

OVERVIEW

As digital demand surges due to cloud services, AI applications, and the growing digital economy, communities are increasingly facing proposals for new data centers. Local governments must be proactive in planning for these developments to ensure alignment with community values, infrastructure capabilities, and environmental standards.

Strategically placed data centers can catalyze economic development by attracting connected industries such as smart manufacturing and by enabling advanced services like telehealth, virtual learning, autonomous vehicles, drone delivery, and other smart city applications.

WHAT IS A DATA CENTER?

A data center is a facility or group of facilities used to house computer systems and associated components such as storage systems and networking equipment. These centers process, store, and disseminate massive volumes of data for business and governmental operations. A data center may be:

- Colocation or Hosting Facilities – leased by multiple customers.
- Enterprise Centers – owned and operated solely by the supported company.

ACCESSORY USES

Accessory uses at data centers, such as backup power, cooling systems, fiber lines, security features, substations, and water infrastructure are typically located on-site or within a unified development zone.

WHY ARE THEY COMING TO OUR REGION?

Several regional advantages make certain communities attractive to data center developers:

1. Access to Carbon-Free Energy

The Microsoft agreement to purchase electricity from the planned restart of the Three Mile Island nuclear plant demonstrates increasing demand for sustainable, carbon-free power.

2. Strategic Location & Disaster Resilience

The region's central location near New York and Philadelphia avoids major disaster zones, offering business continuity and lower risk.

3. Proximity to Customers

Reduced latency is essential for real-time data delivery, especially for applications like gaming, AI, and enterprise software.

4. Direct Access to Power Generation

Developers prioritize sites with strong power infrastructure, including proximity to transmission lines and generation sources.

5. Abundant Water Resources

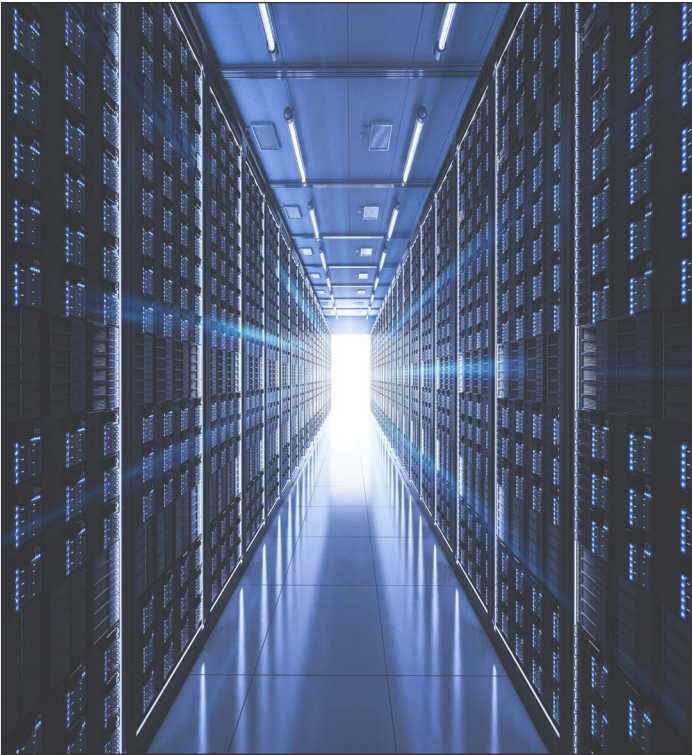
Given that nearly 40% of a data center's energy consumption supports cooling, proximity to major water sources like the Susquehanna River is critical.

TYPES OF DATA CENTERS

Understanding the diversity in data centers helps communities respond knowledgeably to proposals:

- **Enterprise** – Owned and managed by a single organization; typically, on-premises and highly secure.
- **Colocation (Colo)** – Shared facilities where clients lease space and retain hardware control.
- **Managed Services** – Third-party vendors manage both hardware and software operations.
- **Cloud** – Operated by providers like AWS, Microsoft Azure, and Google Cloud; customers access resources on-demand.
- **Hybrid** – Mix of on-site infrastructure and cloud services; common in regulated industries.
- **Edge** – Small facilities close to users, enhancing performance for IoT and real-time applications.
- **Hyperscale** – Massive facilities spanning hundreds of acres, operated by major tech firms.
- **Modular/Containerized** – Portable, scalable, and ideal for temporary or specialized use.





KEY PLANNING CONSIDERATIONS

Land Use Compatibility:

Data centers operate 24/7, producing consistent noise and heat, and are best located in commercial, industrial, or designated overlay districts, away from residential areas.

Confirm zoning allowances and require environmental, noise, and traffic impact studies.

Consider permitting data centers as a conditional use or special exception, incorporate public input, and ensure alignment with long-term planning goals.

Infrastructure Readiness:

- **Electricity** – High, stable supply with redundancy
- **Water** – Adequate for cooling needs
- **Fiber Optics** – Proximity to high-speed internet infrastructure
- **Transportation** – Sufficient for periodic service vehicle access

Environmental Impact Considerations:

Data centers require significant energy and water. Zoning codes should encourage sustainable siting and operation:

- **Cooling systems:** Evaluate water-intensive or air-cooled systems for impacts on local resources
- **Heat emissions:** Understand and mitigate thermal output
- **Stormwater management:** Large impervious surfaces (rooftops, equipment yards) can increase runoff

- **Air quality:** Diesel generators used for backup power may have emissions concerns
- **Noise:** Backup generators and HVAC systems can exceed local noise thresholds

Noise Management:

Sources include generators and cooling systems. Planning should involve:

- Enforcing noise ordinances
- Installing soundproofing and vegetation buffers
- Limiting testing hours for backup systems
- Monitoring noise with on-site acoustic sensors

Zoning Best Practices:

Without clear definitions, jurisdictions risk delays and legal challenges. Defining data centers as a unique land use ensures transparency and regulatory consistency.

Zoning Districts:

- **Residential** – Generally inappropriate due to noise, 24/7 operations, and visual impacts
- **Industrial** – Most suitable, as they are designed to handle high-intensity infrastructure. Permit by right or by special exception
- **Rural Agricultural** – Allowed in some jurisdictions if standards similar to industrial uses are applied





- **Commercial** – May be appropriate with design conditions (e.g. noise, fencing, building facades). Permit by right or by special exception
- **Technology Parks or Business Parks** – Often ideal due to existing utility infrastructure and clustering of compatible uses. Permit by special exception.
- **Overlay Districts** – Custom-zoned areas designed to support data center development with defined rules and performance standards

Conditional Use Permits & Special Exceptions:

Local governments may:

- Evaluate site-specific impacts
- Impose design and façade standards
- Establish noise and environmental performance metrics
- Set parking and operational requirements

Setbacks & Buffers:

- Landscaping and fencing reduce visual and noise intrusion
- Setbacks from residential districts are critical – setbacks of 200ft – 500 ft are typical

Design Standards:

- Encourage sustainable architecture and the repurposing of existing buildings
- Address building height and mechanical screening
- Require acoustic and environmental studies
- Limit exterior lighting to reduce light pollution

Policy & Community Engagement:

Successful data center planning involves alignment with the jurisdiction's Comprehensive Plan and thorough public engagement to address community concerns and highlight potential benefits such as:

- Property values and tax base
- Infrastructure investment

- High-paying, though limited, employment opportunities
- Minimal traffic and school impacts

Ongoing monitoring post-approval should ensure compliance with environmental, noise, and energy use standards.

Benefits vs. Challenges

Benefits:

- Increased tax revenue
- High-salary job creation
- Stimulated infrastructure investment
- Limited traffic congestion
- No strain on school systems

Challenges:

- High electricity consumption
- Water-intensive cooling systems
- Land use impacts and zoning conflicts
- Limited direct employment opportunities
- Community perception and land use fit
- Encourage sustainable architecture and the repurposing of existing buildings
- Address building height and mechanical screening
- Require acoustic and environmental studies
- Limit exterior lighting to reduce light pollution

Resources:

- [PA Data Center Planning Toolkit](#)
- [Data Centers Evolved: A Primer for Planners \(American Planning Association\)](#)
- [Loudoun County, VA Zoning Ordinance \(pdf\)](#)
- [TCRPC Data Center Model Ordinance \(pdf\)](#)



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