ECONOMIC AND SOCIAL IMPACTS TO GREENSVILLE COUNTY FROM THE OTTERDAM TECHNOLOGY GROUP 600MW DATA CENTER PROJECT

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Executive Summary of Otterdam Technology Economic Impacts to Greensville County and the surrounding area.

The construction and long-term operation of a **600 MW data center** in the **Southside VA area** (outside of Northern Virginia) would have significant economic impacts on both **Greensville County** and the broader region. These impacts would manifest in several ways, such as job creation, tax revenue generation, infrastructure development, business growth, and regional economic diversification.

Economic Impacts of a 600 MW Data Center in the Southside VA Area

1. Job Creation

Construction Jobs:

The construction phase of a 600 MW data center involves significant labor for several years. This includes general labor, skilled trades, engineering, and project management.

- **Number of Jobs**: A large data center like this can create hundreds of construction jobs.
    - **General labor**: 100-150 workers
    - **Skilled labor (electricians, plumbers, HVAC, etc.)**: 200-300 workers
    - **Engineers (civil, structural, electrical)**: 50-100 engineers
    - **Project management and supervision**: 20-30 workers
- **Wages**:
    - General labor wages can range from $40,000–$60,000 per year
    - Skilled trades typically earn $50,000–$90,000 per year
    - Engineers and project managers may earn $80,000–$150,000 annually

Estimated Payroll for the construction phase:

- Assuming a **2-year construction timeline** for a 600 MW data center, the total payroll for construction workers could range from **$50 million to $100 million** over the life of the project, depending on wage levels and the scale of labor.

Long-Term Jobs:

Once operational, the data center will require permanent staff for maintenance, IT operations, security, and management.

- **Permanent Operations Jobs**:
    - Data Center Operators/Technicians: 40-60 jobs
    - IT Specialists/Engineers: 30-50 jobs
    - Maintenance/Facility Managers: 20-30 jobs
    - Security and Support Personnel: 20-30 jobs
    - Administrative and Managerial Staff: 10-20 jobs

Annual Salaries:

- Operations and maintenance staff: $50,000–$100,000
- IT specialists: $75,000–$120,000
- Security personnel: $40,000–$60,000

The **total direct payroll** for ongoing operations could be between **$10 million and $20 million** annually. These salaries would contribute to the local economy through increased demand for housing, services, and retail.

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2. Tax Revenue Generation

The construction and operation of a data center generates significant tax revenue, both at the local and state levels.

Property Taxes:

Data centers are high-value properties, and the local government benefits significantly from property taxes.

- **Assumed Property Value**: A 600 MW data center is expected to cost between **$600 million and $1 billion** (including land, buildings, and equipment).
- **Tax Rate**: In **Greensville County**, the **property tax rate** is approximately **$0.75 per $100** of assessed value. Assuming an assessed value of **$800 million** for the data center:

Property Tax=800,000,000100×0.75=6,000,000 USD annually

Thus, **property tax revenues** from the data center could be around **$6 million annually**.

Business Equipment Taxes:

In Virginia, businesses are taxed on equipment and machinery, which is a key component of data centers.

- **Estimated Equipment Value**: A 600 MW data center may invest up to **$500 million** in servers, cooling systems, generators, and other infrastructure.
- **Tax Rate**: The business equipment tax in Virginia is typically **$2.50 per $100** of assessed value.

Business Equipment Tax=500,000,000100×2.50=12,500,000

Thus, **business equipment taxes** could generate **$12.5 million annually**.

Sales and Use Tax:

- **Construction Materials and Equipment**: Sales tax will be generated during the construction phase from the purchase of building materials, equipment, and services.

If construction costs are around **$500 million**, and **30-50%** of these costs are subject to sales tax:

  - **Sales Tax Estimate**:

Sales Tax=Cost of Materials×6.3%

For **30%** of $500 million:

150,000,000×6.3%=9,450,000

For **50%** of $500 million:

250,000,000×6.3%=15,750,000

Thus, **sales and use tax** revenue during construction could range from **$9.45 million to $15.75 million**.

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3. Infrastructure Development

Data centers place a significant demand on local infrastructure, including roads, utilities, and energy supply, leading to investments in these areas. These investments can provide lasting benefits to the surrounding area.

- **Energy Infrastructure**: The construction of the data center will likely require substantial upgrades to the local electrical grid, which could include the construction of new power lines, transformers, and sub-stations. This can lead to **job creation in the utilities sector** and improvements in grid reliability, benefitting the surrounding region.

- **Road and Transport Infrastructure**: The delivery of materials and equipment for construction will put a strain on local roads, leading to potential road improvements, upgrades, and maintenance. The county may allocate funds to ensure that roads can accommodate heavy trucks and construction traffic.

Estimated Costs for Infrastructure Investments:

- **Energy Infrastructure**: $10 million to $50 million in upgrades (depending on the location and scale of the project).
- **Road and Transportation**: $5 million to $20 million in investments for road upgrades and maintenance.

These infrastructure investments would not only support the data center but also provide long-term benefits to surrounding communities.

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4. Business Growth and Ecosystem Development

The presence of a large data center often catalyzes the development of related businesses and a local tech ecosystem.

- **Local Tech Firms**: A data center attracts IT firms, cybersecurity companies, and cloud service providers who may establish offices or offer services to the data center.
- **Support Services**: The need for local services, such as catering, security, maintenance, and janitorial services, will drive the growth of small businesses.
- **Technology Talent**: The data center will create demand for highly skilled workers (engineers, IT specialists, technicians) who may relocate to the area, raising the demand for housing, services, and educational opportunities.

Economic Impact Example:

- Southside VA could see the growth of **cybersecurity firms, software development companies, and other tech startups** as a result of the data center. This could lead to the creation of **100-200 new jobs** in the tech industry, with an average salary of **$75,000** per year. These employees will contribute further to local spending.

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5. Real Estate and Housing Market

As the data center creates jobs and attracts skilled workers to the area, the demand for residential and commercial properties will rise. This could result in:

- **Increased Property Values**: Areas near the data center may see a **rise in property values** due to increased demand for housing.
- **Commercial Real Estate**: New office spaces and retail developments may be constructed to serve the growing workforce and local population.

Estimated Impact on Housing:

- **New Housing Demand**: 100-200 new employees (tech workers, facility operators) could create demand for **50-100 new homes** annually, depending on family sizes.
- **Commercial Development**: New office spaces and retail developments could add **$10 million to $30 million** in new commercial real estate investments.

Summary of Economic Impacts

Impact	Estimated Value
Job Creation (Construction)	500-600 jobs over 2 years
Job Creation (Operations)	100-200 permanent jobs
Total Payroll (Construction)	$50 million to $100 million over the construction phase
Property Tax Revenue	$6 million annually
Business Equipment Tax Revenue	$12.5 million annually
Sales Tax (Construction Phase)	$9.45 million to $15.75 million
Infrastructure Investments	$15 million to $70 million
Local Business Growth	Growth in tech startups and support services
Real Estate Growth	Increased demand for housing and commercial space

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Conclusion:

The construction and long-term operation of a **600 MW data center** in the **Southside VA area** (Greensville County) will have substantial economic impacts. These impacts include job creation (both temporary and permanent), significant tax revenues, infrastructure development, business growth, and the expansion of the local real estate market. By diversifying the local economy and investing in technological infrastructure, the region will experience a broad range of benefits, both in the short term and long term.

Detailed analysis by topic in support of summary findings.

Job Creation Summary

100 MW Site Economics:

Job creation from a **100 megawatt (MW)** data center can be substantial, but it varies depending on the design, automation level, and location of the facility. Here's a detailed breakdown of how job creation typically unfolds:

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1. Construction Phase (Temporary Jobs)

During the **construction phase** (often 18–36 months), building a 100 MW data center requires a significant labor force:

- **Direct construction jobs**:
  ~1,000 to 1,500 workers may be involved over the life of the project.
- **Indirect/induced jobs** (e.g., materials suppliers, food services, accommodations):
  An additional ~1,000–2,000 indirect jobs may be supported temporarily in the region.

  So, **total temporary employment**:
  2,000–3,500 jobs (for the duration of the construction).

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2. Operations Phase (Permanent Jobs)

Once operational, a 100 MW data center typically creates:

a. Direct Jobs (permanent employees on-site)

- **Data center operations staff** (e.g., facilities managers, IT support, electricians, HVAC techs):
  ~100–150 full-time employees, depending on automation levels.
- **Security and monitoring staff**:
  ~20–50 employees.
- **Network and IT support staff** (onsite or shared):
  ~10–30 employees.

📌 **Typical direct permanent jobs**:
150–250 full-time positions

b. Indirect and Induced Jobs

For every direct job, studies estimate 4 to 5 additional jobs may be supported in the broader economy due to:

- Supply chain (e.g., hardware vendors, maintenance contractors)

- Local services (e.g., food, retail, housing)
- Utilities and renewable energy management

📌 **Total ongoing jobs including indirect and induced**:
750–1,250 jobs

Summary: Job Creation from a 100 MW Data Center

Phase	Job Type	Estimated Jobs
Construction	Temporary	2,000–3,500
Operational	Direct (permanent)	150–250
Operational	Indirect/Induced	600–1,000
Total (post-build)	**Permanent + support**	**750–1,250+ ongoing**

These numbers can shift depending on factors like:

- Whether the data center is hyperscale (e.g., AWS, Microsoft) or colocation
- Automation and AI usage (which can reduce operational headcount)
- Location (urban vs rural)
- Sustainability goals (which may add green energy and compliance jobs)

600 MW site economics:

What is the gain from a 600 MW site? Great question — **the calculation is *not* strictly linear** when scaling a data center from 100 MW to 600 MW. While some job categories scale proportionally, others benefit from **economies of scale**, **automation**, and **shared infrastructure**, which reduce the per-MW labor requirement as the site gets larger.
Here's how the scaling typically breaks down:

☑ 1. Construction Jobs – *Roughly Linear*

Construction tends to scale **more linearly** because:

- Larger sites still require proportionally more materials, labor, and time.
- Each building or phase must be constructed regardless of total site size.

📌 **Estimation**:

- 100 MW: ~2,000–3,500 temporary jobs
- 600 MW: ~12,000–21,000 temporary construction jobs (can be phased)

⚖️ 2. Operations Jobs – Non-Linear (Economies of Scale)

Here's where it diverges:

a. Direct Jobs (Data Center Staff)

- Larger sites can consolidate functions.
- Fewer people are needed per MW as systems are centralized or automated (e.g., software-defined power, remote monitoring).
- Cooling, power management, and security scale more efficiently.

📌 **Staffing efficiency improves with size**:

- 100 MW: ~150–250 direct jobs
- 600 MW: **not** 6 × 150 (which would be 900), but more like **500–700 jobs** total

b. Indirect & Induced Jobs

- These tend to scale more linearly, since energy demand, vendor support, and local economic ripple effects grow with size.
- You'll still see large multipliers due to housing, energy, local services, and supply chain impacts.

📌 **Rough estimate**:

- 100 MW: ~600–1,000 indirect/induced
- 600 MW: ~3,500–5,000+ indirect/induced jobs

📊 Summary: Estimated Job Creation for a 600 MW Site

Job Type	100 MW Estimate	600 MW Estimate	Notes
Construction Jobs	2,000–3,500	12,000–21,000 (phased)	Scales mostly linearly
Direct Operations	150–250	500–700	Benefits from centralization
Indirect/Induced	600–1,000	3,500–5,000+	Driven by broader economic impact

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In essence:

✅ **Construction** → scales almost linearly

⚖️ **Operations** → scales sub-linearly

📈 **Indirect jobs** → scale strongly, but region-dependent

Detailed Construction Positions by type and earnings

Building a 600 MW data center involves a substantial workforce across various roles, each contributing specialized skills to ensure the project's success. Here's a detailed breakdown of key positions, their associated skill sets, estimated workforce quantities, and average annual salaries in Virginia as of 2025.

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1. Project Management & Administrative Roles

Position	Skill Set	Estimated Workforce	Average Annual Salary (VA)
Project Manager	Project planning, budgeting, scheduling, stakeholder communication	5–10	$95,000–$130,000
Construction Manager	Site management, contractor coordination, safety compliance	5–10	$90,000–$125,000
Administrative Support	Documentation, scheduling, procurement	3–5	$45,000–$60,000

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2. Engineering & Design

Position	Skill Set	Estimated Workforce	Average Annual Salary (VA)
Civil Engineer	Site design, grading, drainage systems	2–5	$85,000–$110,000
Structural Engineer	Load-bearing structures, foundation design	2–5	$90,000–$115,000
Mechanical Engineer	HVAC systems, airflow design, thermal management	3–6	$95,000–$120,000
Electrical Engineer	Power distribution, backup systems, lighting	3–6	$95,000–$120,000

Position	Skill Set	Estimated Workforce	Average Annual Salary (VA)
Plumbing Engineer	Water systems, fire suppression systems	2–4	$85,000–$110,000

3. Construction Labor

Position	Skill Set	Estimated Workforce	Average Hourly Wage (VA)
General Laborer	Site preparation, material handling, basic construction tasks	50–100	$20–$30
Electricians	Wiring, conduit installation, electrical systems setup	20–40	$30–$50
Plumbers	Pipe installation, water systems setup	10–20	$25–$45
HVAC Technicians	Installation and maintenance of HVAC systems	10–20	$30–$50
Equipment Operators	Operating cranes, backhoes, and other heavy machinery	10–15	$25–$40

4. Specialized Trades

Position	Skill Set	Estimated Workforce	Average Hourly Wage (VA)
Data Center Technicians	Rack installation, cable management, system testing	15–30	$25–$40
Fire Protection Specialists	Fire suppression system installation and maintenance	5–10	$30–$50
Security System Installers	Surveillance and access control system setup	5–10	$25–$40

5. IT & Network Infrastructure

Position	Skill Set	Estimated Workforce	Average Annual Salary (VA)
Network Engineers	Network design, cabling, routing, switching	5–10	$90,000–$120,000
Systems Integrators	Server installation, software configuration, system testing	5–10	$85,000–$115,000

6. Safety & Compliance

Position	Skill Set	Estimated Workforce	Average Annual Salary (VA)
Safety Officers	OSHA compliance, site safety audits, emergency response planning	3–5	$60,000–$80,000
Environmental Compliance	Environmental impact assessments, waste management	2–4	$65,000–$85,000

7. Support Services

Position	Skill Set	Estimated Workforce	Average Annual Salary (VA)
Catering Staff	Meal preparation and service for workers	5–10	$30,000–$45,000
Janitorial Services	Site cleanliness, waste disposal	5–10	$25,000–$35,000

Estimated Total Workforce for 600 MW Data Center Construction

Category	Estimated Number of Workers
Project Management & Admin	13–25
Engineering & Design	15–30
Construction Labor	95–180
Specialized Trades	25–50
IT & Network Infrastructure	10–20
Safety & Compliance	5–10
Support Services	10–20
Total	**173–315**

Key Considerations

- **Labor Costs**: Labor expenses can constitute 30% to 50% of total construction costs, with skilled labor commanding higher wages due to specialized skills and certifications. Business Plan Templates+1cushwake – Library+1
- **Project Duration**: The construction timeline for a 600 MW data center can span several years, with peak labor requirements occurring during the building phase.
- **Location Impact**: Labor costs and availability can vary significantly based on the project's location. For instance, areas with a high concentration of data center activity may offer a more experienced workforce but could also face higher labor costs due to demand. cushwake – Library
- **Supply Chain Considerations**: Material costs, such as for copper and steel, have seen significant increases, impacting overall construction budgets. Homepage
- **Skilled Labor Shortage**: The demand for specialized workers in data center construction has led to labor shortages, particularly in emerging markets, which can drive up wages and

Operations Employment by position with average earnings

A 600 MW data center is a large-scale facility requiring a diverse workforce to manage its operations, maintenance, and development. Below is a detailed list of key job roles typically found at such a facility, along with their associated annual salaries in Virginia as of 2025.

Executive and Managerial Positions

1. **Data Center Director**
    - **Role**: Oversees all aspects of data center operations, including strategy, budgeting, and compliance.
    - **Average Salary**: $195,282 per year
2. **Data Center Manager**
    - **Role**: Manages day-to-day operations, staff, and ensures service level agreements (SLAs) are met.
    - **Average Salary**: $142,164 per year Salary.com+1Salary.com+1
3. **Data Center Senior Manager**
    - **Role**: Leads multiple teams or departments within the data center, focusing on efficiency and performance.
    - **Average Salary**: $171,489 per year Salary.com
4. **Data Center Operations Manager**
    - **Role**: Ensures the smooth functioning of all operational processes, including incident management and capacity planning.
    - **Average Salary**: $142,200 per year Salary.com

Technical and Engineering Roles

5. **Data Center Operations Engineer**
    - **Role**: Handles the technical aspects of data center operations, including system monitoring and troubleshooting.
    - **Average Salary**: $95,506 per year Glassdoor
6. **Data Center Engineer**

- **Role**: Designs and implements infrastructure solutions, ensuring scalability and reliability.
- **Average Salary**: $88,000 per year Glassdoor

7. **Data Center Technician**
   - **Role**: Performs hands-on maintenance, hardware installation, and system diagnostics.
   - **Average Salary**: $66,299 per year CompTool
8. **Data Center Technician I**
   - **Role**: Entry-level position focusing on basic maintenance and support tasks.
   - **Average Salary**: $60,352 per year Salary.com
9. **Data Center HVAC Technician**
   - **Role**: Specializes in the heating, ventilation, and air conditioning systems critical for data center cooling.
   - **Average Salary**: $70,000 per year Job Search | Indeed

Support and Administrative Roles

10. **Data Center Inventory & Asset Technician**
    - **Role**: Manages hardware assets, including tracking and lifecycle management.
    - **Average Salary**: $65,395 per year
11. **Data Center Operations Technician I**
    - **Role**: Assists in daily operations, monitoring systems, and responding to alerts.
    - **Average Salary**: $40,404 per year

Specialized and Security Roles

12. **Field Installation / Data Center Technician (with Security Clearance)**
    - **Role**: Installs and configures equipment in secure environments, often requiring government clearance.
    - **Average Salary**: $132,500 per year

Summary Table

Job Title	Average Annual Salary (VA)
Data Center Director	$195,282
Data Center Manager	$142,164
Data Center Senior Manager	$171,489
Data Center Operations Manager	$142,200
Data Center Operations Engineer	$95,506
Data Center Engineer	$88,000
Data Center Technician	$66,299
Data Center Technician I	$60,352
Data Center HVAC Technician	$70,000
Data Center Inventory & Asset Technician	$65,395
Data Center Operations Technician I	$40,404
Field Installation / Data Center Technician	$132,500

Increased Tax Revenue:

Property Taxes

Real Property Taxes:

- **Loudoun County:** In fiscal year 2024, Loudoun County projected approximately $667 million in revenue from data centers, encompassing both real and business personal property taxes. This substantial contribution underscores the critical role data centers play in the county's economy. LoudounNow.com
- **Prince William County:** For tax year 2024, data centers contributed over $130 million in real property taxes, marking a significant increase from previous years. This growth reflects the expanding presence of data centers in the region. WTOP News

Anticipated property tax revenue from a $1B investment in Greensville County

For a $1 billion industrial investment in Greensville County, Virginia, the estimated annual property taxes would be approximately **$7.5 million**. This calculation is based on the county's median effective property tax rate of **0.75%**, which is slightly higher than the previously mentioned 0.67% .Ownwell: Reduce Your Property Taxes

Breakdown of Property Tax Components

In Virginia, property taxes are typically assessed on real estate and tangible personal property:

- **Real Estate**: This includes land and buildings.
- **Personal Property**: This encompasses machinery, tools, and equipment used in business operations.

For a large-scale industrial facility, both real estate and personal property taxes would apply. However, the specific allocation between these categories would depend on the nature of the investment and the county's assessment practices.

Additional Considerations

- **Tax Incentives**: Greensville County may offer tax incentives to attract large-scale investments, which could reduce the effective tax rate.
- **Assessment Appeals**: The assessed value of the property can be appealed if the owner believes it is overvalued, potentially lowering the tax liability.

- **Local Variations**: Tax rates can vary within different parts of the county, so it's important to consult with the local tax assessor for precise calculations.

Business Equipment Taxes

Personal Property Taxes on Equipment:

- **Loudoun County:** Data centers in Loudoun County are assessed at approximately $4.20 per $100 of assessed value on computer equipment. In tax year 2021, this rate generated about $424 million in personal property taxes. The Business Journals+2Datacenter Dynamics+2Datacenter Dynamics+2
- **Prince William County:** The county's computer and peripherals tax rate increased from $2.15 to $3.70 per $100 of assessed value between tax years 2023 and 2024, resulting in a $57.5 million increase in tax revenue from data centers. WTOP News+2WTOP News+2INSIDENOVA.COM+2

Anticipated Equipment taxes at current rates.

For a $500 million business equipment facility in Greensville County, Virginia, the estimated annual business personal property tax revenue would be approximately **$3.75 million**.

Calculation:

The business personal property tax rate in Greensville County is **$0.75 per $100 of assessed value**. This rate is consistent with the county's median effective property tax rate, as previously mentioned.

To calculate the tax:

$$\text{Tax} = (\text{Assessed Value} / 100) \times \text{Tax Rate}$$

Substituting the values:

$$\text{Tax} = (500{,}000{,}000 / 100) \times 0.75 = 3{,}750{,}000$$

Therefore, the estimated annual business personal property tax revenue would be **$3.75 million**.

Additional Considerations:

- **Depreciation**: The assessed value of business equipment typically depreciates over time, which can reduce the taxable value and, consequently, the tax revenue.

- **Tax Incentives**: Greensville County may offer tax incentives to attract large-scale investments, which could lower the effective tax rate.
- **Assessment Appeals**: The assessed value can be appealed if the owner believes it is overvalued, potentially lowering the tax liability.
- **Local Variations**: Tax rates can vary within different parts of the county. It's important to consult with the local tax assessor for precise calculations.

🛒 Sales Taxes

Sales and Use Tax Exemptions:

- **Statewide Impact:** Virginia offers sales and use tax exemptions for qualifying data center investments. In fiscal year 2023, the state granted approximately $932.7 million in exemptions, based on $16.06 billion in qualifying investments. The Business Journals

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📈 **Long-Term Revenue Growth**
Over the past decade, data center tax revenues in Prince William County have increased by 1,535%, from $6.2 million in 2012 to $101.4 million in 2022. This growth underscores the expanding economic footprint of data centers in the region.

Expected Sales and Use tax calculations:

The **Sales and Use Tax (SUT) impact** from building a 600 MW data center campus in **Greensville County, VA** can be significant, both during the construction phase and through ongoing operations. The sales and use tax revenue generated will largely come from the purchase of materials, equipment, and services necessary to build and maintain the data center. Below is a breakdown of how to calculate the potential tax revenue from these purchases, along with a general estimate of the impact.

1. Construction Phase Impact

During the construction phase of a 600 MW data center, a significant portion of the investment goes into building materials, machinery, and contracting services. In Virginia, the **sales tax rate** is **5.3%** for general goods and services, with an additional **1% local tax** in most areas, totaling **6.3%** sales tax in Greensville County.

Estimating Construction Costs

For a large-scale data center construction project, let's estimate the construction costs and the portion subject to sales tax.

- **Construction costs**: Data center construction costs can vary based on the region and specifics of the project. A large data center typically costs between **$800–$1,000 per kW** to build.

For a 600 MW facility:

Construction Costs=600,000 kW×800 USD/ (low estimate)
Construction Costs=480,000,000

Construction Costs=600,000,000 (high estimate)

- **Taxable materials**: Assuming **30% to 50%** of the total construction costs are for materials and services subject to sales tax (including building materials, machinery, electrical and HVAC equipment, and other tangible goods), we can estimate the taxable amount.

For the low estimate:

480,000,000 USD×30%=144,000,000

For the high estimate:

600,000,000 USD×50%=300,000,000

Sales and Use Tax Calculation for Construction Phase

At the total sales tax rate of **6.3%**, the sales tax generated from construction-related purchases would be:

- **Low estimate**:

144,000,000 USD×6.3%=9,072,000

- **High estimate**:

300,000,000 USD×6.3%=18,900,000

Therefore, the **total sales and use tax revenue** generated during the construction phase of a 600 MW data center could range between **$9.07 million** and **$18.9 million**.

2. Ongoing Operations Impact

Once the data center is operational, the sales and use tax revenue will come from the purchase of goods and services necessary for maintenance, equipment upgrades, and day-to-day operations.

Typical Ongoing Expenses:

- **Energy and utility costs**: While utilities are typically exempt from sales tax, some related services (such as generators or backup systems) may generate tax revenue.
- **Equipment maintenance**: Spare parts and hardware replacements, especially for high-tech infrastructure like servers, routers, and cooling systems, will generate sales tax revenue. This can amount to millions of dollars annually.
- **Supplies**: Office supplies, cleaning, and facility management services can also contribute to sales tax revenue.

Estimating Ongoing Sales and Use Tax:

Let's assume the operational spending on goods and services is around **$10 million to $20 million** annually, with about **30% to 40%** of that amount being subject to sales tax (based on purchases of goods and equipment).

- **Low estimate**:

10,000,000 USD×30%=3,000,000

Sales tax:

3,000,000 USD×6.3%=189,000 USD

- **High estimate**:

20,000,000 USD×40%=8,000,000

Sales tax:

8,000,000 USD×6.3%=504,000

So, the ongoing **annual sales and use tax revenue** from operations could range between **$189,000** and **$504,000**.

3 . Summary of Sales and Use Tax Revenue

Phase	Estimated Sales Tax Revenue
Construction Phase	$9.07 million – $18.9 million
Ongoing Operations (Annual)	$189,000 – $504,000

Key Considerations:

- **Taxable Purchases**: Only certain items are subject to sales tax, and most of the construction costs related to land or major infrastructure (such as power lines and roads) may not be subject to sales tax.
- **Local Sales Tax**: In some areas, localities may impose additional taxes or offer incentives that could lower the taxable amount or defer tax liability.
- **Incentive Programs**: The state of Virginia and Greensville County may offer **sales tax exemptions** on certain equipment or materials as part of economic development incentives to attract large-scale projects like data centers.

Conclusion:

Building a 600 MW data center campus in Greensville County, VA, will generate substantial sales and use tax revenue, both during the construction phase (up to **$18.9 million**) and through ongoing operations (up to **$504,000 annually**). This is a significant boost for the local economy, especially when coupled with other economic benefits like job creation, business growth, and infrastructure development.

Local and Regional Economic Stimulus:

Estimated Economic Impact of a 600 MW Data Center in Southern Virginia

1. Construction & Development Investment

- **Total Capital Investment**: Approximately **$6–10 billion**, based on $10–$15 million per MW.
- **Local Economic Impact**: An estimated **$1.8–5 billion** during the construction phase (3–5 years), encompassing:
  - Labor (e.g., electricians, engineers, laborers)
  - Materials (e.g., steel, concrete, electrical components)
  - Services (e.g., permitting, legal, environmental consulting)
  - Temporary housing, food, and services for workers

2. Ongoing Operations Spending

- **Annual Operating Expenditures**: Approximately **$120–180 million per year**.
- **Local Economic Impact Over 20 Years**: An estimated **$2.4–3.6 billion**, including:
  - Payroll for 500–700 direct jobs
  - Service/vendor contracts
  - Utilities and real estate taxesVirginia EDP+7AP News+7AP News+7PRWeb+7Virginia Business+7INSIDENOVA.COM+7

3. Induced Economic Activity

- **Multiplier Effect**: For every job inside a Virginia data center, an additional **3.5 jobs** are supported in the broader economy.
- **Total Induced Local Stimulus Over 20 Years**: Approximately **$2–4 billion**, encompassing:
  - Spending by employees and suppliers on housing, retail, healthcare, education, transportation, and more.INSIDENOVA.COM+2PRWeb+2Northern Virginia Technology Council+2

📊 Combined Local & Regional Economic Stimulus

Source	Estimated Value	Median Value	Notes
Construction-phase local spend	$1.8 – $5 billion	$3.4B	Over ~3–5 years
Operational-phase local spend	$2.4 – $3.6 billion	$3B	Over 20 years
Induced & indirect stimulus	$2 – $4 billion	$3B	Multiplier effect
Total Estimated Stimulus	**$6.2 – $12.6 billion**	$9.4B	Conservative, location-dependent

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🏗️ Real-World Examples in Southern Virginia

- **Microsoft's Data Center in Mecklenburg County**: Originally a $499 million project, it expanded to a $1.99 billion investment, creating over 250 jobs and contributing significantly to the local economy. Virginia EDP
- **Pittsylvania County Project**: A proposed data center project could represent up to $5 billion in investment, $120 million in tax revenue over 10–15 years, and up to 500 jobs. Cardinal News

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🏛️ Regional Incentives & Support

- **Tax Incentives**: Virginia offers exemptions from retail sales and use tax for qualifying computer equipment purchased by data centers that meet statutory investment and employment requirements. Virginia EDP
- **Development Opportunity Fund**: Supports private-sector investments and expansions in the state, facilitating large-scale data center projects. Virginia EDP

🌱 Broader Community and Environmental Considerations

While data centers provide significant economic benefits, they also raise concerns:

- **Energy Consumption**: Increased electricity demand could lead to higher power bills for residents. Axios

- **Community Impact**: Rapid development may lead to conflicts with local communities over land use and environmental concerns. AP News
- **Environmental Footprint**: The expansion of data centers can impact local landscapes and historical sites. Business Insider

Infrastructure Investment:

Expanding a data center site to an aggregated or campus-scale level (e.g., 300–600+ MW) significantly impacts **infrastructure investment** in several interconnected ways. This investment typically spans **power, water, broadband, transportation**, and **environmental systems**, often with lasting regional economic benefits. Here's a breakdown:

🔌 1. Electric Power Infrastructure

Data centers are extremely power-intensive, especially aggregated sites.

- **New or upgraded substations**: Large-scale data center campuses may require dedicated substations (e.g., 230kV or 345kV class) and high-voltage transmission lines.
- **Grid resilience investments**: Utilities often reinforce or modernize local grids to handle load peaks, integrate renewables, or build energy storage.
- **Renewable energy integration**: Hyperscalers increasingly fund off-site solar, wind, and battery projects, driving broader clean energy investments.
  Impact: Hundreds of millions may be invested by utilities and partners; benefits extend to local industry and future developments.

🌐 2. Fiber Optic and Network Connectivity

Data centers require ultra-fast, redundant internet connectivity.

- **Carrier hotels and dark fiber expansion**: Telcos often lay new fiber lines or expand metro fiber rings.
- **Edge networking**: Local ISPs benefit from the improved backbone and peering infrastructure.
- **Low latency infrastructure**: Proximity to major networks improves performance for businesses and residents.
  Impact: Regional digital transformation; better service for schools, hospitals, and municipalities.

🚚 3. Transportation and Logistics Infrastructure

While data centers themselves have limited traffic, construction and operations still drive transportation upgrades.

- **Road and access improvements**: Especially during multi-year buildouts, new roads or road-widening may be funded.
- **Improved access for workforce**: Local governments may invest in public transit or housing corridors to accommodate new workers.

Impact: Enhances mobility and may catalyze commercial development (e.g., hotels, services).

4. Water and Cooling Infrastructure

Especially for air-cooled or hybrid systems, water infrastructure is a major concern.

- **Cooling systems**: Some large sites require dedicated water lines, treatment plants, or water reuse systems.
- **Sustainability-driven innovations**: Investment in water-efficient cooling or on-site recycling tech (e.g., direct evaporative cooling, closed-loop systems).
  Impact: May prompt municipal upgrades that improve water resilience for the whole area.
- **UPGRADE FUNDING:** In the case of Greensville County, a new 600 MW site will aid in financing the planned 4MGD upgrade to the Jarratt water treatment plant.

5. Environmental and Sustainability Infrastructure

Due to their scale, aggregated data centers often need to address emissions, sustainability, and public scrutiny.

- **Carbon offset programs**: Some sites invest in regional afforestation or carbon capture as part of ESG mandates.
- **Microgrids and backup generation**: Localized energy systems that benefit emergency resilience for entire communities.
- **Stormwater and land-use mitigation**: Green infrastructure such as retention ponds, low-impact development (LID), or smart landscaping.
  Impact: Supports climate resilience and may attract further green-tech investment.

6. Catalytic Impact on Other Infrastructure

Once a critical mass of digital infrastructure is in place, additional developments tend to follow:

- **Tech parks and smart cities**: Aggregated sites can anchor broader innovation ecosystems.
- **Educational institutions**: Partnerships with universities or training centers can lead to new campuses or tech academies.
- **Data gravity**: Businesses co-locate near data hubs to take advantage of latency and access, creating a flywheel of economic activity.

Summary Table

Infrastructure Area	Type of Investment	Broader Benefit
Power	Substations, grid upgrades, renewables	Modernized, resilient energy systems
Network/Fiber	Fiber rings, IX points, edge nodes	Improved connectivity for region
Transportation	Roads, access points, public transport	Mobility and logistics improvement
Water & Cooling	Water lines, cooling plants, efficiency tech	Stronger municipal water systems
Environmental & Resilience	Green infra, carbon offsets, energy storage	Climate adaptation and local resilience
Induced Development	Tech clusters, housing, education	Long-term regional growth engine

Energy Sector Development:

The **energy sector development** to support **data center clusters** is a crucial component of the infrastructure required to ensure these centers operate efficiently. Data centers are highly energy-intensive, requiring significant investments in both energy supply infrastructure and renewable energy sources to meet sustainability goals.
Below is an overview of the **costs** and **timeframes** associated with the energy sector development needed for data center clusters.

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1. Energy Demand from Data Centers

Data centers typically consume vast amounts of electricity, and as the demand for data storage, cloud computing, and digital services grows, the energy needs of these centers expand.
Energy Consumption Estimates:

- A typical **data center** consumes between **5 MW to 100 MW** of power, depending on size.
- Large-scale **hyperscale data centers** (those with a capacity of 100 MW or more) are designed to support the needs of global cloud services (AWS, Google, Microsoft), requiring consistent power to run servers and cooling systems.
  For example:
  - A **600 MW data center campus** could require up to **5,000 GWh** (gigawatt hours) of electricity annually, depending on energy efficiency and the intensity of cooling systems.

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2. Infrastructure Development Costs

A. Grid Expansion and Power Distribution

- **Electricity Transmission Lines & Substations:** Significant upgrades are often necessary to meet the demands of large data centers, especially in more remote or developing areas. New **substations**, **high-voltage transmission lines**, and **transformers** may be needed to deliver reliable power.
  - **Estimated Costs:**
    - **Substations**: Each can cost anywhere from **$5 million to $25 million** depending on the voltage level and proximity to existing infrastructure.

- **Transmission Lines**: Construction of new transmission lines can range from **$1 million to $10 million per mile** depending on terrain and environmental concerns.
- **Example**: A **600 MW campus** might require 10–20 miles of new transmission lines, which could cost anywhere from **$10 million to $200 million**.

B. Power Plant and Backup Generation (if applicable)

- **Natural Gas, Solar, or Wind Farms**: In areas where local grid infrastructure is insufficient or unreliable, some data center providers invest in their own dedicated energy generation or backup systems. This might include natural gas plants, solar arrays, or even dedicated wind farms. Alternatively, a **backup diesel generator** system is common in case of grid failures.
  - **Costs:**
    - **Natural Gas Power Plant**: The capital cost of building a natural gas plant to supply 200–300 MW could range from **$250 million to $500 million**.
    - **Solar Power Farm**: Building a solar farm with a capacity of 100 MW typically costs between **$100 million and $150 million**.
    - **Backup Diesel Generators**: These are typically **$0.5 million to $5 million per MW** of installed capacity.
    - **Example**: If the data center needs a **100 MW solar farm** to supplement its power, the cost could be around **$100 million to $150 million** for the solar infrastructure alone.

C. Cooling Systems

- **Cooling Infrastructure**: Data centers consume a significant amount of energy just for cooling, often as much or more than the energy used by the servers themselves. Efficient cooling infrastructure is critical, and cooling systems (like chilled water loops, evaporative cooling, or advanced direct-to-chip cooling) often need to be scaled in accordance with the size of the data center.
  - **Costs**:
    - A **cooling system** (HVAC, chillers) can cost anywhere from **$1 million to $5 million** per MW of capacity.
    - The total cost for the **600 MW data center** cooling infrastructure could thus range from **$600 million to $3 billion**, depending on the technology and redundancy required.

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3. Timeframe for Energy Sector Development

A. Grid Expansion & Power Infrastructure

- Expanding or upgrading grid infrastructure to support data center clusters typically takes **2–5 years**, depending on the complexity and the involvement of local utilities and environmental regulations.
    - **Planning**: The **initial planning** and permitting phase for major transmission lines and substations can take **1–2 years**, depending on the regulatory environment.
    - **Construction**: Actual construction of new grid infrastructure and substations may take an additional **1–3 years** depending on the region and the scale of the project.

B. Power Generation Projects

- **Renewable Power Plants (Solar/Wind)**: If a data center cluster is relying on renewable power sources like solar or wind, the construction of these projects can take **2–4 years**.
    - **Solar Farms**: Building a solar farm can take **12–18 months**, with additional time required for grid integration.
    - **Wind Farms**: Typically require **2–3 years** for full development, permitting, and construction.
- **Natural Gas Plants**: Development of a natural gas facility can take **3–5 years**, considering permitting, environmental assessments, and the construction of the plant itself.

C. Cooling Infrastructure

- **Cooling Systems**: The installation of cooling systems is typically integrated into the construction of the data center itself and can take **6 months to 2 years** to implement, depending on the size of the data center and cooling technology used.

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4. Real-World Example: Northern Virginia

In Northern Virginia, the rapid growth of data center clusters has significantly impacted energy infrastructure development.

- **Dominion Energy**, the main utility provider, has been expanding its grid capacity to accommodate the growing demand from data centers.
    - **Costs**: Dominion Energy has spent more than **$1 billion** on grid expansion, including new substations and transmission lines.

- **Power Supply**: The region's data centers have relied on **renewable energy** through investments in solar and wind farms. Dominion Energy is also investing in **offshore wind projects** to help meet the future needs of the data center sector.
- **Timeline**: Dominion Energy has been able to support the demand of growing data centers within **2-3 years** of initiating new grid upgrades.

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5. Cost Breakdown Example for 600 MW Data Center Cluster

Component	Cost Estimate	Timeframe
Substations & Transmission Lines	$10 million to $200 million	2-5 years
Natural Gas Power Plant	$250 million to $500 million	3-5 years
Solar Farm (100 MW)	$100 million to $150 million	2-4 years
Cooling Infrastructure (HVAC)	$600 million to $3 billion	1-2 years (Integrated)
Backup Diesel Generators	$0.5 million to $5 million per MW	1-2 years

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6. Conclusion

The energy sector development for data center clusters is a significant investment both in terms of infrastructure and time. For a **600 MW data center cluster**, the development could cost between **$1 billion and $5 billion** for power infrastructure, including grid upgrades, backup generation, and cooling systems. The development of this energy infrastructure would typically take **2 to 5 years**, with renewable power options like solar or wind taking 2–4 years for full integration.

These investments are essential to ensure data centers have reliable, scalable, and sustainable power, which is critical for supporting the expanding tech industry and maintaining regional competitiveness in the global digital economy.

Technology Ecosystem Growth:

The **technology ecosystem growth** associated with data center clusters is an increasingly significant trend. As data centers grow and scale up, they not only contribute directly to local economies through taxes and job creation but also serve as a catalyst for broader technological innovation, entrepreneurship, and infrastructure development.

1. Impact on Tech Industry Development

A. Attraction of Tech Firms

Data centers are at the heart of regional tech ecosystems. Their presence directly influences the growth of cloud computing, AI, cybersecurity, edge computing, and other related sectors.

- **Example: Northern Virginia** – Northern Virginia has become the largest data center market in the world due to its dense concentration of data centers, drawing in major tech companies like Amazon Web Services (AWS), Microsoft, and Google. These companies use the region's data centers to support their cloud services, creating a vibrant tech cluster.
    - **Supporting data**: Loudoun County, Northern Virginia, hosts over 30 million square feet of data center space and contributes more than $2 billion annually in tech industry revenue. The region is home to more than 100 cloud computing-related companies. (DCD).

B. Growth of Tech Startups

The presence of large-scale data centers enables the growth of startups by providing scalable infrastructure. Entrepreneurs benefit from access to cloud services, big data processing, and computational resources without the need for huge upfront investment in physical infrastructure.

- **Example: Silicon Valley / San Francisco** – Data centers in the Bay Area support a wide range of startups, especially in the fields of AI, blockchain, and SaaS. These companies rely on data center resources to host their platforms, making access to data center hubs crucial for their growth.
    - **Supporting data**: According to a report from Silicon Valley Economic Development Alliance, the local tech ecosystem generates more than $500 billion annually, with cloud computing services being a major enabler. Data center clusters account for a substantial portion of this growth by providing the infrastructure needed for scalable computing resources. (SVEDC).

2. Infrastructure Development and Investment

A. Creation of New Data Hubs and Connectivity

Data centers create demand for better infrastructure, not only in terms of computing resources but also for fiber-optic connectivity, public utilities, and transportation. As the data center industry grows, it attracts investments in these critical infrastructure components.

- **Example: Dublin, Ireland** – Dublin has become a leading European hub for data centers, attracting major players like Amazon and Facebook. The growth of data centers in the region has spurred investment in both public infrastructure (such as fiber networks) and private industry (new tech parks and co-working spaces).
    - **Supporting data**: Over €10 billion has been invested in data centers in Ireland, with significant growth in fiber-optic and connectivity infrastructure that supports a wide range of other tech-related industries. (TechIreland).

B. Improvement of Local Infrastructure

The establishment of large-scale data center clusters leads to investments in local infrastructure—roads, utilities, housing, and healthcare services. These improvements, while directly supporting the data center operations, also benefit the broader tech ecosystem by attracting talent and enabling better quality of life.

- **Example: Central Washington (Tacoma)** – As the region expands its data center footprint, local infrastructure investments such as improved fiber-optic networks, transportation hubs, and energy grids are increasingly supporting tech companies.
    - **Supporting data**: The state of Washington invested over $1.3 billion in expanding the power grid and fiber-optic infrastructure in the last decade. This investment has facilitated the rise of more than 200 tech startups in the region. (Washington State Department of Commerce).

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3. Job Creation and Talent Development

A. High-Tech Job Opportunities

Data center clusters are major employers of high-skilled workers. These jobs span IT infrastructure, cloud architecture, data science, and cybersecurity. Beyond direct employment in the data centers themselves, the ecosystem also supports jobs in ancillary industries like software development, hardware engineering, and business management.

- **Example: Austin, Texas** – With multiple data centers and a growing tech hub, Austin is attracting tech talent from all over the world. Companies like Dell, Oracle, and

Google have made significant investments, and the tech ecosystem continues to expand.

- **Supporting data**: The Austin tech industry generated over $18 billion in direct economic impact in 2020, with many of these firms relying on local data centers for infrastructure. (Greater Austin Chamber of Commerce).

B. Education and Training Programs

To support the demand for skilled labor, educational institutions and private training programs have sprung up to meet the growing need for workers who can design, operate, and maintain data center infrastructure.

- **Example: Virginia Tech's Northern Virginia Campus** – As a leading provider of talent in cloud computing, cybersecurity, and data science, Virginia Tech has adapted its curriculum to support the burgeoning data center industry in Northern Virginia. The university works directly with data center companies to align educational outcomes with market needs.
  - **Supporting data**: In 2022, Virginia Tech received more than $20 million in funding for its data science programs, which directly benefit companies in the Northern Virginia data center cluster. (Virginia Tech).

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4. Economic Impact of Data Centers on Local Economies

A. Tax Revenue Growth

As data centers proliferate, they contribute significantly to local economies through property taxes, business equipment taxes, and sales taxes. These revenues are often reinvested in the local tech ecosystem, supporting the development of new projects, infrastructure, and education programs.

- **Example: Prince William County, Virginia** – The county's data centers have contributed over $300 million in tax revenue in 2023 alone, supporting local schools, public infrastructure, and tech-related community programs.
  - **Supporting data**: Prince William's real property tax revenue from data centers grew by 70% in just 5 years, with projections of $500 million in tax revenue by 2025. (Prince William County Economic Development).

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5. Enhancing Regional Competitiveness

A. Global Investment Attraction

Data center clusters can make a region more competitive on a global scale by providing a world-class infrastructure platform that attracts foreign investments.

These investments not only support the data centers themselves but also create opportunities in high-tech industries such as fintech, edtech, and AI.

- **Example: Singapore** – The government of Singapore has heavily invested in data center infrastructure to drive economic growth, attracting both international and domestic tech companies to the region. The creation of the Singapore Data Center Park has helped the country establish itself as a leading tech hub in Southeast Asia.
    - **Supporting data**: Singapore is home to more than 30 data centers, with investments totaling more than $1 billion in 2021 alone. This has helped grow the country's tech sector, with a projected 10% growth in tech employment by 2025. (Singapore Economic Development Board).

Summary of Technology Ecosystem Growth:

Category	Impact	Supporting Data
Tech Industry Development	Attracts tech firms, startups, and supports cloud computing, AI, and cybersecurity sectors.	Northern Virginia: Over 100 cloud computing firms; Loudoun County: $2 billion annually.
Infrastructure Development	Drives investment in fiber-optic networks, power grids, and transportation, benefitting both data centers and tech companies.	Dublin: €10 billion in data center infrastructure investment.
Job Creation	Creates high-tech jobs in data center operations, software development, cloud architecture, and related fields.	Austin: Generated $18 billion from tech sector in 2020.
Tax Revenue Growth	Contributes millions in property, equipment, and sales taxes that fund local tech initiatives, schools, and infrastructure.	Prince William County: $300 million in 2023 tax revenue from data centers.
Regional Competitiveness	Attracts global investment, enhancing the region's competitive edge in high-tech industries.	Singapore: 30 data centers, $1 billion invested in 2021, projected 10% growth in tech jobs by 2025.