity prices are higher than that of the United States. Summer capacities for the electric power industry totaled 48,941 MW in April of 2025, up 1.8 percent from 48,087 MW in December 2024.

Pennsylvania Energy Commodity Prices			
	Pennsylvania	**U.S. Average**	**Period**
Petroleum			
Domestic Crude Oil First Purchase	$ 54.98 /barrel	$ 62.05 /barrel	Apr-25
Natural Gas			
City Gate	$ 4.84 /thousand cu ft	$ 4.48 /thousand cu ft	Apr-25
Residential	$ 16.20 /thousand cu ft	$ 16.05 /thousand cu ft	Apr-25
Coal			
Average Sales Price	$ 91.71 /short ton	$ 54.04 /short ton	2023
Delivered to Electric Power Sector	$ 2.82 /million Btu	$ 2.46 /million Btu	Apr-25
Electricity			
Residential	18.98 cents/kWh	17.45 cents/kWh	Apr-25
Commercial	11.99 cents/kWh	13.09 cents/kWh	Apr-25
Industrial	8.59 cents/kWh	8.21 cents/kWh	Apr-25
Source: U.S. Energy Information Administration			

Renewables

Renewable energy capacity refers to the maximum amount of power that renewable energy sources can produce at a given time. As of April 2025, the Commonwealth's total renewable capacity was 3,903 MW, up from 3,772 MW in December2024. In 2023, renewable energy consumption accounted for 4.9 percent of the state's total energy use, holding steady from 2022.[lxx]

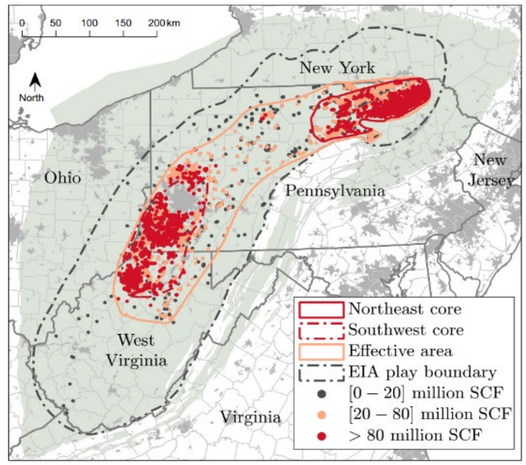
Pennsylvania Renewable Energy Capacity, Production, & Consumption			
	Pennsylvania	**Share of U.S.**	**Period**
Renewable Energy Capacity			
Total Renewable Energy Electricity Net Summer Capacity	3,903 MW	1.0%	Apr-25
Ethanol Plant Nameplate Capacity	128 million gal/year	0.7%	2024
Renewable Energy Production			
Utility-Scale Hydroelectric Net Electricity Generation	231 thousand MWh	1.0%	Apr-25
Utility-Scale Solar, Wind, and Geothermal Net Electricity Generation	556 thousand MWh	0.8%	Apr-25
Utility-Scale Biomass Net Electricity Generation	116 thousand MWh	3.4%	Apr-25
Small-Scale Solar Photovoltaic Generation	188 thousand MWh	2.1%	Apr-25
Fuel Ethanol Production	2,855 thousand barrels	0.8%	2023
Renewable Energy Consumption			
		U.S. Rank	
Renewable Energy Consumption as a Share of State Total	4.9 %	41	2023
Fuel Ethanol Consumption	10,709 thousand barrels	8	2023
Source: U.S. Energy Information Administration			

Nuclear

The industry is exploring the use of Hydrogen Small Modular Nuclear Reactors (SMNRs). With demand for data centers growing at a rate that can outpace traditional grid capacity and planning, developers are interested in reliable, low-carbon energy. SMNRs also require limited land use. Although data centers do not yet rely on SMNRs, Northeast Pennsylvania's Cumulus Data project does use nuclear energy from the Susquehanna Steam Electric Station. The area's Amazon campus is following suit. According to the American Society of Civil Engineers, this Susquehanna-Cumulus "is the closest "real-world analog to an SMR data center campus."[lxxi]

Natural Gas

The Marcellus Shale makes Pennsylvania an attractive location for data centers.[lxxii] One study published in January 2024 found that key areas of focus for natural gas in the region exist in the northeast and southwest. The existing 12,406 wells are projected to produce 85 TSCF of natural gas by 2040, with an anticipated increases to 150 to 180 TSCF by adding 3,864 to 7,896 new wells, respectively.[lxxiii]

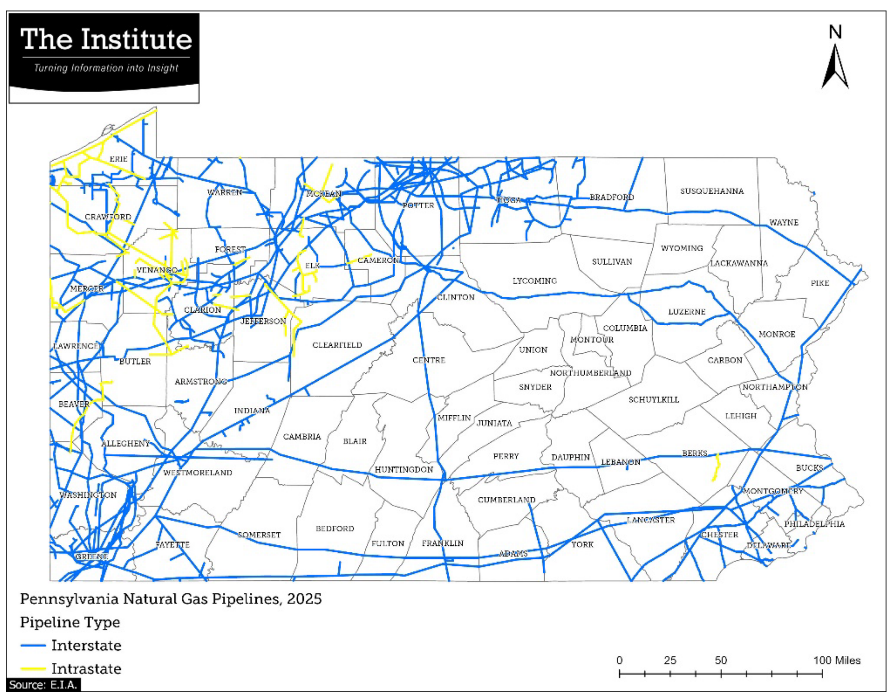


Pennsylvania was the second largest producer of natural gas beginning as of 2005, due to new horizontal drilling methods and hydraulic fracturing techniques.[lxxiv] This trend continued into 2023, according to data from the EIA. The increased production of natural gas has outpaced the development of pipeline infrastructure, however, creating challenges in transporting and distributing supply efficiently.[lxxv] There are 9,178.2 miles of natural gas pipeline in the state.[lxxvi]

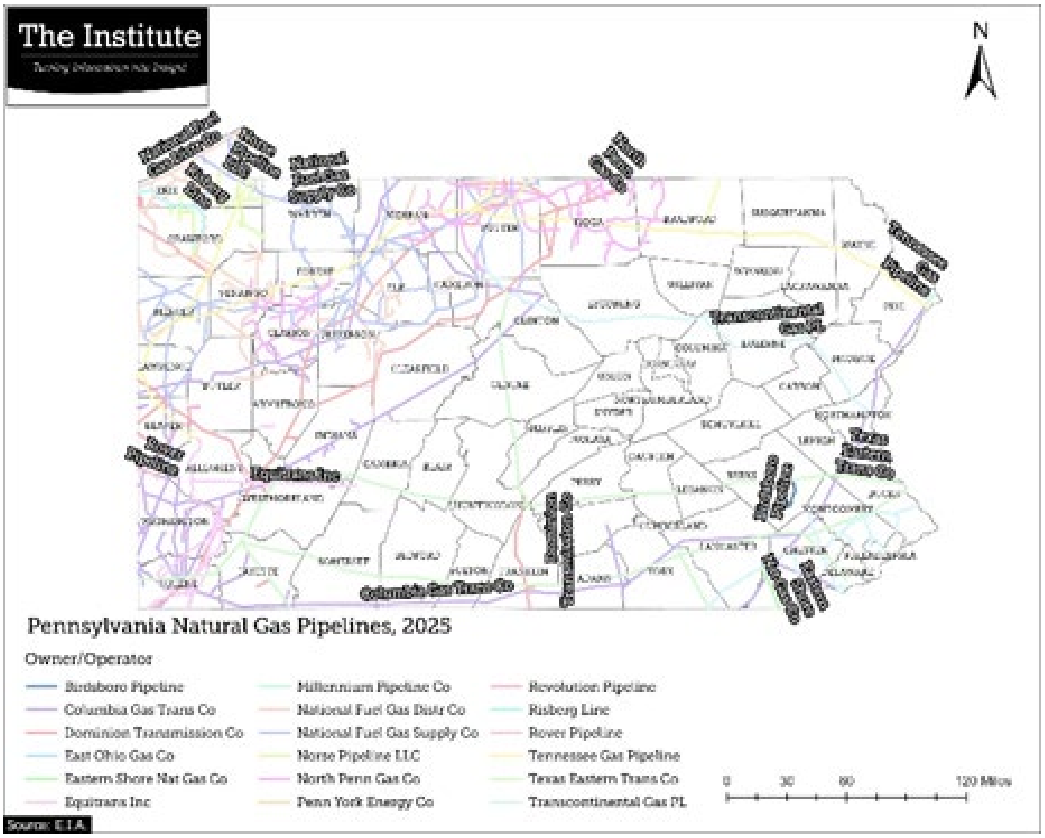
Pennsylvania Natural Gas Pipeline, 2025

Operator	Miles of Pipeline
Columbia Gas Trans Co	1,715.9
National Fuel Gas Supply Co	1,284.1
Texas Eastern Trans Co	1,010.3
Equitrans Inc	945.0
Dominion Transmission Co	939.5
North Penn Gas Co	872.6
National Fuel Gas Distr Co	753.1
Tennessee Gas Pipeline	650.5
Transcontinental Gas PL	566.9
Norse Pipeline LLC	210.7
Risberg Line	70.5
Revolution Pipeline	48.7
Eastern Shore Nat Gas Co	27.9
East Ohio Gas Co	21.4
Millennium Pipeline Co	18.1
Birdsboro Pipeline	17.0
Penn York Energy Co	14.6
Rover Pipeline	11.3
Grand Total	9,178.2

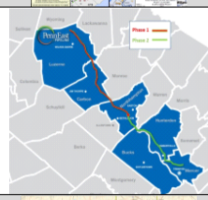
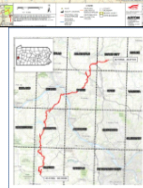
Source: EIA



Many companies are also proposing natural gas infrastructure projects across the state, to total 711.4 miles of new pipeline and 18.3 miles of replacement pipeline, as well as upgrades or new pipeline ancillary infrastructure.[lxxvii]

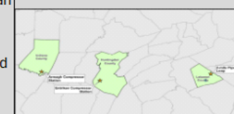
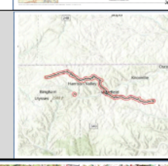
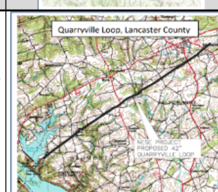


Upcoming Pennsylvania Pipeline Projects

Project Name, Type, Miles of Pipeline	Description	Map
Sunoco Pennsylvania Pipeline Project/ Mariner East II, new, >300	The pipeline will traverse 17 counties in the southern tier of Pennsylvania. Is is an expansion of the existing Sunoco Mariner East pipeline system.	
Atlantic Sunrise Pipeline Project, new, ~183	The project crosses three regions of the Pennsylvania Department of Environmental Protection (DEP): 4 counties in the Northeast Region, 4 counties in North-Central Region, and 2 counties in the South-Central Region	
PennEast Pipeline Company, LLC. - PennEast Pipeline, new, ~68.05	Phase 1 of the project spans from Dallas Township in Luzerne County to Bethlehem Township in Northampton County and includes areas in Luzerne, Monroe, Carbon and Northampton Counties. Phase 2 of the Project, which will be considered at a future time, is anticipated to continue from Bethlehem Township, Northampton County, through Bucks County and then across the Delaware River into New Jersey.	
Shell Pipeline Company Falcon Ethane Pipeline, new, ~45.5	Would be located in Pennsylvania and the pipeline will cross portions of southwestern Pennsylvania, eastern Ohio, and the West Virginia panhandle.	
Revolution Pipeline Project, new, ~ 40.5	Revolution Pipeline Project begins in Jackson Township, Butler County, traverses through New Sewickley, Conway, Center, Raccoon, and Independence Townships, in Beaver County, Findlay Township in Allegheny County, and Robinson Township, in Washington County before ending in Smith Township, in Washington County	
Leidy South, new, ~ 12.2	The proposed project will extend across two 3 counties in the Northcentral Region and 3 counties in the Northeast Region	
FM100 Project, new, ~31.31	The proposed project will extend across two regions: 2 counties in the Northwest Region and 4 counties in the Northcentral Region	

Source: Commonwealth of Pennsylvania

Upcoming Pennsylvania Pipeline Projects (continued)

Project Name, Type, Miles of Pipeline	Description	Map
Conemaugh River Crossing Project, new, ~ 1	The Conemaugh River Crossing Project is in Blacklick Township, Indiana County and Derry Township, Westmoreland County, Pennsylvania	
National Fuel Gas – FM120 Insertion Project, replacement, ~12.5	The project proposes work in Shippen Township in Cameron County; City of St. Mary's and Jones Township in Elk County; and Sergeant Township in McKean County	
Regional Energy Access Expansion Project, new, NA	The proposed project will extend across three regions: 3 counties in the Northeast Region (Luzerne, Monroe, Northampton), 3 counties in the Southeast Region (Bucks, Chester, Delaware), and 1 county in the Southcentral Region (York). However, the Project will not require earth disturbance in Delaware and York counties.	
Appalachia to Market II Project, replacement, ~2	The Project involves replacing approximately 2 miles of the existing Line 28 Loop, removal of an existing receiver site, installation of a new receiver, compressor unit replacement at the Armagh and Entriken Compressor stations, and utilization of the Lebanon, Myerstown, Mt. Braddock, and Mundys Corner yards/construction storage areas for off-site support activities.	
Schuylkill River Horizontal Directional Drilling (HDD) Project, new, ~0.21	The Schuylkill River Horizontal Directional Drilling (HDD) Project is located in Spring City Borough, Chester County and Upper Providence Township, Montgomery County	
Tioga Pathways, replacement, new, ~3.84 , ~19.48	The Tioga Pathways Project starting in Harrison Township in Potter County and will continue east for approximately 2.89 miles before crossing into Tioga County. In Tioga County, the pipeline will traverse the townships of Brookfield, Westfield, Deerfield, and Chatham.	
Northeast Supply Enhancement Project (NESE), new, ~10.17	The Quarryville Loop consists of approximately 10.17 miles of new 42-inch diameter natural gas pipeline located in Drumore, East Drumore, and Eden Townships, Lancaster County.The project also includes the installation of a new 21,902-horsepower motor-driven compressor unit at Compressor Station 200 in East Whiteland Township, Chester County	

Source: Commonwealth of Pennsylvania

Workforce Impacts

Data centers make a significant impact on local job markets during both the construction and operational phases, influencing employment both directly and indirectly. Job creation is most substantial during construction. Operational roles in data centers are typically high-paying and skilled positions, however. Additionally, data centers have a strong employment multiplier effect, stimulating local businesses and services. The clustering of data centers can also create a 'knock-on' economic effect by attracting related industries and further investment to the area.[lxxviii]

Furthermore, although operational staffing levels are lower than construction-phase employment, data centers function as high-skill anchor facilities within regional labor markets. Their long-term economic value lies in workforce quality rather than workforce volume, supporting careers in IT infrastructure, cybersecurity, electrical systems, facilities engineering, network operations, and advanced building management. These positions offer transferable technical skills, wage stability, and career mobility, reinforcing regional higher education and technical training pipelines. In this way, data centers contribute to long-term economic resilience and workforce modernization, rather than short-term employment spikes tied solely to construction activity.

The economic impact of an investment is shaped by the *multiplier effect*. This concept explains how money spent in an economy creates additional activity beyond the original purchase. As dollars are spent and re-spent, they circulate through local businesses and workers, generating more revenue, production, and jobs. As a result, the total economic benefit is greater than the primary project activities alone. As such, the figures displayed below regarding jobs, wages, economic activity, and tax revenue encompass the indirect and induced impacts in addition to the direct impacts.

A 2017 report found that during the construction phase, a typical 165,141 sq ft data center can employ 1,688 jobs that will create $77.7 million in wages. Once operational, this typical data center can provide 157 jobs and $7.8 million in wages. Typical jobs include security staff, operations staff, and on-site IT engineering and management staff.[lxxix] Additionally, a 2025 study from Maryland found that a typical 800,000 sq ft data center will create 5,000 new jobs, $775 million in economic activity, and $18 million in state tax revenue during the construction phase. Once operational, this size data center will create 500 permanent jobs, create $31 million in annual compensation, and $14 million in state tax revenue.[lxxx] The Commonwealth's total annual employment contributions increased five percent from 2022 to 2023, and annual labor income contributions grew seven percent. During that period, annual contributions from GDP increased nine percent (without spillover effect) and eight percent (with spillover effect).[lxxxi]

Economic Impacts of a Typical 165,141sq ft Data Center	
Construction Phase 18-24 Months	**Operation Phase Annually**
1,688 Local Jobs	157 local jobs
$77.7 million wages	$7.8 million wages
$243.5 million local economic activities	$32.5 million local and economic activities
$9.9 million state & local taxes	$1.1 million state & local taxes
Source: U.S. Chamber of Commerce Technology Engagement Center	

Economic Impacts of a Typical 800,000sq ft Data Center	
Construction Phase	**Operational Phase**
5,000 direct and indirect jobs	500 permanent jobs
$775 million economic Activity	$31 million annual compensation
$18 million state tax revenue	$14 million state tax revenue
Source: Sage Policy Group	

Although construction jobs typically decline after projects are completed – a pattern common in 'boom and bust' industries –

contractors across the United States are currently experiencing a surge in early-stage activity related to data center construction.[lxxxii] Construction phases typically span three to six years depending on complexity.[lxxxiii] As data center construction increases in the area, the demand for construction workers is expected to rise accordingly.

Spillover effects referenced in the adjacent chart pertain to additional ripple effects of the economic activity beyond the measured impacts.

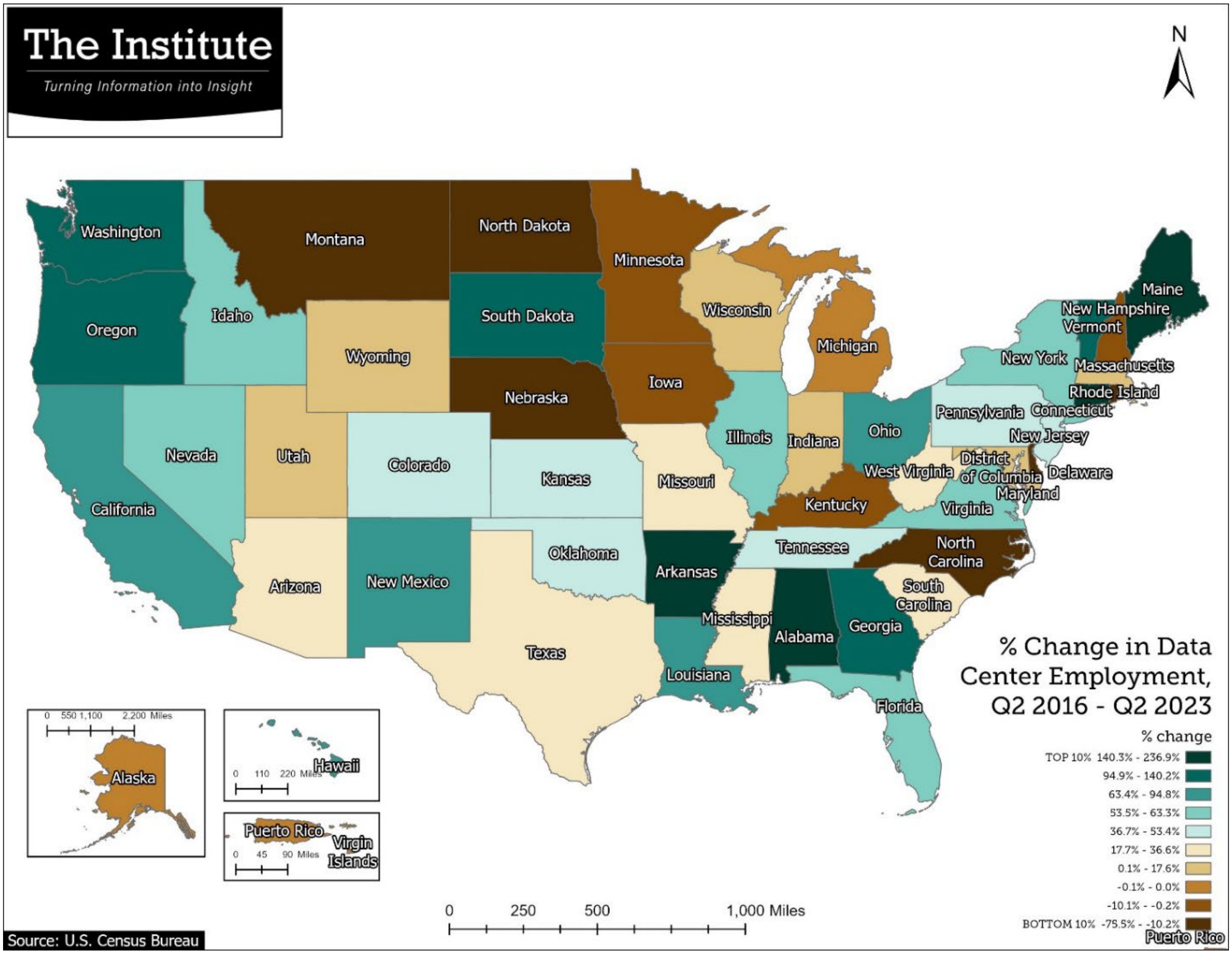
Data center employment has changed drastically across the U.S. since 2016. States such as Arkansas, Alabama, and the District of Columbia have experienced the largest such employment increases at 236.9 percent, 203.1 percent, and 181.8 percent, respectively.[lxxxiv] The Commonwealth is ranked 22nd, with data center employment growth of 53.4 percent during this period.[lxxxv] Virginia is the largest hub for data center activity in the world, with a total of 641 data centers.[lxxxvi] Over three-quarters of the state's data centers are located in northern Virginia.[lxxxvii]

Data Center Industry Economic Contributions in Pennsylvania,	2022	2023	Growth
Employment (jobs)			
Direct contribution	17,910	18,270	2%
Indirect and induced without the spillover effect[a]	76,830	80,880	5%
Operational	63,710	64,960	2%
Capital Spending	13,120	15,920	21%
Total contribution without the spillover effect[a]	94,740	99,150	5%
Cross-state spillover	52,200	54,800	5%
Total contribution with the spillover effect[a]	146,940	153,950	5%
Labor Income (millions)			
Direct contribution	$2,245	$2,440	9%
Indirect and induced without the spillover effect[a]	$5,580	$5,907	6%
Operational	$4,476	$4,572	2%
Capital Spending	$1,104	$1,335	21%
Total contribution without the spillover effect[a]	$7,825	$8,347	7%
Cross-state spillover	$4,057	$4,333	7%
Total contribution with the spillover effect[a]	$11,882	$12,679	7%
GDP (millions)			
Direct contribution	$4,697	$5,372	14%
Indirect and induced without the spillover effect[a]	$8,567	$9,054	6%
Operational	$6,990	$7,139	2%
Capital Spending	$1,577	$1,915	21%
Total contribution without the spillover effect[a]	$13,264	$14,427	9%
Cross-state spillover	$6,314	$6,740	7%
Total contribution with the spillover effect[a]	$19,578	$21,167	8%
Total State and Local Tax Contribution ($million)[b]			
Without cross-state spillover[a]	$1,256	$1,363	9%
With cross-state spillover[a]	$1,838	$1,966	7%

Source: PwC. NOTES: [a] The spillover effect refers to the indirect and induced effects in a state attributable to the national data center industry's direct activity in all other states. [b] Tax contribution includes all state and local taxes directly or indirectly resulting from the U.S. data center industry's construction and operations (including direct, indirect, and induced economic effects) benefiting the state.

Virginia Data Centers, Economic Impacts in 2023 (2024 dollars)			
1st Round Direct Effects	**Jobs**	**Pay and Benefits**	**Economic Output**
Data Center Construction	14,240	$887,100,000	$2,854,600,000
Data Center Operation	12,140	$1,891,900,000	$13,720,900,000
2nd Round Indirect and Induced Effects			
Data Center Construction Supported	9,730	$608,200,000	$2,102,900,000
Data Center Operation Supported	42,030	$2,840,100,000	$12,692,400,000
Total Impact			
Construction Subtotal	23,970	$1,495,300,000	$4,957,500,000
Ooperational Subtotal	54,170	$4,732,000,000	$26,413,300,000
Total Economic Impact in Virginia	78,140	$6,227,300,000	$31,370,800,000

Source: Northern Virginia Technology Council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Kentucky
Virginia
Tennessee
North Carolina
Oklahoma
Arkansas
Arizona
New Mexico
South Carolina
Mississippi
Alabama
Georgia
Texas
Louisiana
Florida
% Change in Data Center Employment, Q2 2016 - Q2 2023
% change
TOP 10% 140.3% - 236.9%
94.9% - 140.2%
63.4% - 94.8%
53.5% - 63.3%
36.7% - 53.4%
17.7% - 36.6%
0.1% - 17.6%
-0.1% - 0.0%
-10.1% - -0.2%
BOTTOM 10% -75.5% - -10.2%
Puerto Rico
0 550 1,100 2,200 Miles
Alaska
0 110 220 Miles
Hawaii
Puerto Rico
Virgin Islands
0 45 90 Miles
0 250 500 1,000 Miles
Source: U.S. Census Bureau

Computer and mathematical occupations represent the largest share of data center employment across the U.S., 191,484 employees in 2024 growing to 201,624 in 2025 and 245,536 in 2026.[lxxxviii]

Data Center Industry Staffing Pattern								
	Employed in Industry (2024)		Employed in Industry (2025)		Employed in Industry (2035)		% Change (2025-2035)	
Occupation	PA	US	PA	US	PA	US	PA	US
Computer and Mathematical Occupations	5,041	191,484	5,221	201,624	5,879	245,536	12.6%	21.8%
Management Occupations	2,490	80,827	2,564	84,965	2,797	102,176	9.1%	20.3%
Office and Administrative Support Occupations	2,226	69,353	2,248	71,608	2,191	76,630	-2.6%	7.0%
Business and Financial Operations Occupations	1,841	68,338	1,895	71,605	2,062	84,494	8.8%	18.0%
Sales and Related Occupations	1,262	44,909	1,297	46,831	1,379	53,515	6.4%	14.3%
Arts, Design, Entertainment, Sports, and Media Occupations	221	8,386	228	8,773	248	10,223	8.8%	16.5%
Legal Occupations	105	3,997	109	4,201	118	5,021	8.8%	19.5%
Architecture and Engineering Occupations	99	3,938	101	4,133	112	4,907	10.5%	18.7%
Healthcare Practitioners and Technical Occupations	93	3,554	97	3,711	107	4,280	10.0%	15.3%
Production Occupations	96	2,611	98	2,709	101	3,041	3.1%	12.2%
Repair Occupations	90	2,517	91	2,624	94	3,013	4.1%	14.8%
Transportation and Material Moving Occupations	53	1,606	55	1,692	62	2,072	12.1%	22.4%
Protective Service Occupations	22	701	23	757	28	1,027	18.5%	35.7%
Educational Instruction and Library Occupations	16	676	18	714	21	864	17.5%	21.0%
Building and Grounds Cleaning and Maintenance Occupations	<10	208	<10	221	10	282	26.0%	27.9%
Life, Physical, and Social Science Occupations	<10	200	<10	214	<10	261	46.3%	22.4%
Community and Social Service Occupations	<10	132	<10	145	<10	223	92.6%	53.8%
Personal Care and Service Occupations	<10	128	<10	134	<10	162	5.2%	20.7%
Food Preparation and Serving Related Occupations	<10	117	<10	122	<10	159	9.1%	29.7%
Construction and Extraction Occupations	<10	100	<10	107	<10	135	50.2%	26.3%
Healthcare Support Occupations	0	21	0	22	0	26	0.0%	17.2%

Source: Lightcast

Understanding the regional job market can bring insights into local economic strength and labor market structure. Projections from emerging job markets, such as in the NEPA region, often do not account for upcoming projects due to limited historical data available to model future growth. As a result, there is little growth projected for the data center job market across the three counties.

Staffing Patterns for Computing Infrastructure Providers, Data Processing, Web Hosting, and Related Services. Lackawanna, Luzerne, and Wayne Counties

Occupation	Employed 2020	Employed 2024	Employed 2035	Median Hourly Earnings
Chief Executives	0	<10	<10	$93.31
Computer and Information Systems Managers	<10	<10	<10	$63.99
Financial Managers	<10	<10	<10	$59.15
Computer Network Architects	<10	<10	<10	$58.44
Marketing Managers	<10	<10	<10	$56.38
Software Developers	13.6	18.8	19.3	$53.23
Managers, All Other	0	<10	<10	$52.41
Sales Managers	<10	<10	<10	$51.21
Software Quality Assurance Analysts and Testers	<10	<10	<10	$50.86
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	0	<10	<10	$50.28
Database Architects	0	<10	<10	$50.00
Information Security Analysts	<10	<10	<10	$49.27
Lawyers	0	<10	<10	$49.05
Computer Occupations, All Other	<10	<10	<10	$43.61
Management Analysts	<10	<10	<10	$43.27
General and Operations Managers	<10	12	11	$42.69
Project Management Specialists	<10	<10	<10	$42.59
Sales Engineers	0	<10	<10	$41.22
Data Scientists	0	<10	<10	$40.90
Computer Programmers	<10	<10	<10	$40.37
Computer Systems Analysts	<10	<10	<10	$39.63
Database Administrators	<10	<10	<10	$38.11
Web Developers	<10	<10	<10	$37.57
Network and Computer Systems Administrators	<10	<10	<10	$36.95
Claims Adjusters, Examiners, and Investigators	0	<10	0	$36.30
Electrical and Electronics Repairers, Commercial and Industrial Equipment	0	<10	<10	$33.36
Accountants and Auditors	<10	<10	<10	$32.44
Business Operations Specialists, All Other	0	<10	<10	$32.28
Web and Digital Interface Designers	<10	<10	<10	$30.06
First-Line Supervisors of Office and Administrative Support Workers	<10	<10	<10	$29.69
Market Research Analysts and Marketing Specialists	<10	<10	<10	$29.19
Human Resources Specialists	<10	<10	<10	$29.08
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	0	<10	<10	$28.67
Training and Development Specialists	0	<10	<10	$28.11
Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel	<10	14	13	$27.06
Computer Network Support Specialists	<10	<10	<10	$25.88
Computer User Support Specialists	15	11	11	$25.50
Maintenance and Repair Workers, General	0	<10	0	$23.38
Bookkeeping, Accounting, and Auditing Clerks	<10	<10	<10	$22.60
Billing and Posting Clerks	0	<10	0	$20.33
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	<10	<10	<10	$19.68
Office Clerks, General	<10	<10	<10	$19.52
Data Entry Keyers	<10	<10	<10	$18.91
Customer Service Representatives	14	13	11	$18.70

Source: Lightcast

Community Concerns

Data centers generate substantial tax revenue and contribute to economic growth, but they can also strain local resources. Facilities located near residential areas cause concern, with some residents citing constant noise and light pollution, environmental degradation, increased air and water pollution, and excessive consumption of vital resources such as water. Depending on their size, data centers may use large amounts of water each day. Issues like these have fueled concern among local residents in the NEPA region, where a surge of proposed data center developments has many worried about the potential environmental and community impacts.

Data centers are resource intensive in general, using electricity as well. Data center energy use was projected to consume 1.9 percent of the U.S. total in 2018, 4.4 percent in 2023, and anywhere from 6.7 to 12.0 percent by 2028.[lxxxix] Electricity consumers near data centers have experienced large bill increases (more than double from 2020 to 2025) because of this increased usage.[xc]

The high energy demand of data centers – much of which is met through fossil fuel generation - contributes to increased emissions of pollutants such as carbon dioxide (CO_2). Backup power systems can also be significant pollution sources; some facilities require up to 168 generators, each with a capacity ranging from 1.5 to over 3.0 MW. These generators emit pollutants including particulate matter (PM), nitrogen oxides (NO_x), sulfur dioxide (SO_2), and additional CO_2 during operation.[xci]

Data centers produce noise from mechanisms such as chillers and cooling towers (70 – 90 dB), backup generators (85 – 100 dB during operation), and server chillers (60 – 80 dB), creating a significant source of concern for workers and nearby residents.[xcii] Prolonged exposure to increased noise levels have been associated with increased likelihood of cardiovascular issues, fragmented and reduced sleep, mental health effects, hearing loss, and cognitive and behavioral issues in children. Noise pollution can also disrupt wildlife, interfering with reproductive success and migration leading to decreasing populations and increased mortality. Noise levels above 85 dB are considered unsafe and can potentially cause hearing loss with prolonged exposure.[xciii] Although light pollution is generally less disruptive than noise pollution, it can still negatively impact surrounding areas, affecting both residential neighborhoods and nocturnal wildlife activity.[xciv]

dB Reference Chart

Measure	dB
Gun Shot	140
Stock Car Races	130
Rock Concert	120-129
Chainsaw	106-115
School Dance	101-105
Motorcycle	90-100
Subway	90-95
Heavy Traffic, Lawn Mower (harmful above 85)	80-89
Vacuum	70
Office Noise	60
Normal Conversation	50
Average Home	40
Leaves Rustling	30

Source: University of California

Solutions to reduce noise pollution include:

- The use of natural gas generators to reduce backup generator noise
- Upgraded cooling systems, optimized server layout, and increased insulation to reduce cooling and HVAC noise
- Advocacy for policies that regulate data center distance from residential areas to reduce noise pollution of nearby residents

- Soundproofing strategies such as custom enclosures and acoustic barriers and screens to reduce dB by 20 to 30), duct and ventilation attenuators to reduce HVAC noise, anti-vibration mounts and pads for equipment such as compressors to reduce vibration related noises, and noise blocking doors and panels.[xcv, xcvi]

In some communities, opposition has been strong enough to delay or even block data center development entirely. Across the U.S., investments totaling $64 billion have been delayed or blocked, with a significant portion occurring in Virginia – the world's largest data center market.[xcvii]

Blocked or Delayed Data Center Projects				
Location	Investment	Developer	Status	Summary
Goodyear & Buckeye, AZ	$14B	Tract	Blocked (Withdrawn)	Withdrawn in May 2024 after local opposition over height, noise, and resource strain; a revised Buckeye project was later announced with mayoral support.
Peculiar, MO	$1.5B	Diode Ventures	Blocked (Zoning Ban)	Blocked in Oct 2024 after zoning changes prohibited data centers following community pushback over visual, noise, and property value concerns.
Chesterton, IN	$1.3B	Provident Realty Advisors	Blocked (Withdrawn)	Withdrawn in June 2024 due to resident concerns over environmental impacts and property values.
Richmond, VA	$500M	DC Blox	Blocked (Withdrawn)	Withdrawn in Nov 2024 after noise and aesthetic concerns; a smaller revised project was announced in Feb 2025.
Catlett Station, VA	$400M	Headwaters Site Development	Blocked (Withdrawn)	Withdrawn July 2024 before hearings amid opposition over noise, utilities, and environmental issues.
Cascade Locks, OR	$100M	Roundhouse Digital Infrastructure	Blocked (Local Stop)	Canceled July 2023 after residents recalled approving officials over utility rate and credibility concerns.
Prince William, VA	$24.7B	QTS & Compass Data Centers	Delayed	Delayed due to lawsuits and opposition over environmental, noise, and historic site concerns.
Culpeper County, VA	$12B	Culpeper Acquisitions	Delayed	Denied by Planning Commission in June 2024 over rural preservation and battlefield concerns; no final Board decision yet.
King George, VA	$6B	Amazon	Delayed	Ongoing disputes with county officials over rezoning, infrastructure, and political tensions have stalled the project.
Midlothian, VA	$3B	Province Group	Delayed	Approved Oct 2024 despite opposition; delays possible due to required new power infrastructure.
Fort Worth, TX	$750M	WUSF 5 Rock Creek East	Delayed	Approved Sept 2024 by City Council despite zoning denial; awaiting site plan and water compliance approvals.
Alexandria, VA	$165M	Starwood Capital Group	Delayed	Approved Sept 2024 but awaiting SCC decision on new substation and power lines opposed by residents.
Santa Clara, CA	$79M	GI Partners	Delayed	Initially denied in Mar 2024, approved Aug 2024 after engagement; construction delayed by five months.
Warrenton, VA	Undisclosed	Amazon	Delayed	Facing at least one-year court-ordered delay amid lawsuits and political turnover opposing the project.
Burns Harbor, IN	Undisclosed	Provident	Delayed	Withdrawn Oct 2024 after opposition; no updated proposal submitted.
Manassas, VA	Undisclosed	Amazon	Delayed	Hearing postponed twice due to local opposition over proximity to homes, schools, and wildlife areas.
Source: Data Center Watch				

Opposition to data center development has been voiced in Northeastern Pennsylvania as well (this information was collected through Fall 2025). For instance, concerns were raised when community leaders in Dorrance Township held a town meeting in July 2025 to discuss the potential sale of land in the city for the construction of a data center. Residents conveyed their worry about potential resource use and environmental impacts should the data center be developed. The town meeting came shortly after the topic of rezoning warehouse districts for data center development was broached by the Commercial Real Estate Group (CBRE). Rezoning the municipality for data center development was touted by the real estate company to bring anywhere from 300 to 500 new high paying jobs. Even with prospects of increased local taxes, community members pushed back against the development with concerns regarding the overall impact on rural life in the area.[xcviii]

The Pennsylvania State Senate Majority Policy Committee's public hearing represents another example of a convening at which impacts of data center development have been discussed. It was held at Valley View High School in Archbald on August 11, 2025. Organized in response to growing community concerns, the hearing aimed to gather testimony on the economic, environmental, and local implications of these projects. Nineteen experts representing four industry sectors—economic development, energy and water resources, local impact, and construction and workforce—were questioned. Many of the questions, submitted by constituents, focused on issues such as infrastructure, land use, and the strain on local resources.

Panelists highlighted potential benefits for the region, including increased tax revenue, job creation, and a stronger local economy. When pressed on transparency around data centers' energy and water consumption, however, experts offered few concrete answers. Senator Dawn Keefer, attending virtually, noted that in other states, local officials were required to sign nondisclosure agreements (NDAs), limiting access to detailed resource usage data, while also posing the question, "How are elected officials going to make responsible and informed decisions without all that information?"

In response, panelists referenced independent meetings with staff, and local utilities—including PPL, UGI, Pennsylvania American Water, and the Lackawanna Sewer Basin Authority—to better understand the issues surrounding data center development. Leadership also noted efforts to bring together data center experts from Northern Virginia, Lackawanna County Commissioners, and officials from Jessup and Archbald Boroughs to address questions regarding resource use.

The Policy and Research Director for the Pennsylvania State Association of Township Supervisors (PSATS) emphasized that a key requirement for data centers should be providing proof of adequate water resources prior to construction. At the conclusion of the session, legislators indicated that additional meetings would be necessary to further explore and address these complex issues.[xcix]

In drier regions targeted for data center development, such as Reno, Nevada, local officials face difficult decisions balancing potential economic benefits with community needs. Land originally set aside to meet projected housing demand is at risk of being allocated to data centers instead. Proponents argue that data centers would consume less water than the planned housing developments, but critics remain concerned about resource use in areas with limited water availability. Cities must weigh the promise of jobs and substantial tax revenue against community opposition, making these decisions particularly challenging.[c]

Data centers can pose challenges to local communities through environmental impacts, high resource consumption, and potential pollution. To foster a more positive perception, one industry association, 7x24 Exchange, outlines several steps that data center operators can take to promote community support and engagement.[ci]

- Establish a community feedback loop
- Leverage local suppliers and workforce
- Collaborate closely with local authorities

- Highlight the project's community benefits
- Invest in local infrastructure improvements
- Engage early and often with local stakeholders
- Be patient and persistent in building relationships
- Design with aesthetics and local character in mind
- Address environmental concerns with transparency
- Be upfront about resource use and sustainability plans

Case Studies

Case studies offer a clear, practical look at how real-world challenges are addressed and solved. The following examples highlight outcomes, best practices, and how similar approaches might be applied in communities and organizations.

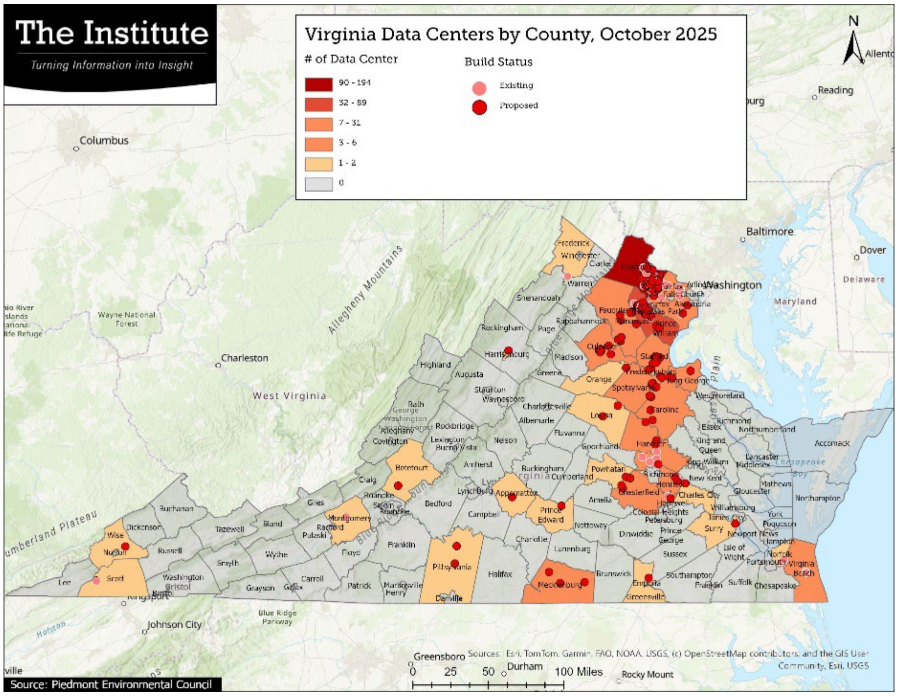
Virginia Data Centers

Virginia is the largest hub of data centers in the world, with 25 percent of U.S. hyperscale facilities as of Q3 2019. Many factors, including generation and permitting, were initially problems for the region, like many emerging data center markets.[cii] The state's data center industry emerged with the founding of Metropolitan Area Exchange – East, a consortium between private companies to connect several existing networks in Washington D.C. and Ashburn, Reston, and Vienna, Virginia.[ciii] Industry expansion in the region accelerated with the development of America Online's headquarters in Dulles and Equinix's first data center.

Catalysts for data center expansion in Virginia include:

- the 2009 expansion of data center sales and use tax exemptions on computer equipment; additionally, many areas offered reduced personal property taxes on data center computers and related equipment as well as streamlined approval processes
- the Virginia General Assembly's 2018 bill that created a specific class for data centers
- partnerships between data center developers like AWS and local energy distributors to leverage renewable energy sources, increasing overall energy generation and fostering positive relationships with the community
- efforts to create a data center-ready workforce, such as AWS's 2018 partnership with local community colleges to create a cloud associates degree program, followed by expansion of computer science programs into K-12.[civ]

Issues impeding further growth in the state include energy constraints from development outpacing new generation, higher permitting thresholds, and increased opposition from local residents. In 2025, one northern Virginia county eliminated by-right zoning for data centers, adding new approval steps that slow development and are already pushing projects elsewhere.[cv]



Although energy consumption rose marginally from 2010 to 2020, generation grew by 41.2 percent and subsequently net imports decreased by a little more than half, dropping the percentage of imports from 41 percent to 18.4 percent.[cvi] Demand projections were simulated under three scenarios to illustrate differing needs based on data center development. Additionally, projections were calculated with and without the Virginia Clean Economy Act (VCEA) of 2020, which aims to reduce GHG emissions and increase renewable energy usage.[cvii]

Virginia Power Generation, Consumption, and Imports TWh				
Year	Consumption	Generation	Net Imports	% Imports
2010	123.8	73.0	50.9	41.1%
2020	126.3	103.1	23.2	18.4%
Source: Virginia Department of Energy				

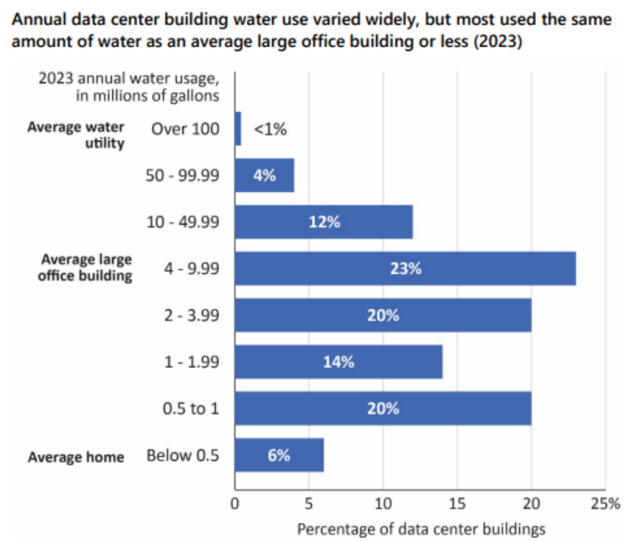
Energy Demand Projections						
	2025	2023	2035	2040	2045	2050
Scenario 1, Unconstrained Demand (MW)						
No VCEA	38,393	49,792	66,861	92,462	102,043	106,967
VCEA	38,393	49,851	67,040	94,665	122,911	126,394
Scenario 2, Half of Unconstrained Demand (MW)						
No VCEA	38,393	46,038	59,615	69,589	84,565	85,835
VCEA	38,393	46,422	63,126	73,075	91,132	93,114
Scenario 3, No New Data Center Demand (MW)						
No VCEA	38,293	42,310	51,369	56,725	64,695	65,421
VCEA	38,293	42,310	53,465	60,256	68,682	67,341
Source: Joint Legislative Audit & Review Commission						

Rate adjustment clauses (RACs) allow utility companies to recoup costs on riskier projects with a minimum rate of return, but these costs often get shifted to ratepayers. Monthly electric bills have risen 51.2 percent since 2007 due to RACs.[cviii] Efforts are underway to safeguard rate payers from increased usage and subsequent costs.[cix]

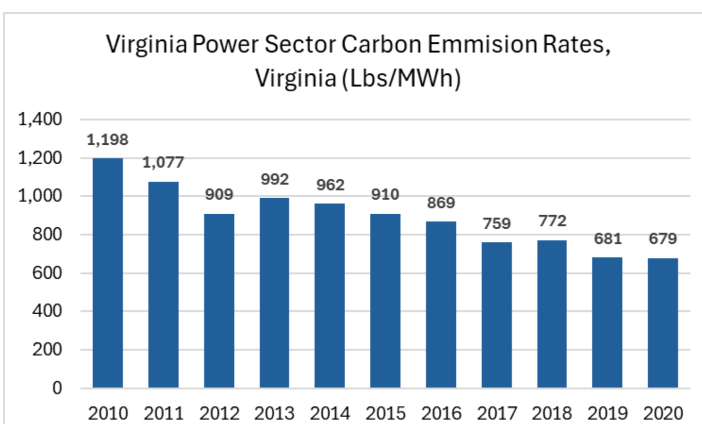
Virginia Rate Adjustment Clauses (RACs) Increase Monthly Electric Bills				
	7/1/2007	**7/1/2015**	**7/1/2018**	**7/1/2022**
AverageTotal Bill	$90.59	$109.40	$115.00	$136.93
RACs	0	10.04	15.08	30.92
Fuel	$22.32	$24.06	$27.19	$35.38
Base Rates	$68.27	$75.30	$72.73	$70.63
Source: Virginia Department of Energy				

Aside from commercial and irrigation uses, both ground and surface water consumption decreased from 2022 to 2023. Commercial and irrigation consumption increased by a total of 3.37 MGD.[cx] The majority of data centers in the state (83 percent) were found to only use as much water as an average large office building or less.[cxi]

Virginia Water Withdrawals by Use Category and Source Type (Total(GW+SW))							
	2019	**2020**	**2021**	**2022**	**2023**	**5yr Average**	**% Change 2023 to Avg.**
Agriculture	32.20	31.06	29.88	28.35	26.59	29.62	-10.2
Commercial	14.46	10.02	12.94	11.81	13.87	12.62	9.9
Irrigation	22.59	18.15	23.54	20.92	22.23	21.49	3.4
Manufacturing	351.25	359.92	369.22	360.64	354.30	359.07	-1.3
Mining	31.31	35.31	33.63	30.33	21.36	30.39	-29.7
PublicWaterSupply	782.56	727.47	803.82	823.16	822.75	791.95	3.9
FossilPower	752.25	635.91	732.38	751.73	449.92	664.44	-32.3
NuclearPower	3,739.73	3,864.26	3,656.73	3,679.03	3,553.37	3,698.62	-3.9
Source: Virginia Department of Environmental Quality							



Carbon emission rates from Virginia's power sector have declined since 2010. Additionally, from 2010 to 2020 the state reduced carbon dioxide by 20 percent, sulfur oxides by 91 percent, and nitrogen oxides by 58 percent.[cxii]



Initial investments for data centers in the state totaled $19.5 billion in FY21 – FY23. During that period data centers created 39,400 direct and 34,600 indirect jobs through both the construction and operational phases. They increased state labor income by $5.5 billion and GDP by $9.1 billion.[cxiii]

Data Centers in the Midwest

Similar to Pennsylvania, the Midwest is on the brink of a data center boom. As with the Commonwealth, the Midwest region offers significant land and power resources, relatively low disaster risk, and a fairly cool climate to help offset the facilities' cooling costs. The Federal Reserve Bank of Minneapolis acknowledges the potential of this boom to increase investment, tax revenue, and employment.

The Federal Reserve Bank also acknowledges the impending surge in demand for power. Although many of the centers in the region are not yet operational, several that are functioning in North Dakota and Minnesota have yielded significant impacts. For example, over the next seven years, two of Minnesota's major utility providers project that demand from data centers will equal the total electricity demand of all households in the state. The Federal Reserve Bank of Minneapolis also acknowledges concerns surrounding lack of transparency amid data center development, with many facility developers signing non-disclosure agreements and using shell corporations that limit the public from accessing information.

Although the costs of this exponential growth in energy consumption may be passed to customers – as was the case in Williston, North Dakota – it is possible for transmission-related revenue to help offset costs. In 2023 residents in Ellendale, North Dakota saw average decreases of $6 in their monthly bills. Furthermore, expected increase in energy usage may incentivize additional investment in renewable energy. Concerns about energy shortages elevate awareness of the need to draw from all available resources, and many data center operators have already committed to embracing carbon-free energy.[cxiv]

As these dynamics unfold throughout the Midwest, they stand to offer helpful insights for Pennsylvania's decision-makers and community members to consider.

Data Center Development in Texas

Texas data centers offer a compelling case study in the rapid expansion of digital infrastructure, illustrating both significant economic opportunity and mounting resource challenges driven by the growth of artificial intelligence and cloud computing. The state's abundance of relatively low-cost and diverse energy resources, including wind, solar, and natural gas, combined with a pro-business regulatory environment and generous tax incentives, has made Texas highly attractive to major technology companies such as Google and other hyperscalers. Its central U.S. location and strong fiber connectivity further support large-scale digital operations, accelerating investment and positioning Texas as a national hub for data center development.

At the same time, this growth is straining existing systems and communities. Data centers' enormous electricity demands raise concerns about grid reliability, with projections suggesting they could account for as much as 20.0 percent of Texas's electricity demand by 2030 if current trends continue. Water consumption for cooling presents another challenge, particularly in drought-prone regions where there is no comprehensive statewide system for tracking data center water use. Rapid development has also triggered land-use conflicts, as rural and agricultural areas are repurposed for industrial facilities, prompting community resistance and zoning disputes. In many regions, transmission lines, substations, and water infrastructure are struggling to keep pace with the scale and speed of planned projects.

Specific examples highlight both the promise and the pressure of this growth. In Wilmer, near the Dallas–Fort Worth metro area, a QTS data center benefits from proximity to major fiber routes, access to power through Oncor, and local tax incentives, while also contributing to highly concentrated electricity demand. In more rural areas, such as Medina County, billion-dollar projects like Rowan Digital Infrastructure have raised concerns about water availability, grid capacity, and long-term impacts on communities unaccustomed to industrial-scale development.[cxv] Researchers and policy groups, including HARC, the University of Texas at Austin, and EPRI, emphasize the need for coordinated solutions—such as demand response programs, incentives for onsite generation, grid-aware siting, improved transmission planning, and integrated water management—to ensure that Texas can balance digital economic growth with grid stability, resource sustainability, and community well-being.

Quincy, Washington

A Microsoft data center in Quincy, Washington, in partnership with the City of Quincy, developed a water reuse facility to better manage groundwater and surface water consumption while reducing total dissolved solids (TDS) in wastewater. The 270-acre data center campus originally relied on potable groundwater for cooling, discharging wastewater with high levels of calcium, magnesium, and silica to the city's municipal reclamation facility. During summer months, TDS concentrations exceeded reuse requirements for aquifer recharge. The high mineral content also limited how often cooling water could be cycled before mineral buildup risked damaging equipment, requiring frequent replenishment.

To address these challenges, Microsoft and the City of Quincy constructed the Quincy Water Reuse Utility, a project more than 10 years in the making, designed to treat and recycle cooling water for continued use. The initiative included the construction of a lime softening facility, ultrafiltration facility, permeate and blend tank facilities, storage systems, and brine ponds, integrated with existing infrastructure such as a high-efficiency softening system and a reverse osmosis plant. The total project cost was $31 million, offsetting an estimated 138 million gallons per year in water demand.[cxvi]

Renewable Energy Investments

By leveraging renewable energy resources, data centers have the opportunity to significantly reduce their overall energy consumption and environmental impact. A 2025 report identified ten facilities worldwide that operate entirely on renewable energy, including two in the United States powered exclusively by solar generation.[cxvii]

Data Center Using 100 Percent Renewable Energy				
Company	**Location**	**Year Built**	**MW**	**Description**
Telehouse South (KDDI)	London, United Kingdom	2022 (expanded 2024)	18	operates on wind, solar, biomass and hydro power
Iron Mountain London (LON-2)	London, United Kingdom	2021	27	operates entirely on renewable energy and upholds rigorous BREEAM sustainability standards
Falun, Sweden	EcoDataCenter 1	2019	90	operates entirely by renewable energy – 75% sourced from local hydropower and 25% from regional wind generation
Viborg Data Centre – Apple	Viborg, Denmark	2019	NA	operates entirely by wind and solar energy through long-term agreements and on site generation
Moro Hub Data Centre (DEWA)	Dubai, UAE	2023	100	world's largest solar-powered data center
Scala's Tamboré Campus	São Paulo, Brazil	Phase 2 operational 2024	600	operates by wind and hydropower through Brazil's renewable grid and strategic long-term PPAs
Switch SuperNAP	Las Vegas, USA	2008	315, expandable to 495	operates entirely on renewable power sourced from large-scale solar partnerships
Eagle Mountain Data Center – Meta	Eagle Mountain, Utah, US	2018 - 2023	NA	operations are fully powered by renewable energy, supported by dedicated solar developments both on- and off-site
Switch Citadel Campus	Tahoe Reno, Nevada, USA	2017	650	operates entirely by renewable energy
SINES DC – Start Campus	Sines, Portugal	Phase 1 (SIN01) 2024, phase 2+ underway	1.2 GW	pioneering seawater cooling

Source: Energy Digital

The National Renewable Energy Laboratory

In 2011, the National Renewable Energy Laboratory (NREL) constructed a new research facility designed to serve as a model for energy-efficient data center operations, showcasing significant energy savings. To achieve this, NREL implemented several innovative methods, including: [cxviii]

- Virtualizing servers, which can reduce energy footprint 95 percent
- Using directional cooling to reduce heat from hot spots created by wiring clumps
- Using free cooling methods such as outside air and evaporative cooling to minimize the use of traditional cooling methods
- Installing vacancy sensors that automatically shut off lights when unoccupied, subsequently reducing over lighting loads
- Reducing IT equipment and required cooling loads by upgrading the uninterruptable power supply from 80 to 95 percent efficient
- Replacing legacy servers for blade servers equipped with variable speed fans and energy efficient power supplies to increase energy efficiency
- Reducing energy loss using power distribution units designed to handle higher voltages and reduce overall conductor length (a more central location)
- Tracking metrics such as data center lighting, auxiliary plug loads, air handler unit, return fans, chilled water and computer power can help save overall costs by evaluating performance. The Power Usage effectiveness (PUE) and Energy Reuse Effectiveness (ERE) are key metrics to track success.
- Upgrading traditional hot/cold isle configuration to hot aisle containment, which can prevent hot and cold air mixing and supply air can be delivered at a warmer

temperature (Hot Aisle Containment). Additionally, vented heat can be used to heat incoming air in winter months

- Optimizing airflow by using properly sized, organized, and secured cables, grouping equipment with similar functions, routing cables through overhead conduits rather than impeding air in underfloor plenums, reducing dust in server room with antistatic mats and clean practices, and sealing airflow paths to force cold air directly into the rack equipment

These strategies help cut energy usage by 1,450,000 kWh (60 percent reduction), and at $0.057 kWh save $82,000 annually. Additionally, the data center was able to reduce lighting loads, miscellaneous loads, and load losses by 82 percent, cooling loads by 96 percent, and IT loads by 23 percent. Metrics such as the PUE and ERE are suggested for tracking performance of energy consumption and reuse.[cxix] Other metrics that track data center efficiency include the Data center infrastructure efficiency (DCiE), Water usage effectiveness (WUE), and Carbon usage effectiveness (CUE).[cxx]

Conclusion

Data centers are quickly growing in number, with 10,645 worldwide – 4,014 (52 percent) of which are in the U.S. Northeastern Pennsylvania is positioned to play a major role in this growth.[cxxi] The region offers several advantages that make it appealing for data center development, including robust energy infrastructure, access to natural gas, cooler climate conditions, and proximity to key markets. Community members in Lackawanna and Luzerne Counties have raised important concerns about the potential impacts of these facilities, however. Concerns involve increased energy demand, water use, environmental effects, and rising utility costs. Additionally, legislative and regulatory requirements are continually evolving, and multiple entities assert overlapping jurisdiction. When their directives conflict, it creates significant challenges in navigating the regulatory and policy landscapes.

Data centers can generate jobs, tax revenue, and new business activity, but without careful oversight they may strain local resources and increase costs for residents. Balancing these opportunities and challenges will be critical moving forward. Achieving this balance will require collaboration among industry leaders, local governments, utility providers, and community members to ensure that growth is managed responsibly and benefits are maximized while minimizing overall impacts.

Recommendations

Data centers are often discussed as uniform infrastructure projects, yet their real-world impacts vary significantly based on design, siting, governance, and integration with local systems. Community outcomes are not inherent to the technology itself, but rather to the policies, standards, and planning frameworks that guide development. Factors such as energy sourcing, cooling systems, land-use strategy, regulatory oversight, and community benefit structures determine whether a facility functions as a regional asset or a local burden. As such, data center development should be understood not as a fixed outcome, but as a set of choices that can be intentionally shaped to align with long-term community, economic, and environmental goals.

Data centers are complex and resource-intensive, yet their ultimate impact on Northeastern Pennsylvania is not predetermined. Outcomes depend on planning, standards, governance, and alignment with regional institutions. By implementing these recommendations, Northeastern Pennsylvania can capitalize on the economic benefits of data centers while addressing community concerns and safeguarding long-term sustainability:

Require public reporting of emissions performance and electricity and water usage, with daily and annual water usage thresholds. Transparency is essential for informed decision-making. During the Pennsylvania State Senate Majority Policy Committee's public hearing, community members and municipal leaders noted limited access to detailed usage reports. Public reporting would enable accurate monitoring of resource demands and help identify potential strains on local infrastructure.

Supplement reliance on resources with renewable energy options and energy-efficient cooling technologies. Data centers can consume large amounts of electricity and water. Reliance on these resources should be supplemented with efforts to explore potential for new generation opportunities and through renewable options. Utilizing free cooling methods and renewable energy sources can reduce environmental impacts and lower operational costs. Additionally, water-catch basins and the use of closed-loop cooling, along with wind and solar can help mitigate energy usage. The use of reflective paint on rooftops can reduce heat absorption and subsequently save energy. Within the facilities, strategic airflow design and isolation of hot and cold airstreams (aisle containment and thermal zoning) can help maintain appropriate temperatures efficiently. Heat from servers can be reclaimed and used for facility needs, such as water heating. AI itself may be used to automatically power down ide machines, and non-urgent tasks can be shifted to occur when renewable supply is high.[cxxii] Facility management should seek third-party sustainability certification.

Mitigate safety risks and address community concerns by adopting and following safe-distance guidelines for data center development. Development should occur away from residential areas, and appropriate separation distances should be maintained from other man-made elements such as airports, radio and television stations, dams and reservoirs and sewage treatment plants, and from gas stations, railroads, and water storage towers.[cxxiii] Other considerations may involve favoring of industrial-zoned, brownfield, or previously disturbed sites. Buffer zones, setbacks, noise shielding efforts, lighting mitigation, and requirements for site layout should be considered as well.

Engage local communities early in the planning process. Residents and municipal leaders can be informed about potential impact of development in their communities through the exchange of independently-conducted environmental impact studies, grid capacity impact studies, and emergency response plans. Information about inspection and compliance should be made available as well. Residents and municipal leaders should also be actively involved with local infrastructure improvements prioritized to benefit surrounding neighborhoods. HB 1834, referred to the House Energy Committee on September 9, 2025, includes regulations requiring contributions to LIHEAP and the establishment of the Data Center LIHEAP Enhancement Fund, shifting benefits to local communities and fostering positive relationships.

Strengthen oversight through legislation and regulatory measures. Effective zoning, utility planning, and environmental safeguards are necessary to mitigate negative impacts. Legislation in states such as Oregon, Georgia, and Virginia provides examples of regulations that protect ratepayers, mandate cost responsibility contracts, and require annual reporting of electricity and water usage. In Pennsylvania, HB 1834, introduced on September 4, 2025, would grant regulatory authority of data centers to the Pennsylvania Public Utility Commission (PUC). Proposed regulations include cost recovery, contributions to LIHEAP, creation of the Data Center LIHEAP Enhancement Fund, renewable energy requirements, and filing and enforcement standards. Such oversight ensures that data center growth balances economic development with resource protection while addressing community concerns transparently. Examples of advanced bills are provided in the appendix.

Require local hiring targets for construction and operations, and prepare the local workforce through regional colleges and training programs. Data centers create significant employment opportunities during construction and fewer, but higher-skilled, positions during operation. Local colleges and universities, such as the consortium led by the PACCC, can provide a framework for workforce pipelines, ensuring that the local workforce is prepared for both construction and operational roles. Such framework may include internship and co-op programs, and apprenticeship and technical certification pipelines.

Ensure that development contributes to long-term regional resilience. Required contributions may include off-site infrastructure support for roads, utilities, and fiber; community reinvestment funds for schools, housing, and workforce programs; co-location of renewable energy projects, and annual public reporting of community benefit metrics.

Appendix

Disclaimer

This report is not intended to reflect endorsement of or opposition to data centers by The Institute, its Board of Directors, or funders. This report is meant to educate and inform the community about data centers and their pros and cons, share case studies on communities that have experienced data center development and their lessons learned; and provide suggestions on public policy to oversee development and present Pennsylvania fairly and equitably for development while reaping the economic benefits of data centers and mitigating their adverse effects.

This report will be updated with current events in spring 2026 and presented at the organization's annual meeting on May 12.

Advanced Bills

Per NCEL, 65 pieces of legislation were introduced in 22 states during 2025. The following list, credited to NCEL, highlights some of these bills according to the policies' overarching themes of ratepayer protection, transparency and reporting, renewable energy usage, and siting and zoning.

Ratepayer Protection

To shield consumers from rising electricity costs driven by data center demand and grid upgrades, at least 12 states have introduced ratepayer protection legislation.

- **Prohibiting Cost Pass-Throughs:** Georgia's SB 34 would prevent grid or energy costs incurred solely to serve data centers from being passed on to other ratepayers.
- **Special Utility Rates:** Virginia (HB 2084) and Oregon (HB 3546) would require state public utility commissions to establish special electricity rates for data centers, while New Jersey (AB 5462) directs utilities to pursue a similar approach.
- **Direct Energy Contracts:** Utah's SB 132, which has passed both legislative chambers and awaits the governor's signature, allows power suppliers to contract directly with data centers, ensuring their energy costs are not shifted to other customers.

Transparency and Reporting on Energy Usage

As grid planners struggle to accurately forecast data center energy demand, at least 10 states have proposed legislation requiring greater transparency to support informed infrastructure and policy decisions.

- **Preventing "Venue Shopping":** Texas introduced SB 6 and SB 1641, building on earlier disclosure requirements for the bitcoin industry, to require data center developers to disclose whether identical interconnection requests have been filed in other states—reducing the risk of overestimating load growth and overbuilding infrastructure.

- **Impact Studies:** Maryland's HB 0270 and SB 0116, both of which have passed their respective chambers, would commission a statewide study on the environmental and energy impacts of data centers.
- **Self-Reporting Requirements:** Connecticut (SB 1292 / HB 5076), Georgia (HB 528), New Jersey (S 4143 and S 4293), Oregon (HB 3698), Indiana (SB 135), and Illinois (SB 2181) would require data centers to regularly report energy and water usage.

Renewable Energy Requirements and Demand-Side Management

Concerned that rapid data center growth could undermine decarbonization goals and prolong reliance on costly fossil fuel generation, eight states have introduced legislation addressing emissions, efficiency, and demand flexibility.

- **Renewable Energy Mandates:** New Jersey's S 4143 would require data centers to source all electricity from renewable or nuclear energy.
- **Emissions Standards:** Oregon's HB 3698 would establish emissions limits for backup generators used by data centers.
- **Efficiency and Operational Goals:** New York's S 6394 would direct the New York Power Authority and state agencies to develop energy efficiency standards for data center design and operations, while also prohibiting fossil fuel power purchase agreements from offering incentives or discounted rates.

Siting and Zoning Processes

As data centers increasingly affect local land use, water resources, agriculture, conservation areas, and air quality, 13 states have proposed legislation to strengthen local oversight and community involvement.

- **Local Site Assessments:** Indiana (SB 135), Virginia (SB 285), and Tennessee (HB 0946 / SB 0962) would require assessments of water and natural resource impacts before approving data center projects.
- **Siting Restrictions:** Minnesota (HF 245 / SF 608) and Virginia (HB 337 and HB 1010) have introduced legislation limiting where data centers may be located.[cxxiv]

Economic Impact of Data Centers in NEPA: An Example

Economic Impact of Data Centers in NEPA: An Example

The economic impact of an investment is shaped by the *multiplier effect*. This concept explains how money spent in an economy creates additional activity beyond the original purchase. As dollars are spent and re-spent, they circulate through local businesses and workers, generating more revenue, production, and jobs. As a result, the total economic benefit is greater than the primary project activities alone.

Data centers generate one-time economic impact during the construction phase. The impact generated benefits the construction industry and workers, but also provides revenue and job support for other industries during the construction period. Retail, hospitality, real estate, health care and professional services can share in this impact. In turn, spending in these areas generates tax revenue at all levels of government; and include school districts. For instance, multi-year construction of data center campuses in Lackawanna County could generate millions for local schools.

Pennsylvania offers a sales tax credit on computer and HVAC equipment for data centers to compete with other states for data center projects, thus state sales tax revenue is limited during this construction period.

Once data centers are operational, however, they generate economic impact annually. Estimates of revenue based on MW produced vary widely, but for purposes of this example, The Institute chose to measure a single 75 MW building with annual revenues of $4,875,000 (thus using a very conservative estimate of revenue equal to $65,000 per MW). At this volume, the building will produce approximately $8.6 million in total output, support 39.5 jobs in various sectors, add $3.9 million to the regional gross domestic product and produce $2.6 million in labor income annually.

Industries outside the data centers share in this economic benefit through indirect and inducted impact. These include housing, financial services, hospitality, healthcare, and a variety of professional services.

As a result of operations, this building will produce about $925,000 in tax revenue annually. The estimated tax impact is as follows: $26,900 for the municipality; $58,470 for the school district; $23,800 county, $181,500 for the state and $634,000 for the federal government. The tax revenue is a combination of property, wage, sales, and business income tax.*

Annual Economic Impact	$8.6 million	Total annual output
	39.5	Jobs in various sectors
	$2.6 million	Labor income
	$3.9 million	contribution to regional GDP
Annual Tax Revenue	$26,900	Municipality
	$58,470	School District
	$23,800	County
	$181,500	State
	$634,000	Federal

*The impact is estimated using the IMPLAN Software by IMPLAN Group, LLC. This is a software system that addresses the functions of a local economy and the impact a business (for-profit and non-profit) has on that economy. It generates input-output multipliers by geographic region and by industry, combined with a county/state database (using the North American Industry Classification System (NAICS), which allows the assessment of change in overall economic activity. See Appendix for additional Disclaimer.[cxxv]

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