

The Impact of Data Centers on Virginia's State and Local Economies

5th Biennial Report



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- **Policy Analysis:** Mangum has extensive experience in identifying and quantifying the intended and unintended economic consequences of proposed legislative and regulatory initiatives.

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ABOUT THE NORTHERN VIRGINIA TECHNOLOGY COUNCIL (NVTC)



NVTC is the trade association representing the Northern Virginia technology community.

As one of the nation's largest technology councils, NVTC serves companies from all sectors of the industry, from small businesses and start-ups to Fortune 100 technology companies, government contractors, as well as service providers, academic institutions, and nonprofit organizations. More than 460 members look to the organization as a resource for networking and educational opportunities, peer-to-peer communities, policy advocacy, industry promotion, fostering of strategic relationships, and branding of the region as a major global technology center.

Learn more at nvtc.org



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Executive Summary

Virginia is second to none in terms of data center development. Northern Virginia is the largest data center market in the world. And the rest of the state has so much data center capacity, that even without Northern Virginia, the Commonwealth would still rank among the top ten states based on data center capacity.

In 2023, new and expanding data centers accounted for 92% (\$45.9 billion) of all new investment announced by the Virginia Economic Development Partnership. Northern Virginia's colocation data center market grew nearly 500% between 2015 and 2023. It has flourished due to attractive tax incentives, dense and expanding fiber infrastructure, and an increasingly large pool of skilled workers to support the construction and everyday operation of these facilities. Additionally, hyperscale data center capacity, which makes up about 60% of the total data center capacity in Northern Virginia, saw a one-year growth rate of 16% with 454 megawatts added between 2022 and 2023.

The total accumulated capital investment of data centers in Virginia amounts to \$203 billion, employing 12,140 operational workers, with about 90% in Northern Virginia.

Virginia's data centers drive investment in the data center supply chain. Examples of companies include:

- Harbor Peak: \$20 million to increase fiber connectivity to data centers in Northern Virginia;
- Hitachi Energy: \$37 million to expand its transformer manufacturing plant in Southern Virginia; and
- Tate: \$15 million in a new plant making structural elements for data centers in Southwestern Virginia.

In 2023, data centers in Virginia directly provided approximately:

- 12,140 operational jobs plus 14,240 construction jobs;
- \$2.8 billion in operational and construction pay and benefits; and
- \$16.6 billion in operational and construction economic output.

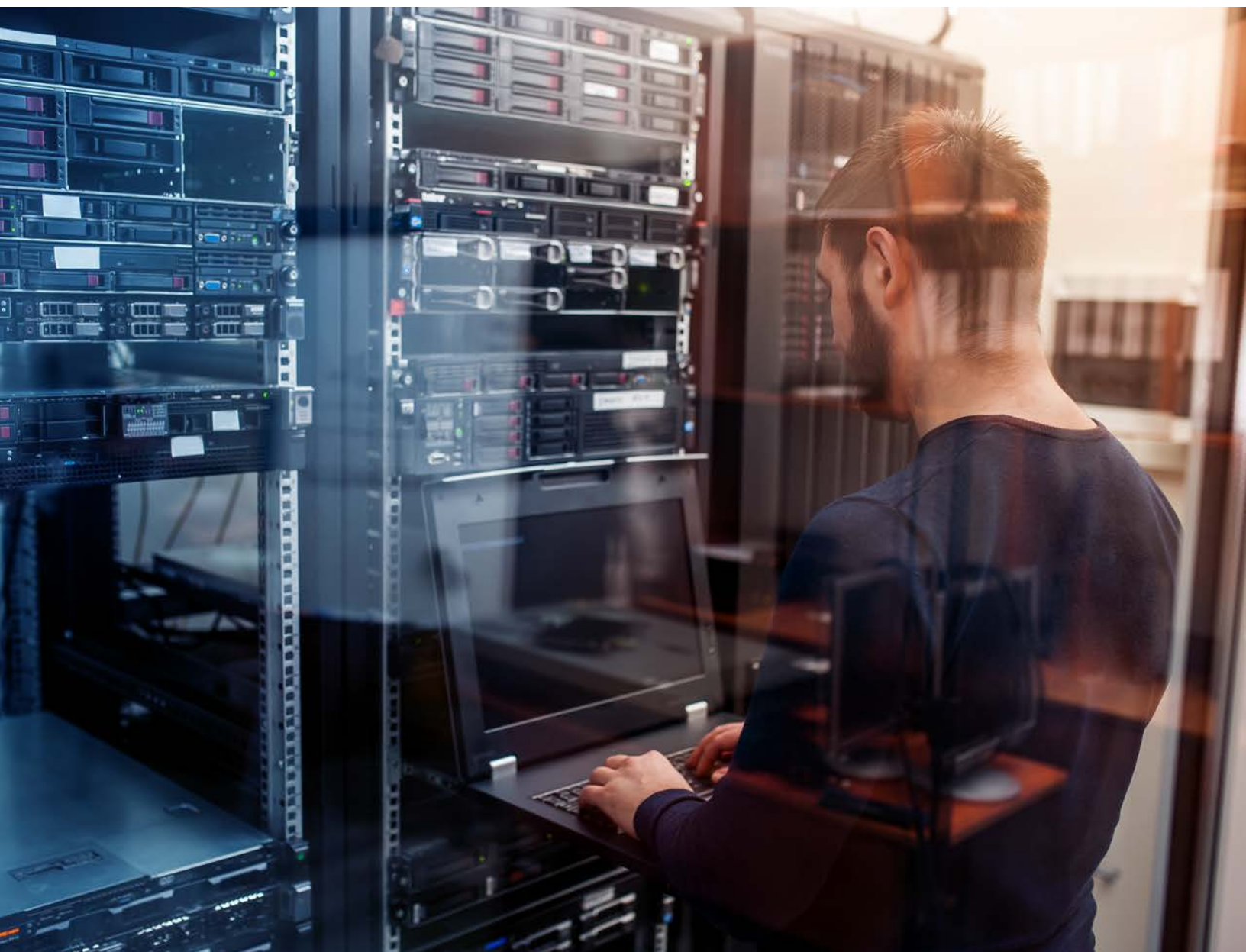
In 2023, the economic ripple effects generated by the growth of data centers have had the following impact on Virginia's workforce and economy:

- 78,140 jobs supported by operation and construction combined;
- \$6.2 billion in supported employee pay and benefits; and
- \$31.4 billion in supported economic output.

For every job inside a Virginia data center, 3.5 additional jobs are supported in the rest of Virginia's economy, not counting construction jobs. Also, 10% of commercial/industrial construction jobs state-wide are directly employed building data centers. In Northern Virginia, the percentage increases to 22%.

Because data center facilities are taxed locally but serve customers globally, they import tax revenue from other states. In 2022, data centers paid \$640 million in taxes to the Commonwealth of Virginia and \$1 billion to local governments in Virginia.

Because data centers pay large amounts in taxes, but place few demands on local public services, they have a high fiscal benefit-to-cost ratio. In Loudoun County, data centers pay \$26 for every dollar of local public services required (a 26:1 ratio). In Prince William County, the ratio is 13:1. For comparison, fiscal benefit-to-cost ratios for other types of development such as manufacturing plants rarely exceed 4:1.



Data Centers Drive Investment in Virginia

Data centers are the major drivers of investment in Virginia. This investment comes in the form of building and operating the data centers themselves, plus investments in Virginia made by businesses that supply and support data centers in the state, such as energy and utility providers and manufacturers.

Investment by Data Center Suppliers

According to information from the Virginia Economic Development Partnership (VEDP), 92% (\$45.9 billion) of all new investment in 2023 came from new and expanding data centers. In 2022, data centers accounted for 65% (\$7.2 billion) of all of the new investment that VEDP announced.¹ As explained below, the accumulated capital investment of data centers in Virginia amounts to an estimated \$202.6 billion in 2024 dollars employing 12,140 operational workers.

The investment in data centers in Virginia is also driving investment in businesses in the data center supply chain. Some specific examples of new investment in Virginia associated with data centers include a \$37 million investment by Hitachi Energy to expand its electrical transformer manufacturing facility in South Boston in South Central Virginia. In the initial press release, the company clearly stated that the expansion was fueled by growing demand for data centers and renewable energy, as utility providers work to satisfy the needs of new developments.²

Another example is Tate, an Irish company that manufactures raised-access floors, hot/cold aisle containment systems, structural ceilings, and other critical data center components. Last year, Tate announced an investment of nearly \$15 million to build a manufacturing facility in St. Paul in Southwest Virginia. According to the company's website, the new facility will support a total of 170 new manufacturing jobs. Tate's president, Daniel Kennedy, stated, "Tate is excited to begin operations in Russell County. The facility is an integral addition to support our commitment to manufacturing innovative infrastructure solutions for the data center industry."³ It is clear that, while the company supplies other industries, data centers are a key business priority and a major impetus behind their move to Virginia.

Harbor Peak, a joint entity specializing in planning and implementation of carrier-neutral network infrastructure, unveiled plans in May 2023 to construct a seven-mile fiber route to increase connectivity throughout Data Center Alley in Ashburn at a cost of roughly \$20 million.⁴ This new route will be connected to the 60-mile stretch of conduit installed by Harbor Link, which spans up towards Washington, D.C. and into Maryland along I-95. Harbor Peak estimates completion of the project by the second half of 2024.

¹ [Virginia Economic Development Partnership](#)

² [Hitachi Energy invests US\\$37 million to expand transformer manufacturing facility in South Boston, Virginia](#)

³ [Tate® to Establish New Facility in Virginia \(tateinc.com\)](#)

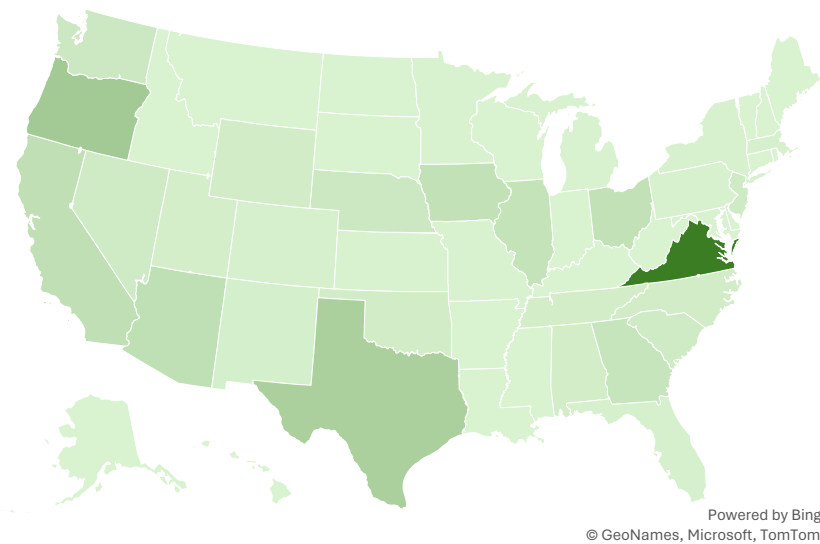
⁴ [Harbor Peak breaks ground on new fiber conduit system in Ashburn, Virginia - DCD \(datacenterdynamics.com\)](#)

Economic Profile of Data Centers in Virginia

Virginia is undoubtedly second to none when it comes to data center development. This report compares Virginia to other states and demonstrates how the presence of data centers in a region attracts related industries to the area.

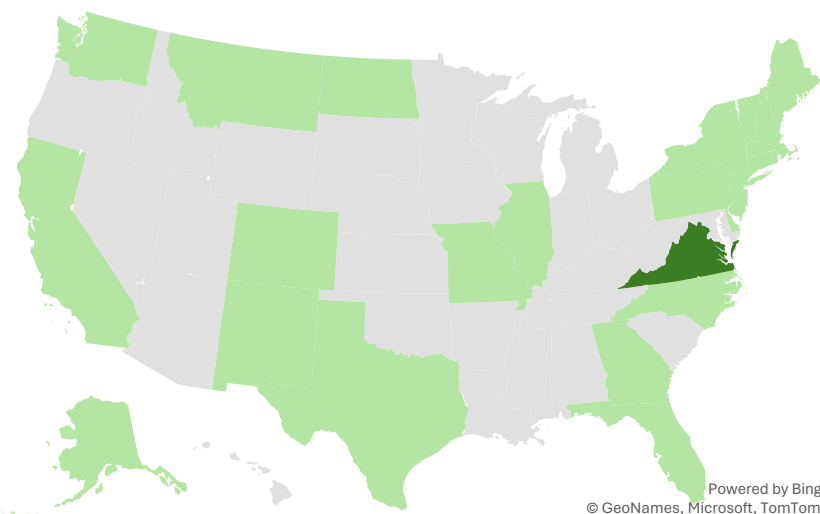
Figure 1 is a heat map of data center investment nationwide, based on megawatts of critical capacity. Virginia stands out significantly, compared to the rest of the country.

Figure 1. Relative Sizes of the Largest Data Center Markets (megawatts of critical capacity) – 2023



Moreover, as shown in Figure 2, the data center capacity in Virginia is equivalent to all of California, Washington, Montana, Colorado, New Mexico, Texas, North Dakota, Missouri, Illinois, Florida, Georgia, North Carolina, Pennsylvania, New York, Delaware, New Jersey, Connecticut, Massachusetts, Vermont, Rhode Island, New Hampshire, Maine, and Alaska combined (23 states).

Figure 2. The 23 States which, Combined, Contain Data Center Capacity Equal to that of Virginia – 2023

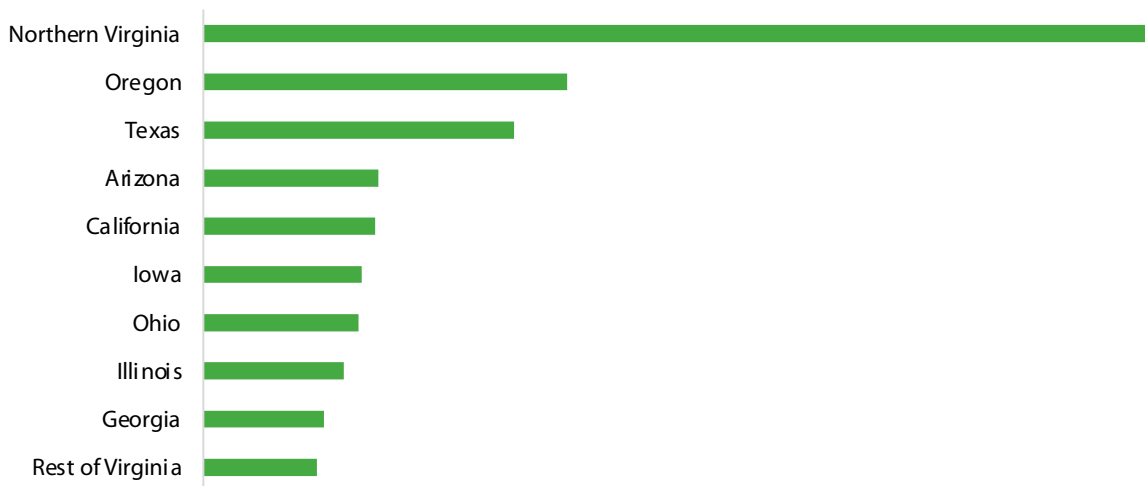


The Northern Virginia Data Center Market in 2023

Northern Virginia has more data center capacity than all of Dublin, London, Frankfurt, Amsterdam, Singapore, and Sydney combined. It has flourished due to attractive tax incentives, dense and expanding fiber infrastructure, and an increasingly large pool of skilled workers to support the construction and everyday operation of these facilities.

As shown in Figure 3, not only is Northern Virginia the largest data center market in the world, but if Northern Virginia was a state by itself, the rest of Virginia would still have enough data center capacity to, in its own right, rank 10th among all 50 states.

Figure 3. Data Center Capacities of the Largest States if Northern Virginia Was its Own State – 2023

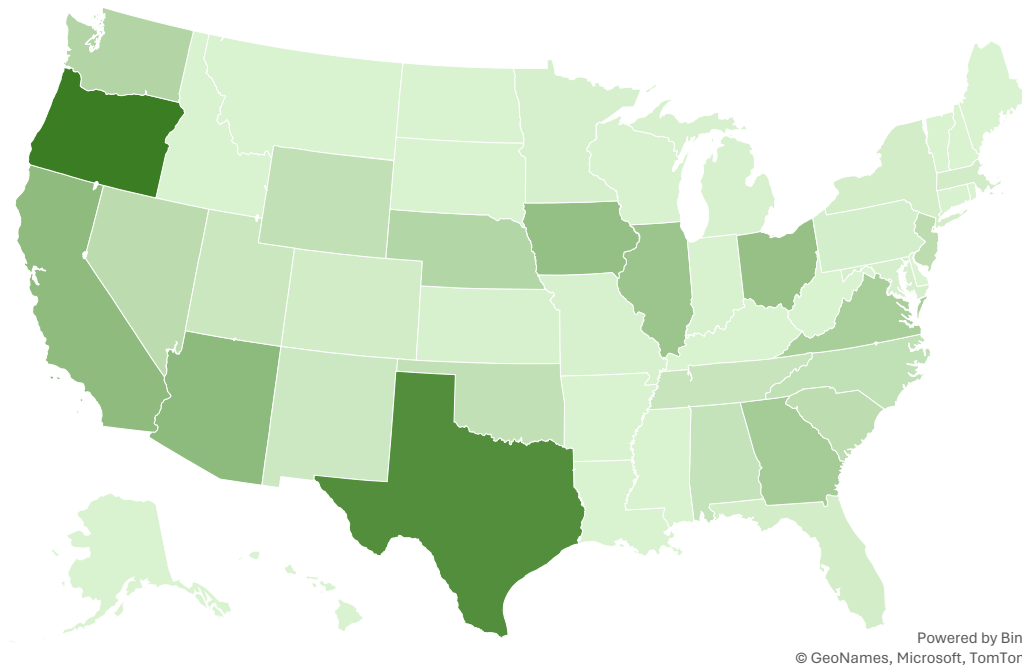


Northern Virginia's ranking at the top of the data center market is actually a relatively recent development. In 2016, Northern Virginia had just supplanted the New York market as the largest data center market in the United States. In 2017, the New York/Tri-State area fell to become the sixth-largest data center market. A 2011 report on the data center market in the United States contains only one mention of Virginia in four pages. "Reston, VA has excess supply and new construction will be minimal for a few years."⁵ This 2011 report highlighted Chicago, Silicon Valley, Southern California, Phoenix, New York, St. Louis, Washington State, Boston, Minneapolis, Denver, and Charlotte as important data center locations. This illustrates the fluid nature of the data center market and the speed with which market conditions can change.

⁵ ESD (Environmental Systems Design, Inc.), 2011 Data Center Technical Market Report. February 2011.

Figure 4 shows how Virginia would rank relative to the other states if Northern Virginia was removed from consideration. Virginia would remain a “Top 10” location for data centers even without Northern Virginia.

Figure 4. Data Center Capacities of the Largest States, Excluding the Capacity in Northern Virginia (darkness of shading indicates relative megawatts capacity) – 2023



As large as the data center market in Northern Virginia is, the growth of data centers in the region is even more impressive. Northern Virginia’s colocation data center market grew nearly 500% between 2015 and 2023. In comparison, over that same period, growth in the Atlanta and Silicon Valley markets stood at less than half that amount.⁶

Based on data from CBRE, growth of the colocation market in Northern Virginia reached 21% in 2023, compared to markets like Silicon Valley and Phoenix, which grew 13% and 11%, respectively. Notably, during that time, the Chicago and Hillsboro colocation markets experienced increases of 64% and 56%, respectively. While the one-year growth rates in both Chicago and Hillsboro are tremendous in proportion to their sizes and 2.5 to 3 times greater than the one-year growth rate in Northern Virginia, because the Northern Virginia colocation market is so large to begin with (in terms of megawatts of colocation capacity), it added more megawatts of colocation capacity than were added in Chicago and Hillsboro, combined.

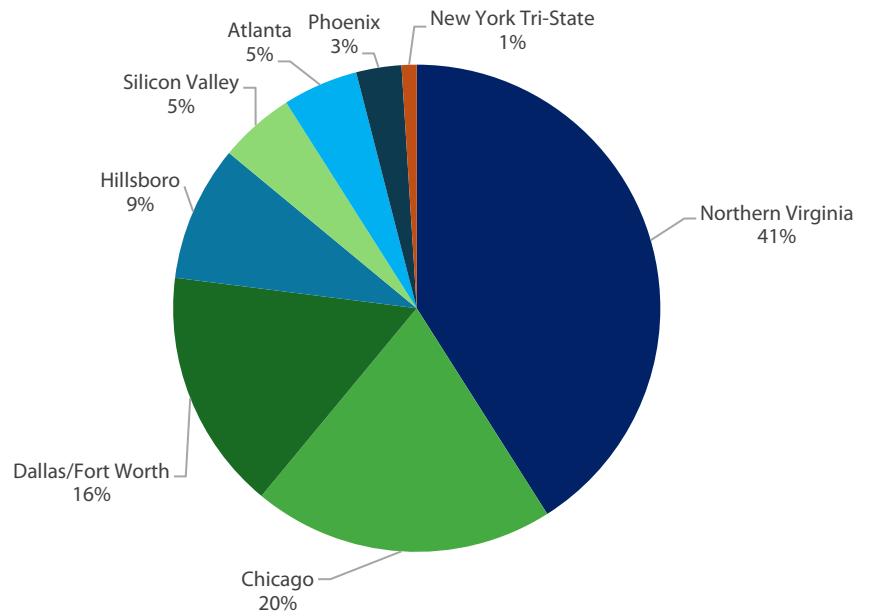
⁶ Data source: CBRE

Figure 5 shows the regional distribution of total growth among primary colocation markets from 2022 to 2023. Considering the combined growth that was observed within this timeframe among these 8 markets, Northern Virginia accounted for 41% of all growth among primary colocation markets from 2022 to 2023.

Figure 5. Share of Growth Among Primary Colocation Markets from 2022 to 2023⁷

It is important to note that colocation presence only tells part of the story.

In addition to colocation facilities, hyperscale capacity, which makes up about 60% of the total data center capacity in Northern Virginia, saw a one-year growth rate of 16%, with 454 megawatts added between 2022 and 2023.⁸



⁷ Mangum Economics estimates based on data from CBRE

⁸ Data source: datacenterHawk

Fairfax County Spotlight

Fairfax County has a large, thriving and extremely diverse economy. Data center investment in Fairfax County continues to grow, as land availability is sufficient to meet current and future demand. The demand for data centers in the area is expected to double over the next decade. Including enterprise data centers, there are currently 29 separate facilities in Fairfax County, ranging from 30,000 to 500,000 sq. ft.

As of February 2024, the pipeline includes 4.4 million sq. ft. of space under construction, more than doubling the existing inventory. Fiber infrastructure and connectivity have enabled increased investment in the Chantilly, Herndon, and Reston markets adjacent to Washington Dulles International Airport, and the Tysons market on the Capital Beltway. The county has a history of welcoming data center development, which is one reason why many household technology names have chosen to locate in the area. Almost one-third of Fairfax County jobs are in technology fields, which includes a strong focus on emerging tech jobs, such as AI and cybersecurity.



Data Centers Drive Other Types of Investment in Virginia

In addition to the investments that data centers are making in their own infrastructure in Virginia, they are also investing in renewable energy generation in the state and the Virginia workforce.

Investment in Renewable Energy

Data centers have embraced clean energy and are major drivers of investment in electrical generation from renewable sources as evidenced by the widespread adoption of power purchase agreements (PPAs) with renewable energy providers. A 2020 report on the challenge of powering data centers estimated that data center operators account for more than 60% of renewable PPAs in the United States.⁹

It is important to recognize that renewable or otherwise carbon-free energy can take many forms, such as wind, solar, hydrogen, or nuclear, to name a few. Regardless, the technology companies that own and operate data centers prefer to have the renewable energy that they purchase generated close to their facilities. This has created a strong demand for investments in renewable energy in Virginia. For example, Dominion Energy is investing over \$9 billion to build a wind farm off Virginia Beach which will create thousands of jobs in Hampton Roads. As of the fourth quarter of 2023, The Solar Energy Industries Association reports that 4,841 megawatts of solar generation capacity have been installed in Virginia.¹⁰ Amazon alone owns 18 solar farms in Virginia that, once fully built out, will provide nearly three million megawatt hours of power per year.¹¹

Investment in Workforce Development

At the end of 2023, nearly 379,000 tech workers were employed in Virginia. However, almost 165,000 tech jobs remained unfilled across the state.¹² To address the high demand for tech workers, Virginia data centers have been and are making significant investments in workforce development initiatives to help close this real skills gap in Virginia's workforce.

⁹ [Powering data centers | Norton Rose Fulbright - October 2020 \(projectfinance.law\)](#)

¹⁰ [Virginia Solar | SEIA](#)

¹¹ [Learn about AWS's long-term commitment to Virginia \(aboutamazon.com\)](#)

¹² [CompTIA State of the Tech Workforce 2024 vFinal \(azureedge.net\), p 62](#)

George Mason University

The College of Engineering and Computing at George Mason University, located in Fairfax, provides an advanced, multidisciplinary approach to higher education. In November 2022, Mason announced an innovative partnership with Amazon aimed at strengthening education and securing its spot as one of the most technologically-advanced universities in the nation. As part of this collaboration, George Mason University introduced concentrations in data center engineering tailored toward both engineering and computer science programs. This academic opportunity enables further data center engagement with both faculty and students as the university expands its reach through a partnership with AWS.¹³

Specifically, the partnership between George Mason University and AWS focuses on the advancement of high-performance computing, machine learning, artificial intelligence, and 5G technology, just to name a few, by capitalizing on AWS' resources and expertise and inviting the next generation of future leaders to learn the fundamentals for these emerging technologies. One of the first courses in the academic program focuses on major topics and trends, including infrastructure design, cooling, efficiency, and sustainability, as well as provides hands-on experience to the students, as opposed to purely theoretical, classroom-based instruction.

Northern Virginia Community College

In 2023, Northern Virginia Community College (NOVA) also announced a partnership with AWS to support the educational journeys of students seeking careers in the data center industry. AWS made a \$300,000 contribution—the largest single private donor investment in program history—to NOVA Educational Foundation's Information and Engineering Technologies Fund. While AWS and NOVA have been collaborating for years as part of their Data Center Operations program, this investment will help drive advancement and facilitate future offerings at the college, including the forthcoming Fiber Optic Technician career study certificate program.¹⁴

As part of its commitment to supporting the Virginia workforce and economy, NOVA applies a multi-level approach to admissions for these highly competitive programs, prioritizing prospective students from the immediate area first before considering other Virginia residents and out-of-state applicants.

¹³ [Amazon and George Mason University Collaborate to Deliver New Innovations in Education and Research Powered by the Cloud | George Mason University \(gmu.edu\)](https://www.gmu.edu/news/amazon-and-george-mason-university-collaborate-to-deliver-new-innovations-in-education-and-research-powered-by-the-cloud)

¹⁴ [AWS donates \\$300,000 to Northern Virginia Community College data center program | Headlines | insidenova.com](https://www.insidenova.com/news/aws-donates-300000-to-northern-virginia-community-college-data-center-program)

The Impact of Data Centers on Virginia's State and Local Economies

The construction and ongoing operation of data centers in Virginia have large, broad effects across the state economy. This section includes the estimated statewide economic impact that data centers have on Virginia as a whole, as well as Northern Virginia. The impacts relate to the data centers themselves, as well as the businesses in the data center supply chain.



Examples of VA Businesses in Data Center Supply Chain with Locations around the State

Many Virginia businesses make up the data center supply chain. Table 1 below demonstrates the variety of companies located in Virginia that benefit from data centers in Virginia, and that, in turn, generate economic activity in the state. This list is not an endorsement, promotion, or commendation of them, and it is far from a complete list of companies. This list illustrates some of the types of businesses that are part of the second ripple effect of economic activity related to spending by data centers.

Table 1. Some Businesses Serving Virginia Data Centers

Company	Line of Business	Location
Anord Mardix	Power distribution and management products and services	Henrico
Compu Dynamics	Design, construction, optimization, and maintenance	Chantilly
Fulcrum Collaborations	Facilities management cloud-based platform	Glen Allen
Hanley Energy	Energy management services	Ashburn
Harbor Peak	Carrier-neutral fiber interconnecting Data Center Alley	Ashburn
Hitachi Energy	Electric transformer manufacturing	South Boston
Interglobix	Data center and fiber consulting and marketing	Herndon
Iron Bow Technologies	Cybersecurity	Herndon
Metro Fiber Networks	Carrier-neutral fiber connecting Virginia Beach to Henrico data centers	Yorktown
Munters	Cooling and air treatment	Buena Vista
Power Distribution Incorporated	Power transformation, distribution, and monitoring	Sandston
Rosendin Electric	Design and construction services	Sterling
Submer	IT hardware immersion cooling	Ashburn
Tate	Raised-access floors, hot/cold aisle containment systems, structural ceilings, etc.	St. Paul
Technoguard	Materials, cleaning, and disaster recovery	Sterling
Timmons Group	Site certification and development	Richmond
Windward Consulting	Management consulting	Herndon

Virginia Statewide

In 2023, data centers throughout Virginia directly provided approximately:

- 12,140 operational jobs and 14,240 construction jobs,
- \$2.8 billion in associated employee pay and benefits, and
- \$16.6 billion in economic output.¹⁵

Considering the economic ripple effects generated by that direct impact, the total impact on Virginia from data centers in 2023 was approximately:

- 78,140 supported jobs including construction and manufacturing jobs,
- \$6.2 billion in associated employee pay and benefits, and
- \$31.4 billion in economic output.

For every job inside a Virginia data center, 3.5 additional jobs are supported in the rest of the Virginia economy, not including construction jobs.

Table 2. Economic Impact of Data Centers in Virginia – 2023 (2024 dollars)

1st Round Direct Effects	Jobs	Pay & 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
Operation 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

¹⁵Economic output is the total amount of economic activity that is created in the economy.



Northern Virginia

In 2023, data centers throughout Northern Virginia directly provided approximately:

- 10,420 operational jobs and 12,340 construction jobs,
- \$2.6 billion in associated employee pay and benefits, and
- \$15.5 billion in economic output.

Considering the economic ripple effects generated by that direct impact, the total impact on Northern Virginia from data centers in 2023 was approximately:

- 59,140 supported jobs including construction and manufacturing jobs,
- \$5.4 billion in associated employee pay and benefits, and
- \$26.6 billion in economic output.

For every job inside a Northern Virginia data center, 2.9 additional jobs are supported in the rest of the Northern Virginia economy, not including construction jobs.

Table 3. Economic Impact of Data Centers in Northern Virginia – 2023 (2024 dollars)

1st Round Direct Effects			
	Jobs	Pay & Benefits	Economic Output
Data Center Construction	12,340	\$887,400,000	\$2,646,900,000
Data Center Operation	10,420	\$1,761,200,000	\$12,895,300,000
2nd Round Indirect and Induced Effects			
Data Center Construction Supported	6,410	\$444,100,000	\$1,440,300,000
Data Center Operation Supported	29,970	\$2,314,600,000	\$9,598,200,000
Total Impact			
Construction Subtotal	18,750	\$1,331,500,000	\$4,087,200,000
Operation Subtotal	40,390	\$4,075,800,000	\$22,493,500,000
Total Economic Impact in Northern Virginia	59,140	\$5,407,300,000	\$26,580,700,000

Impact on the Construction Industry in Virginia and Northern Virginia

In today's market, the average data center houses more infrastructure than a small city, in terms of both investment level and quantity of components. As a result, these facilities are key drivers of the construction industry, a phenomenon that is especially evident in Northern Virginia.

Ten percent of the state's construction jobs that are not employed in residential or road construction are directly employed in building data centers. In Northern Virginia, that number increases dramatically to 22%, since the area contains the fastest-growing data center market worldwide.

Loudoun County Spotlight

Over the past 15 years, Loudoun County has built over 30 million sq. ft. of data centers, establishing Northern Virginia as the world's largest data center market. With five million additional square feet currently under development and an ecosystem encompassing more than 3,500 technology companies, momentum continues to grow.

The large amount of County tax revenue generated by data centers and the low demands that they place on local public services have placed downward pressure on overall tax rates, thereby improving Loudoun County's business climate and attracting even more investment.

The data center ecosystem provides more than 12,000 jobs in Loudoun County. Over 60% of the individuals who hold these positions have a bachelor's degree or higher. Northern Virginia Community College, which offers several technical degrees and certificates, has enabled students in the area to pursue careers in the technology field, creating a pipeline of qualified talent.

Overall, the data center hub in Loudoun County has become a fundamental aspect of the local economy, driving job creation and economic growth while positioning the region as a global leader in technology infrastructure.



With complex infrastructure requirements emphasizing power distribution, cooling, and structural integrity, to name a few, data centers require significant capital investment and labor, even before they become populated with servers and other computer hardware. Whether it's their vast network of fiber optics and other signal cables, specially designed components for fire prevention and mitigation, networks of water lines to supply cooling, or fully-redundant power supplies, the systems that work seamlessly to support continuous data center operation are far from simple and subject to constant reimagining, improvements, and maintenance. Additionally, certain aspects of data center construction are unique to the facilities and require crews with specialized expertise. In most cases, this involves outsourcing to companies outside of the region; however, the continued need for these experts in the area encourages firms to relocate nearby, further establishing the local market. Thus, data center development has become a key driver for the construction and maintenance industries in the area, even after the buildings are complete.

Typically, data center construction, which includes everything from site work to testing and final delivery, can take 12 to 24 months, depending on the scale of the facility. With the rise of multi-facility campuses, buildings are often constructed on a staggered basis or two or more in parallel, which further increases the demand for construction jobs over time. It also creates a more permanent impact, as construction crews can move from one building to the next on the same plot of land. Furthermore, following the completion of one campus, new work is often available nearby, ensuring a lasting demand for construction jobs and attracting contractors to establish hubs in the area.

Following construction, the process of populating the buildings with servers varies widely based on the type of user and absorption trends in the area. A hyperscale development might be fully populated within the first few months of operation, whereas a colocation facility could take longer to reach capacity. Notably, vacancy rates are so low in Northern Virginia that the biggest issue is power availability, rather than a lack of demand. Maintaining the servers is a continual process, which drives employment and continued investment.

Data Centers' Contribution to State and Local Government Budgets

Data Centers Contribute to Local Government Budgets

Because data centers require more equipment and utilities than they need employees, data centers provide a staggering amount of property tax revenue for local governments. Additionally, data centers place downward pressure on overall tax rates, thereby improving the locality's business climate and economic attractiveness. Table 4 details the local tax revenue that was derived from data center property investment, and spillover effects from their purchases, as well as the employees who operated their facilities in 2022.

Table 4. Local Tax Revenue Generated by Data Centers in Virginia – 2022

	Local Tax Revenue from Data Centers in Northern Virginia	Local Tax Revenue from Data Centers Statewide
1st Round Direct Effects	\$930,000,000	\$1,000,000,000
2nd Round Indirect and Induced Effects	\$370,000,000	\$500,000,000
Total Virginia Local Revenue Generated	\$1,300,000,000	\$1,500,000,000

Statewide Tax Collections Associated with Data Centers

As shown in Table 5, data centers in Virginia paid an estimated minimum of \$640 million in taxes to the State in 2022, even after considering the State's Sales and Use Tax Exemption for large data centers. The Virginia Department of Taxation has reported State revenues paid by those data centers that qualify for the exemption.¹⁶ Extrapolating that amount to all data centers in Virginia allows for an estimation of taxes paid to the Commonwealth of Virginia by all data centers. Because the extrapolation is from companies that qualify for the exemption to companies that do not qualify for the exemption, \$640 million is certainly an underestimate of the actual tax paid by data centers to the State of Virginia.

Table 5. State Tax Revenue Generated by Data Centers in Virginia – 2022

	VA State Tax Revenue from Data Centers in Northern Virginia	VA State Tax Revenue from Data Centers Statewide
1st Round Direct Effects	\$600,000,000	\$640,000,000
2nd Round Indirect and Induced Effects	\$260,000,000	\$440,000,000
Total Virginia State Revenue Generated	\$860,000,000	\$1,080,000,000

¹⁶ Biennial Report on the Retail Sales and Use Tax Exemption for Data Centers – January 25, 2024 (virginia.gov)

Data Centers Have a High Local Benefit-to-Cost Ratio

Data centers provide a high benefit-to-cost ratio in terms of the tax revenue they generate relative to the government services that they and their employees require. Loudoun and Prince William Counties are home to the most significant concentrations of data centers in Virginia. County staff in those localities reported detailed data on the 2022 tax revenue generated by data centers in each locality from real estate and business personal property taxes.¹⁷ Combining these data with data from other government sources allows for the computation of the benefit-to-cost ratio associated with data centers in each locality.

To quantify the budgetary cost that data centers and their employees imposed on these localities in 2022, information from the Census Bureau and the official budget reports from Loudoun and Prince William Counties were used. This approach focuses on the largest costs that data centers impose on local governments including the costs to provide public services to data center employees and their families. Beyond that, the nature of data centers does not place large demand on local public services. For example, they provide their own high security, have a very high level of fire prevention, and have a minimal impact on truck traffic compared to other large industrial buildings.

Table 6 details the calculations used to estimate the budgetary cost that data centers and their employees imposed on these two counties in 2022. As shown, those costs total approximately \$26 million in Loudoun County and \$9 million in Prince William County.

Table 6. Estimate of Total Budgetary Costs Imposed by Data Centers and Employees – 2022

	Loudoun County	Prince William County
County Private Sector Data Center Employment	5,400	2,300
Percentage of Employees Residing Outside the County ¹⁸	65.7%	65.5%
Employees who Reside within the County ¹⁹	1,852	794
County Residents per Employee ²⁰	3.02	3.13
Locally-Funded County Expenditures (FY 2022) ²¹	\$1,992,900,000	\$1,736,500,000
County Population ²²	432,085	486,943
Per-Resident Locally-Funded County Expenditures	\$4,612	\$3,566
Total Virginia State Revenue Generated	\$25,800,000	\$8,900,000

¹⁷ These estimates exclude BPOL and other local taxes which, while also applicable to data centers, we are unable to estimate. As a result, the revenue estimates provided almost certainly underestimate the actual local tax revenues generated by data centers.

^{18, 19, 20} U.S. Census Bureau

²¹ Loudoun County Department of Finance and Budget. Prince William County Office of Management and Budget. The sum of all local revenue, excluding contributions from state, federal, and other non-local sources.

²² U.S. Census Bureau

Table 7 shows that by combining the estimates of budgetary costs from Table 6 with data from each of the localities on the local revenue generated by data centers, in 2022, the benefit-to-cost ratio associated with data centers was approximately:

- 26:1 in Loudoun County. For every \$1.00 in county expenditures that data centers were responsible for generating in 2022, it provided approximately \$26 in tax revenue.
- 13:1 in Prince William County. For every \$1.00 in county expenditures that data centers were responsible for generating in 2022, it provided approximately \$13 in tax revenue.

Table 7. Estimated Benefit-to-Cost Ratio Associated with Data Centers – 2022

Locality	Estimated Tax Revenue (Benefit)	Estimated Budgetary Cost	Benefit/Cost Ratio
Loudoun County	\$663,000,000	\$25,800,000	25.7
Prince William County	\$114,300,000	\$8,900,000	12.9

Prince William County Spotlight

Prince William County is home to nearly seven million sq. ft. of capacity, split almost evenly between colocation and hyperscale, with nearly 30 million additional sq. ft. undergoing development. The economic benefits from what could become one of the largest data center corridors worldwide – known as the PW Digital Gateway project – are incomparable for the local community.

Prince William County's tax revenue is rapidly increasing as the development of data centers in Prince William continues to accelerate. In 2022, data centers generated more than \$110 million in real estate and personal property tax revenue. Once the facilities currently under development are complete, that value could more than triple. The increased tax base relieves the tax burden on residents while the additional revenue from data centers funds services such as the county's schools, parks, and libraries.

With its proximity to Washington, D.C., and Loudoun and Fairfax Counties, Prince William County has become a hot spot for data center development and skilled workers. These workers also contribute to the high-tech labor pool in the county that can support many industries. Government agencies, academic institutions, and other organizations rely on these professionals to provide a diverse set of specialized expertise, creating a strong demand for the appropriate technological infrastructure that allows them to stay competitive.

The construction and operation of Prince William County's data centers require investments in infrastructure improvements that not only support the data centers but also benefit the broader community by enhancing connectivity, reliability, and access to essential services.

Virginia's Data Center Sales and Use Tax Exemption

Virginia Treats Data Centers Like Other Capital-Intensive Industries

Manufacturing is a capital-intensive business, which means a very large portion of industry spending is allocated for the purchase and refreshing of very expensive durable equipment. States often exempt manufacturing equipment from sales and use taxes to promote economic growth, encourage capital equipment investment in the capital-intensive manufacturing sector and maintain global competitiveness. Like 41 other states, Virginia exempts all manufacturing equipment from sales and use taxes, regardless of the amount of equipment purchased or how few workers the plant employs. This exemption aims to reduce the cost of production for manufacturers, incentivizing new establishments and facilitating expansion of current operations within the state. It also promotes continued investment in modernized equipment, reducing the chance that production workers lose their jobs because of inefficient, outdated production methods. By eliminating or reducing taxes on the equipment used in the manufacturing process, states seek to support job creation, stimulate innovation, and enhance overall productivity.

Similar to their treatment of manufacturing equipment, several states exempt data center equipment from sales and use taxes to attract and retain data center investment, promote economic development, and create job opportunities. This tax incentive is part of a broader strategy to encourage the growth of data centers within the state. By providing exemptions on equipment purchases, states aim to enhance their competitiveness in the digital economy and position themselves as favorable locations for data center development. So, a limited sales and use tax exemption for data center equipment in large facilities with more than a minimum number of employees and a minimum amount of capital investment enables many states (including Virginia) to treat some data centers the way that they treat all manufacturing companies.

These incentives are designed to attract significant investments into the state's data center infrastructure. By exempting data center equipment from sales and use taxes, states aim to lower the overall cost of establishing and operating a data center, making it more financially viable for businesses to set up or expand their facilities within the state. This, in turn, can lead to job creation, increased economic activity, and the development of a robust digital infrastructure.

Virginia's Sales and Use Tax exemption on data center equipment is available statewide until July 2035. To qualify, data centers must make an investment in Virginia of at least \$150 million and create at least 50 new jobs paying at least 150% of the average wage in the locality. Data centers investing in distressed localities can qualify with fewer jobs and less capital investment. For data centers investing even more and employing more people, the incentive is potentially extended until July 2050.

National Context for Virginia Incentives

This report quantifies the significant contribution that data centers make to the state of Virginia and its localities. Virginia is not alone in offering sales and use tax exemptions for data center equipment. Many states across the country, and throughout the eastern United States, have similar offerings. Some examples include:

- Pennsylvania replaced its tax refund program with an exemption in 2022.²³
- Connecticut established an exemption midway through 2021.²⁴
- Utah significantly expanded the scope of its exemption in 2020.²⁵
- Maryland created an exemption in 2020.²⁶
- Illinois passed an exemption in 2019.²⁷
- North Carolina lowered its qualifications for exemption in 2015.²⁸

Data centers are a major driver of tax revenue in Virginia, paying \$640 million to the State in 2022. If Virginia's 6% sales tax rate had been imposed on the data centers that qualified for the State's Sales and Use Tax exemption, Virginia would have collected an additional \$673 million.²⁹ However, the problem with that calculation is that it fails to consider the number of facilities that would have undoubtedly chosen to locate in another state.

In June 2019, Virginia's Joint Legislative Audit and Review Commission (JLARC) found that 90% of the data center investment made by companies that received the sales and use tax exemption would not have occurred in the state of Virginia without the incentive.³⁰ Instead, 90% of data center investment would have occurred in states other than Virginia. Therefore, the "cost" of the Virginia data center incentive is only 10% of the amount of state sales tax revenue exempted.

Virginia's data center tax incentive programs are investments not only in data centers, but also in the construction, manufacturing, energy, and service businesses that support them. The incentive sends a clear signal to potential investors worldwide that the business climate in Virginia is friendly to the high-tech industry at the time of this report's publication.

²³ [Computer Data Center Equipment Program \(pa.gov\)](#)

²⁴ [An Act Concerning Incentives for Qualified Data Centers to Locate in the State.](#)

²⁵ [Utah Levels the Playing Field for Data Centers: Five Questions for Thomas Wadsworth of GOED \(edcutah.org\)](#)

²⁶ [Maryland Enacts Sales Tax Exemption for Qualified Data Centers | Sales Tax Institute](#)

²⁷ [Data Center Investment Tax Exemptions and Credits - Incentives \(illinois.gov\)](#)

²⁸ [North Carolina Makes Data Center Tax Breaks Easier to Get | Data Center Knowledge | News and analysis for the data center industry](#)

²⁹ [Biennial Report on the Retail Sales and Use Tax Exemption for Data Centers – January 25, 2024 \(virginia.gov\)](#)

³⁰ [Data Center and Manufacturing Incentives Economic Development Incentives Evaluation Series](#)

Conclusion

This report evaluates the impacts of data centers on the state and local economies of Virginia, with special attention given to Northern Virginia. In doing so, the total supply in Northern Virginia, and Virginia as a whole, were considered and compared to that of other states nationwide. Local employment impacts, including current construction, and ongoing operations were also considered. This provides a more complete picture of the industry's impact, as data centers rely on the local construction and maintenance industries and provide high-paying jobs in their day-to-day operations.

The results demonstrate that Virginia, specifically Northern Virginia, is home to the largest and fastest-growing data center market in the country. Moreover, even if Northern Virginia's supply was to be eliminated in its entirety, the rest of Virginia would rank among the top 10 states in the nation. In 2023, new and expanding data centers accounted for 92% (\$45.9 billion) of all new investment announced by the Virginia Economic Development Partnership, bringing the total investment by the industry to more than \$200 billion statewide. This amounts to 10% of construction jobs in Virginia and 22% in Northern Virginia, excluding residential and road construction. Additionally, countless companies that support local data center operations can be found within the state, many of which are based in Northern Virginia or the Richmond area. This boosts local economic impacts, as more dollars are spent within the study region with minimal leakage out to other states.

Northern Virginia's data center industry supports nearly 60,000 jobs in the region, amounting to \$26.6 billion in economic output. Statewide, the number of jobs supported approaches 80,000, with \$31.4 billion in economic output. Moreover, data centers generated approximately \$2.6 billion in state and local tax revenue in 2022.



Data and Methods

This report relies on, combines, and employs data from several proprietary and public sources including:

- Bureau of Economic Analysis
- Bureau of the Census
- CBRE
- datacenterHawk
- Fairfax County
- Henrico County
- IMPLAN
- Loudoun County
- Mangum Economics
- Prince William County
- Virginia Economic Development Partnership
- Weldon Cooper Center for Public Service

Data Centers

Data centers are facilities that house collections of interconnected computer equipment. They store, process, and transmit digitized information. Data centers are critical infrastructure for national security, public health and safety, and business operations. The most important functions of the buildings that house the computer equipment include security, reliable power, interconnection of the equipment in the facility to other networks and cooling.

The technology involved with data centers is rapidly changing, which affects how data centers are developed and constructed. There are two major categories of data centers based on how many businesses they serve: 1. enterprise data centers and 2. colocation data centers. While they vary from very large (often called hyperscale) to more modest in size, enterprise data centers house the computer equipment of only a single organization. Colocation data centers are owned by third-party companies that offer security, power, and cooling as a service to the organizations that lease space in the facility for their computers and equipment alongside other organizations, thus the term, “co-locate”. Colocation data centers allow any type of organization to leverage specialized services offered by the facility, without having to individually make the multimillion-dollar investments that the facilities require.

This report counts privately-owned, stand-alone facilities designed to house networked computer equipment. This means measurement of the critical infrastructure of data centers includes both colocation and hyperscale/cloud facilities. Using this approach, a single colocation facility that houses the computer equipment of multiple tenants is one data center. This is the common usage of the term. We do not cover enterprise data centers – networked computer equipment that is operated onsite with other business functions of companies.

Northern Virginia

There are many definitions of “Northern Virginia”. In general, the data center community refers to Northern Virginia as Loudoun and Prince William counties. However, data centers in Fairfax County are often grouped with those in Loudoun County, and data centers in Manassas City are often grouped with those in Prince William County.

Because this report reflects the economic activity within a geographical region and with tax collections that relate to specific legal jurisdictions in Virginia, this report defines Northern Virginia as the cities of Alexandria, Fairfax, Falls Church, Fredericksburg, Manassas and Manassas Park, as well as the counties of Arlington, Clarke, Culpeper, Fairfax, Fauquier, King George, Loudoun, Prince William, Rappahannock, Spotsylvania, Stafford and Warren. In terms of demographics, commuting patterns and economic activity, these 18 localities form the region of Northern Virginia.³¹

Most of the data centers operating in the region are within the jurisdictions of Loudoun, Prince William and Fairfax Counties and the City of Manassas. Data centers also operate in Culpeper and Fauquier Counties.

Economic Impact

To estimate the likely local economic impact attributable to data centers, the report is based on a regional economic impact model called IMPLAN.³² The IMPLAN model is one of the most commonly used economic impact models in the United States. Like all economic impact models, the IMPLAN model uses economic multipliers to quantify economic impacts.

Economic multipliers measure the ripple effects that an expenditure generates as it makes its way through the economy. For example, data centers spend money to pay employees and purchase goods and services, which provides income to the employee households and the businesses of the vendors. Those employees and vendors then have money to spend on goods and services, which again provides income for other businesses, and so on. Through this process, one dollar in expenditures generates multiple dollars of income. The mathematical relationship between the initial expenditure and the total income generated is the economic multiplier.

A primary advantage of the IMPLAN model is that it uses regional and national production and trade flow data to construct region-specific and industry-specific economic multipliers. These multipliers are then further adjusted to reflect anticipated actual spending patterns within the specific geographic area that is evaluated.

³¹ This definition of the Northern Virginia region is consistent with that of UVA’s Weldon Cooper Center for Public Service. [Data Guide and Reference Maps | Cooper Center](#)

³² [IMPLAN is produced by IMPLAN Group, LLC.](#)

As a result, the economic impact estimates produced for this report are not generic. They reflect as precisely as possible the economic realities of data centers and the specific geographic areas of Virginia and Northern Virginia.

The impact estimates are then divided into three categories:

1. The first-round direct impact measures the direct economic contribution of the entity being evaluated (e.g., own employment, wages paid, goods and services purchased by the proposed data centers).
2. The second-round indirect and induced impact measures the economic ripple effects of this direct impact in terms of business-to-business and household/employee-to-business transactions.
3. The total impact is simply the sum of those two.

These impacts are defined in terms of jobs, the pay and benefits associated with those jobs, and economic output (the total amount of economic activity that is created in the economy).





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