

BACKGROUND ON DATA CENTERS

What is a data center?

A data center is a large facility filled with computer servers that store, process, and share vast amounts of digital information. In other words, every time you send an email, stream a video, or use an app, those actions are managed by servers in data centers. These buildings are like the “brains” of the internet and cloud – they enable modern online services.

How do data centers affect jobs and the economy?

Data centers play an important role in the economy. Building a data center costs hundreds of millions of dollars, generating many construction jobs and business for local suppliers. Once operational, a data center usually does not require a large staff; a typical facility might employ around 50 full-time workers.

Still, those jobs tend to be well-paying technical positions. Throughout Virginia, the data center industry (including construction and operation) supports an estimated 74,000 jobs and contributes about \$9 billion annually to the state’s economy.

Data centers also boost local tax revenue, helping fund public services. In some counties with many data centers, they provide a significant portion of the local tax base. (For example, one Virginia county receives up to 31% of its local revenue from data center taxes.) However, to attract data centers, some areas offer special tax incentives, which can reduce the actual revenue the community gains.

Why are so many data centers being built in Virginia?

Virginia, particularly Northern Virginia, has earned a reputation as a global data center hub. More than 300 data centers operate in Northern Virginia, managing a significant portion of global internet traffic (by one estimate, almost 70% of the world’s digital data passes through this region).

This proliferation did not happen by chance; it results from several advantages and historical factors: Excellent Connectivity: Northern Virginia has a very strong fiber-optic network and was an early internet hub. This allows data to travel quickly, attracting companies to build servers there.

- **Affordable, Reliable Power:** The region offers relatively cheap and reliable electricity, which is essential because data centers consume a massive amount of power.
- **Available Land:** There has been space to develop large facilities. Virginia's counties have industrial land suitable for creating big data center campuses.
- **Proximity to Customers:** The area is near major population centers and U.S. government institutions. Being close to customers reduces data lag and provides convenience for companies.

- **Tax Incentives:** Virginia introduced special tax breaks to attract data center investments. By offering lower tax rates on the expensive computer equipment located in data centers, the state and counties made it financially attractive for tech companies to establish operations there.

Data centers first surged in Northern Virginia in the late 1990s and have expanded rapidly since. In Loudoun County (the heart of “Data Center Alley”), the total data center space grew from about 10 million square feet in 1997 to approximately 90 million square feet by 2024. Officials note that there has not been a single day without data center construction in that county for over 14 years, a testament to the relentless growth that has occurred. More recently, companies are also looking to build data centers in other parts of Virginia, such as along the I-95 corridor toward Central Virginia, continuing this trend.

Do data centers consume a lot of electricity?

Yes, they do. Data centers consume vast amounts of power, with all servers operating continuously, much like small cities. For example, in Virginia, data centers already account for over 25% of the state’s total electricity consumption. To illustrate, a single large data center can require as much power as approximately 750,000 U.S. homes. In Northern Virginia, Dominion Energy reported that data center energy demand more than doubled recently, driven by rapid expansion. This high energy usage raises concerns, especially since Virginia’s overall electricity use was stable for years before the data center boom became the main new demand source. Experts warn that meeting this increased demand might necessitate building new power plants and transmission lines at an unprecedented rate. If this electricity is generated from fossil fuels, it could lead to higher carbon emissions. Overall, data centers consume a substantial amount of energy, and with the adoption of new technologies like AI, their energy requirements are expected to continue growing.

Do data centers use a lot of water?

Yes. Besides electricity, water usage is another major concern. Most large data centers depend on water-based cooling systems to prevent their servers from overheating. This means they draw large amounts of water from local sources. A single big data center can use up to about 5 million gallons of water daily for cooling – roughly the same as the water consumption of a small city. In fact, data centers rank among the top 10 highest water-consuming industries in the United States. In Northern Virginia’s Loudoun County (which has the highest concentration of data centers), the facilities collectively used approximately 1.6 billion gallons of water in 2023, accounting for nearly 10% of the entire county’s water usage that year.

This level of demand can strain local water systems, especially during hot summers or droughts. For example, Virginia experienced a drought in 2023, and the driest area was the same region that is home to numerous data centers. Communities and environmental groups worry that if data center development continues unchecked, it could deplete groundwater or require expensive expansions of water infrastructure. Some tech companies have begun investing in water-saving technologies and utilizing recycled (non-drinking) water for cooling; however, transparency remains limited, as many data center operators do not publicly report their water consumption.

Can data centers cause problems for communities?

While data centers bring investment, they can also create local challenges if not planned carefully.

- One concern is noise: large cooling fans and backup generators can produce constant humming or periodic rumbles. Residents living near big server farms in Northern Virginia have complained about 24/7 noise, especially when dozens of facilities and power substations are clustered near neighborhoods.
- Another issue is land use and appearance. Data centers are massive industrial buildings – some projects cover hundreds of acres – and they often replace farmland or wooded areas. This can change the character of communities and even encroach on historical or residential areas if not properly zoned. In some cases, neighborhoods have ended up almost surrounded by data centers, raising concerns about traffic, construction, and loss of green space.
- Perhaps the biggest concern is the environmental impact if a data center’s resource use is not properly managed. The “worst-case” example of this was in Memphis, Tennessee, in 2024-2025. Elon Musk’s AI company (xAI) built a large data center in Memphis to train supercomputers, but the local electric utility could not supply enough power for it. As a result, the company brought in 35 large gas-powered generators (turbines) on site—effectively creating a private power plant to run the data center. These gas turbines were installed as “temporary” units without the usual air pollution permits, and they emitted large amounts of exhaust.
 - Environmental analysts found that peak levels of nitrogen dioxide (a harmful air pollutant) in the area increased 79% after the turbines started operating.
 - Nearby residents, mostly in a Black neighborhood, began experiencing breathing problems (one woman had severe asthma attacks), and many could smell gas in the air. Community members were outraged—they realized the data center was burning as much fuel as a full-scale power plant and polluting the air, all right next to their homes.
 - Protesters and environmental groups have since responded, accusing the company of creating an environmental hazard and violating the Clean Air Act.

This Memphis case illustrates how a data center without proper oversight can harm its community: the pursuit of high-tech progress ultimately overburdened a vulnerable neighborhood with noise and pollution. It is important to note that most data centers are not as extreme as the Memphis example, and many companies follow regulations and invest in mitigation measures. Some are adopting green practices, such as utilizing renewable energy, designing more energy-efficient cooling systems, and recycling water, to minimize their environmental footprint. Moving forward, better planning and stricter standards can help ensure that data centers are built to strike a balance between economic benefits and the health of residents and the environment.

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