

Building Better Neighbors

Best Practices for Responsible Data Center Development

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Executive Summary

Community opposition is now one of the most significant practical obstacles to data center development in the United States. It is also largely preventable.

This paper examines the environmental, infrastructure, and community considerations driving local conflict around data center development and identifies voluntary practices that consistently reduce opposition, improve project outcomes, and support continued

deployment of critical digital infrastructure. Our central finding is straightforward: developers that proactively adopt responsible practices are getting projects built. Those that do not are increasingly finding that they cannot.

Across six areas, this paper identifies best practices and calls on the industry to adopt these approaches voluntarily, before opposition forces more restrictive outcomes.

Energy. Developers that coordinate early with utilities, adopt flexible demand profiles, and pursue diversified energy strategies reduce infrastructure strain and build credibility with grid operators and local governments. Facilities that pursue onsite power without engaging the broader energy planning process create conflict that slows future development.

Air quality. Backup generator fleets are a growing source of community concern. Voluntary adoption of higher-performing emissions controls and transparent permitting practices demonstrate environmental leadership and reduce the likelihood of sustained opposition.



Siting. Projects on previously disturbed lands, brownfields, and in established industrial corridors generate significantly less conflict than those proposed on agricultural land or near residential neighborhoods. Early consideration of land use compatibility is one of the most effective tools available to developers.

Community benefit. Communities that see tangible local investment are more likely to support continued development. Workforce training, educational partnerships, and infrastructure contributions shift the public perception of data centers from external impositions to local assets.

Water. In water-stressed regions, cooling technology choices have become a flashpoint for community opposition. Closed-loop systems, direct liquid cooling, and use of reclaimed water reduce pressure on local resources and demonstrate responsible stewardship.

Transparency. Opposition most often intensifies when communities feel excluded from decisions that affect them. Developers that disclose resource use, environmental performance, and long-term plans early and consistently build the trust that sustained local support requires.

The industry has an opportunity to establish shared voluntary standards before external pressure makes that choice for them. The practices identified in this paper are not aspirational. They are already being implemented by leading developers across the country. Broader voluntary adoption is both achievable and necessary if data center development is to continue at the pace the country's digital infrastructure requires.



Introduction: The Emerging Challenges of Data Center Development

Data centers have become essential infrastructure underpinning the modern economy, supporting cloud computing, artificial intelligence, financial systems, and national security operations. After more than a decade of relatively flat consumption, large-scale computing facilities are now a leading driver of rising electricity demand in the United States.¹ Federal analysis finds that data centers consumed about **44 percent** of total U.S. electricity in 2023 and are projected to account for about **7 to 12 percent** by 2028, as demand for AI and digital services accelerates.² At the global level, the International Energy Agency similarly finds that worldwide data center electricity consumption is growing rapidly, increasing at roughly **12 percent** annually in recent years.³

Continued investment in digital infrastructure will play a vital role in U.S.

economic competitiveness and technological leadership in the coming decades.⁴ As global competition surrounding advanced computing capabilities intensifies, especially with China, the infrastructure required to support domestic innovation has become a strategic consideration of mounting importance.⁵ Questions surrounding data center development have extended beyond local land use decisions and increasingly intersect with broader discussions regarding economic growth, technological leadership, and national security interests.

As development expands, projects are increasingly concentrated in specific regions, creating localized pressures on electric grids, water resources, air quality, land use systems, and on the quality of life of those living in close proximity to the facilities.

¹ U.S. Energy Information Administration, *Electricity Demand Growth in the United States*, U.S. Energy Information Administration, February 2025, <https://www.eia.gov/pressroom/releases/press582.php>

² U.S. Department of Energy, *DOE Releases New Report Evaluating Increase in Electricity Demand from Data Centers*, U.S. Department of Energy, December 2024, <https://www.energy.gov/articles/doe-releases-new-report-evaluating-increase-electricity-demand-data-centers>

³ International Energy Agency, *Energy Demand from AI*, International Energy Agency, 2025, <https://www.iea.org/reports/energy-and-ai/energy-demand-from-ai>

⁴ National Institute of Standards and Technology, *A Strategy for the CHIPS for America Fund* (U.S. Department of Commerce, September 2022), <https://www.nist.gov/system/files/documents/2022/09/13/CHIPS-for-America-Strategy%20%28Sept%206%2C%202022%29.pdf>

⁵ National Security Commission on Artificial Intelligence. *Final Report*. March 2021. <https://www.govinfo.gov/content/pkg/GOVPUB-Y3-PURL-gpo153246/pdf/GOVPUB-Y3-PURL-gpo153246.pdf>

These pressures are contributing to a growing number of local disputes, including project delays, heightened permitting scrutiny, and calls for temporary moratoria or development restrictions. Recent reporting indicates that more than a dozen U.S. states are actively considering limits or pauses on new data center development, while local opposition has emerged as a significant political and policy issue in multiple regions.⁶ Proponents of moratoria have argued that halting further data center development is necessary to allow time for governments to better understand impacts on energy systems, costs, and communities.⁷



Public concerns surrounding data center development are not limited to the physical infrastructure itself. In many communities, debates over data centers

have become intertwined with broader questions regarding artificial intelligence, workforce disruption, automation, and the economic and social impacts of emerging technologies.^{8,9} While these discussions are important, they raise distinct issues that extend beyond the environmental footprint of data center facilities. This paper does not take a position on the broader economic and social consequences associated with AI adoption. Instead, it focuses specifically on the environmental, infrastructure, and community considerations associated with data center development and the practices that may help reduce conflict and improve project outcomes.

Data centers have become a central issue in local planning, energy policy, and economic development. Many developers and operators have begun implementing approaches intended to reduce environmental impacts, improve transparency, bolster community relationships, and strengthen local infrastructure. This paper specifically examines the environmental,

⁶ Reuters. "Dozen U.S. States Weigh Data Center Curbs; Maine Governor Vetoes Bill" April 24, 2026.

<https://www.reuters.com/legal/government/dozen-us-states-weigh-data-center-curbs-maine-governor-vetoes-bill-2026-04-24/>

⁷ The Wall Street Journal, "These Cities and States Are Taking Aim at Data Centers," April 2026. <https://www.wsj.com/tech/ai/these-cities-and-states-are-taking-aim-at-data-centers-3b98adf1>

⁸ OECD, Future of Work, Organisation for Economic Co-operation and Development. <https://www.oecd.org/en/topics/policy-issues/future-of-work.html>

⁹ Brookings Institution, Generative AI, the American Worker, and the Future of Work, October 10, 2024. <https://www.brookings.edu/articles/generative-ai-the-american-worker-and-the-future-of-work/>

infrastructure, and community considerations associated with data center development; identifies emerging examples of responsible development practices; and evaluates voluntary industry measures and best practices that may improve project outcomes, reduce community conflict, and advance the deployment of critical digital infrastructure.

As data center development continues to accelerate, the industry has an opportunity to establish a shared framework for responsible infrastructure development.

Communities across the country are increasingly evaluating the impacts of large-scale digital infrastructure on energy systems, water resources, land use, and quality of life, while local governments face growing pressure to balance economic opportunity with community concerns. In this situation, voluntary industry standards can help demonstrate a commitment to environmental stewardship, transparency, and responsible growth. These efforts are not simply a matter of good corporate citizenship. As project opposition, permitting delays, and development moratoria become more common in some regions, the industry's ability to sustain future growth will increasingly depend on its ability to earn and maintain public trust. Proactively

adopting common principles and best practices – and demonstrating that the project is meeting those identified best practices – can help to create the conditions necessary for continued investment, technological innovation, and successful partnerships with host communities.

The following sections examine the primary considerations associated with data center development, including energy reliability and affordability, air emissions, land use and siting, community impacts, water stewardship, and transparency practices. Particular attention is given to areas where local concerns have contributed to project opposition, permitting delays, and calls for additional restrictions or moratoria. In addition to examining these challenges, this paper highlights emerging examples of responsible development already being implemented across portions of the industry and explores opportunities for broader voluntary adoption where appropriate. ***By identifying successful approaches and areas of common practice, this paper seeks to encourage collaboration across the industry and support development patterns that strengthen community relationships, reduce local conflict, and position data centers as responsible neighbors and valued contributors to local economies.***

Energy Reliability and Affordability: The Challenge of Growing Electricity Demand

The electricity demands of a rapidly expanding data center sector have driven significant policy questions around future digital infrastructure development. Many communities have signaled concern regarding the pace of data center growth, while utilities, grid operators, and policymakers grapple with mounting pressures to manage rising electricity demand, address infrastructure constraints, and maintain reliable and affordable service for ratepayers. Data center interconnection queues have become increasingly congested in some regions, with wait times extending several years as utilities evaluate how best to accommodate large new loads while preserving reliability for existing customers.

The scale of projected growth has triggered legitimate questions regarding energy reliability, infrastructure planning, and affordability. As of March

2025, there were **5,426 data centers** in the United States¹⁰, collectively consuming approximately **17 gigawatts (GW)** of power in 2022.¹¹ The **176 terawatt-hours (TWh)** consumed by data centers in 2023 represented **4.4%** of total electricity consumption in the United States. Data centers are projected to increase electricity demand in 2030 by up to **130 GW**, representing **12%** of total annual demand in the United States.¹² Thus, communities hosting large concentrations of data centers often express concern as to whether existing generation, transmission, and distribution infrastructure will be sufficient to support continued growth without increasing costs for other customers or reducing system reliability. As a result, the conversation surrounding data center development increasingly focuses not only on the facilities themselves, but also on the infrastructure required to support them.

¹⁰ Statista. "Data Centers Worldwide by Country." April 14, 2026. <https://www.statista.com/statistics/1228433/data-centers-worldwide-by-country/>

¹¹ Bangalore, Srin, Arjita Bhan, Andrea Del Miglio, Pankaj Sachdeva, Vijay Sarma, Raman Sharma, and Bhargy Srivathsan. "Investing in the Rising Data Center Economy." McKinsey & Company, January 17, 2023. <https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/investing-in-the-rising-data-center-economy#/>

¹² Engel, Alex, et al. "Fast, Flexible Solutions for Data Centers." Rocky Mountain Institute, 2025. <https://rmi.org/fast-flexible-solutions-for-data-centers/>

In response to prolonged interconnection delays and growing electricity demand, many data center developers have begun exploring alternative strategies to secure power, including behind-the-meter (BTM) generation. Behind-the-meter power generation refers to onsite or adjacent energy sources dedicated to supplying power to specific facilities, without connecting directly to the public grid. In the context of data centers, behind-the-meter energy can provide immediate and reliable power while reducing dependence on utility infrastructure that may take years to expand.¹³



Though some behind-the-meter solutions may be less efficient and more costly than large utility-scale generation resources, onsite generation can provide immediate, reliable energy while ensuring continuity of operations for artificial intelligence workloads and other mission-critical applications. ***Because many of these systems operate independently of the public grid, BTM generation may reduce pressure on local energy infrastructure and allow projects to move forward despite lengthy interconnection timelines.*** At the same time, questions have emerged regarding facilities that pursue onsite generation while also seeking future access to grid power for backup service, supplemental power, or long-term expansion. While this approach may provide additional operational flexibility, it can also complicate utility planning and raise questions regarding infrastructure investments, reliability obligations, and cost allocation. Some forms of onsite generation also raise concerns regarding environmental impacts, particularly air quality near the centers. These tradeoffs have become an increasingly important part of conversations surrounding responsible data center development.¹⁴

¹³ Good, Allison. "Data Center Developers Turn to Distributed, Behind-the-Meter Power." S&P Global Market Intelligence, October 2025. <https://www.spglobal.com/market-intelligence/en/news-insights/articles/2025/10/data-center-developers-turn-to-distributed-behind-the-meter-power-94174247>

¹⁴ Thorogood, Robert. "The Challenges and Opportunities of Onsite Power Generation for Data Centers." Data Center Dynamics, November 7, 2023. <https://www.datacenterdynamics.com/en/opinions/the-challenges-and-opportunities-of-onsite-power-generation-for-data-centers/>

★ Case Study: Behind-the-Meter Power and the Search for Reliability

As developers seek to increase scalability, flexibility, and reliability, a growing number of facilities are exploring onsite power generation through microgrids fueled by gas turbines, fuel cells, modular nuclear reactors, and renewable energy resources. Industry forecasts suggest that onsite generation could play an increasingly important role in future data center operations. Bloom Energy estimates that by 2030, approximately **38 percent** of data centers will utilize some form of onsite generation for primary power, while **27 percent** may be fully powered by onsite generation resources.

These developments reflect a broader effort to address growing electricity demand while reducing dependence on increasingly constrained interconnection processes. Rather than relying exclusively on traditional utility service, some operators are pursuing diversified energy portfolios intended to improve resilience and provide greater flexibility in how facilities are powered.¹⁵



A variety of technologies are being explored to support future data center energy needs. Fuel cells, which generate electricity through electrochemical reactions involving hydrogen or other fuels and oxygen, provide reliable and efficient energy with relatively low emissions profiles. Because fuel

cells can operate continuously and independently of weather conditions, many developers view them as an attractive complement to other energy resources. The fuel cell process produces water as a byproduct and offers one potential pathway toward lower-emission data center operations.¹⁶

¹⁵ Bloom Energy. "2025 Data Center Power Report Mid-Year Pulse." June 17, 2025. <https://www.bloomenergy.com/wp-content/uploads/2025-data-center-power-report.pdf>

¹⁶ Roundy, Jacob. "Hydrogen Fuel Cells Advantages, Disadvantages in Data Centers." TechTarget Search Data Center, October 17, 2024. <https://www.techtarget.com/it-infrastructure/tip/Hydrogen-fuel-cells-advantages-disadvantages-in-data-centers>

Geothermal energy has also attracted growing interest. Generated by tapping into the Earth's internal heat through deep wells, geothermal energy provides reliable, low-emission baseload power capable of operating continuously regardless of weather conditions. While geothermal development can involve significant upfront costs and geographic limitations, several technology companies have begun investing in projects that explore its potential for supporting future data center demand. Meta has partnered with Sage Geosystems on a 150-megawatt geothermal project in Texas, while Google has collaborated with Fervo Energy on geothermal development efforts in Nevada.¹⁷

Many data center operators are likewise evaluating small modular reactors (SMRs) as a potential long-term energy solution.¹⁸ Unlike traditional nuclear plants, which can require a decade or more to construct, SMRs are designed for factory production and modular assembly, potentially reducing construction timelines while providing reliable, carbon-free electricity. SMRs offer a small physical footprint, long fuel

life, and the ability to provide continuous power over extended periods without refueling. Although the technology remains in development, it is increasingly discussed as a potential component of future data center energy strategies.

While renewable resources such as solar and wind will continue to play an important role in meeting future electricity demand, these resources alone may not be sufficient to support every hyperscale facility. Some data centers lack sufficient land to develop large onsite renewable projects, while others require continuous power that extends beyond the capabilities of intermittent generation resources without substantial storage investments. As a result, many operators are pursuing a combination of renewable energy, utility power, onsite generation, storage technologies, and emerging energy resources rather than relying on any single solution.¹⁹

¹⁷ Robson, Seth. "Google Secures Approval for Geothermal to Power Data Centers." *Engineering News-Record*, May 27, 2025.

<https://www.enr.com/articles/60746-google-secures-approval-for-geothermal-to-power-data-centers>

¹⁸ International Energy Agency. "Data Centre Electricity Use Surged in 2025, Even with Tightening Bottlenecks Driving a Scramble for Solutions." April 16, 2026. <https://www.iea.org/news/data-centre-electricity-use-surged-in-2025-even-with-tightening-bottlenecks-driving-a-scramble-for-solutions>

¹⁹ Shehabi, Arman, et al. 2024 United States Data Center Energy Usage Report. Lawrence Berkeley National Laboratory, LBNL-2001637, December 2024. <https://eta-publications.lbl.gov/sites/default/files/2024-12/lbnl-2024-united-states-data-center-energy-usage-report.pdf>

★ Case Study: Planning for Growth Through Utility and Grid Partnerships

Northern Virginia illustrates both the opportunities and challenges associated with concentrated data center development. The region has attracted substantial investment and economic growth while simultaneously requiring significant investments in transmission infrastructure, substations, and generation resources.²⁰ Utilities, grid operators, developers, and policymakers continue to explore opportunities to better align future development with long-term infrastructure planning.

The most successful projects involve coordination between developers, utilities, and regulators early in the planning process. Rather than viewing electricity infrastructure as a constraint to be addressed after development occurs, these projects incorporate long-term load forecasting, transmission planning, and generation procurement during earlier stages of project development.²¹ Such approaches may help ensure that digital infrastructure growth and grid reliability advance in tandem, rather than in conflict.

Utilities in the United States have historically over-forecasted electricity demand. Between 2006 and 2023, utilities over-forecasted ten-year demand growth by more than **17 percent** — consequently, utilities spent billions to build power plants for loads that failed to materialize, and regular ratepayers were ultimately saddled with the cost.²² In preparation for uncertain data center demand, utilities have begun to bring new generation online that ultimately may not be needed, and could result in higher electricity rates and fuel price volatilities. Thus, it is imperative that data centers and utilities coordinate to advance solutions that enhance flexibility, deliver affordable and reliable energy, and ensure that energy supply is right-sized to confirmed loads.

For example, data center developers could consider maintaining flexible demand profiles, in order to reduce or increase electricity usage at the request of grid operators. Flexible demand profiles enable facilities to actively adjust electricity consumption in response to grid conditions or renewable energy availability, and avoid overburdening the

²⁰ Virginia JLARC. Data Centers in Virginia. December 2024. <https://jlarc.virginia.gov/landing-2024-data-centers-in-virginia.asp>

²¹ North American Electric Reliability Corporation. 2025 Long-Term Reliability Assessment. January 2026. https://www.nerc.com/globalassets/our-work/assessments/nerc_ltra_2025.pdf

²² Engel, Alex, et al. "The Billion-Dollar Costs of Forecasting Electricity Demand." Rocky Mountain Institute, 2025. <https://rmi.org/billion-dollar-costs-forecasting-electricity-demand/>

grid during peak demand. Time-intensive and costly infrastructure upgrades for new interconnections are often triggered when a large load is assumed to require firm service and operate at **100 percent** draw, including during system-wide peaks. A modest **0.5 percent** annual load curtailment rate could accommodate **100 GW** of new load without expanding generation, or roughly the equivalent of **1,000 hyperscale facilities**.²³ Introducing flexibility would allow utilities to expedite interconnection requests, and thereby support developers in planning with certainty and speed.



Reports indicate that shifting data center workloads over hours of the year across regions could save billions of dollars in capital investments. Estimated savings for the electricity system, in terms of avoided capital and operating and fuel costs, range from **\$40 billion to \$150 billion** over the next decade.²⁴ Flexible operations could also offer lower electricity prices for data centers and retail customers. Data centers that implement flexible operations could experience average electricity prices that are **\$2.5/MWh and \$8.0/MWh lower**, and retail prices could decrease by approximately **0.5 to 2.8 percent**, given that data center flexibility reduces stress to the grid during highest-cost peak hours and lowers capital expenditures.

Google is piloting carbon-intelligent computing platforms that can shift delay-tolerant tasks to data centers in other regions in response to forecasted grid stress or high abundance of renewable energy.²⁵ By coordinating with utilities to conduct adequate planning and utilize available data, facilities can adopt similar strategies to ensure that shifted workloads do not impact local grid reliability.

²³ Engel et al., "Fast, Flexible Solutions for Data Centers," Rocky Mountain Institute (2025).

²⁴ Ross, M. T., and J. Ewing. 2026. Data Centers and Generation Capacity over the Next Decade: Potential Benefits of Flexibility. NI 26-04. Durham, NC: Nicholas Institute for Energy, Environment & Sustainability, Duke University. <https://nicholasinstitute.duke.edu/publications/data-centers-and-generation-capacity-over-next-decade>

²⁵ Google. "Using Demand Response to Reduce Data Center Power Consumption." Google Cloud Blog, 2024. <https://cloud.google.com/blog/products/infrastructure/using-demand-response-to-reduce-data-center-power-consumption>

The challenge facing policymakers is not whether electricity demand will grow, but how to ensure that growth occurs in a manner that maintains reliability and affordability for all customers. Data

centers are becoming increasingly important components of the modern economy, and their electricity needs will continue to expand alongside advances in artificial intelligence, cloud computing, and digital services. Continued investment in generation, transmission, and grid modernization will therefore be essential.²⁶ At the same

time, developers that proactively engage utilities, support infrastructure planning, and pursue innovative approaches to power supply may be better positioned to demonstrate that data center growth and electric reliability can advance together while supporting broader community needs. If utilities, regulators, and data centers coordinate to balance industry innovation with ratepayer affordability, data center operators could serve as capital-rich partners that can finance infrastructure upgrades that will benefit consumers and industry alike.



²⁶ Vegas, Pablo. "CEO Update." ERCOT Board of Directors Meeting, April 21, 2026. <https://www.ercot.com/files/docs/2026/04/15/12-CEO-Update.pdf>

Air Emissions and Backup Generation: Balancing Reliability and Environmental Performance

Reliable backup power systems are an essential component of modern data center operations. Even brief interruptions in electricity service can disrupt cloud computing, financial transactions, communications systems, and other digital services that increasingly underpin the modern economy. As a result, many data centers maintain large fleets of diesel or natural gas generators capable of providing emergency power during outages, maintenance activities, and system testing.²⁷

As facilities have increased in size, communities have raised questions regarding the cumulative air emissions associated with large concentrations of backup generation equipment. At hyperscale facilities, it is common for operators to maintain **50 to 150** backup diesel generators, which can collectively represent a substantial source of emissions. While individual units may

operate infrequently, residents and local officials have increasingly sought greater transparency regarding how these systems are permitted, how often they operate, and how emissions are evaluated when multiple sources are located in close proximity.²⁸

One major question facing data centers seeking Clean Air Act permits is whether multiple gas turbines or diesel generators located at geographically adjacent facilities constitute a single source of emissions. Under the New Source Review (NSR) permitting program, once a source of a regulated pollutant exceeds applicable emissions thresholds, the facility may be designated a major source and become subject to more comprehensive permitting requirements under programs such as Prevention of Significant Deterioration (PSD) and Title V.²⁹ Regulators have traditionally considered common ownership,

²⁷ U.S. Environmental Protection Agency. "Clean Air Act Resources for Data Centers." January 2026. <https://www.epa.gov/stationary-sources-air-pollution/clean-air-act-resources-data-centers>

²⁸ World Resources Institute. "From Energy Use to Air Quality, the Many Ways Data Centers Affect US Communities." 2025. <https://www.wri.org/insights/us-data-center-growth-impacts>

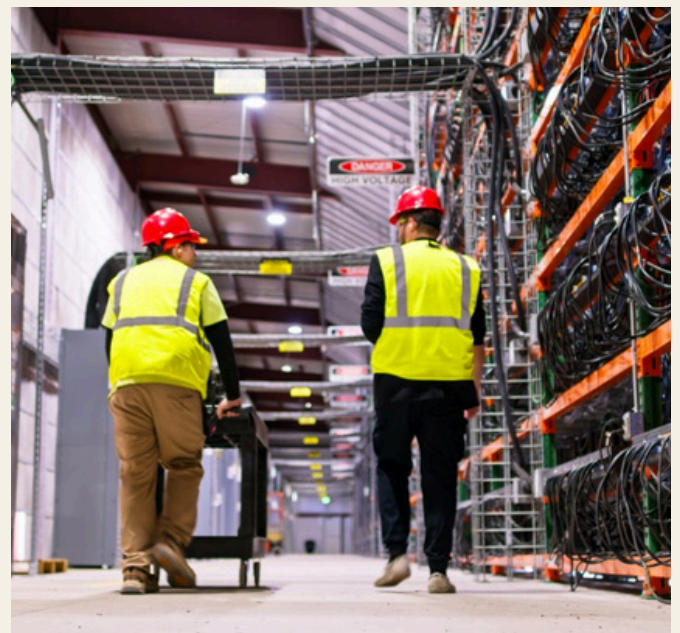
²⁹ U.S. Environmental Protection Agency, "Clean Air Act Resources for Data Centers" January 2026.

geographic proximity, and operational relationships when evaluating whether multiple emissions sources should be aggregated for permitting purposes.³⁰

In the data center context, source aggregation becomes particularly important when power generation equipment and the facilities they serve are located on separate but adjacent sites. Aggregating multiple emissions sources increases the likelihood that those sources may collectively be considered a major source for permitting purposes. While these determinations are highly fact-specific, questions regarding source aggregation have become increasingly relevant as data center campuses continue to grow in scale.³¹

A related issue involves so-called "synthetic minor" permits. A synthetic minor source is a facility that has the potential to emit pollutants at or above major source thresholds but voluntarily accepts legally enforceable permit restrictions to keep emissions below those levels.³² These arrangements can provide flexibility while allowing projects to move forward under less burdensome

permitting frameworks. However, communities may become skeptical when large facilities operate under permitting structures that appear inconsistent with the scale of development being proposed. **Facilities seeking to maintain public trust should ensure that emissions limitations are transparent, enforceable, and consistent with actual operating practices.** While synthetic minor permits are an established and lawful component of the Clean Air Act permitting framework, public confidence may be strengthened when operators clearly communicate how emissions limits are established, monitored, and enforced.



³⁰ Jackson Walker LLP. "EPA Launches Clean Air Act Resource Hub for Data Centers." January 9, 2026. <https://www.jw.com/news/insights-epa-cleanairact-resource-hub/>

³¹ Gibson, Dunn & Crutcher LLP. "EPA Launches Clean Air Act Resource for Data Centers." December 24, 2025. <https://www.gibsondunn.com/epa-launches-clean-air-act-resource-for-data-centers/>

³² Ibid

★ Case Study: Public Scrutiny of Backup Power Infrastructure

Public attention has increasingly focused on the supporting infrastructure required to power large data center facilities rather than on the buildings themselves. In several rapidly growing markets, debates surrounding backup generators, onsite generation resources, and temporary power systems have highlighted the importance of transparency regarding expected operating schedules, emissions profiles, and long-term infrastructure plans. These discussions illustrate how community concerns often extend beyond the data center itself and encompass the broader systems needed to support reliable operations.³³

Recent proposals involving truck-mounted turbines, reciprocating engine generators, and temporary onsite generation resources have further elevated public interest in how these systems are classified and regulated. While these approaches may provide flexibility and accelerate deployment timelines, they also demonstrate the importance of clear communication regarding emissions impacts and operational expectations.



³³ Turner Lee, Nicol, and Darrell West. "Why Community Benefit Agreements Are Necessary for Data Centers." Brookings Institution, January 29, 2026. <https://www.brookings.edu/articles/why-community-benefit-agreements-are-necessary-for-data-centers/>

Different regulatory requirements may apply to backup generators depending upon engine size, age, and intended use.

The Environmental Protection Agency regulates emissions from non-road diesel engines through a series of increasingly stringent standards commonly referred to as Tier 1 through Tier 4 requirements.³⁴ Tier 4 standards represent the most stringent emissions controls currently available and can significantly reduce emissions of particulate matter, nitrogen oxides, and other pollutants relative to earlier engine generations.³⁵

Importantly, Tier 4 emissions standards do not statutorily apply to many generators used exclusively for emergency purposes. As a result, numerous backup generators currently deployed at data center facilities do not meet Tier 4 standards despite serving critical reliability functions.³⁶

Industry experience indicates that Tier 4 generators can carry price premiums of approximately **40 to 50 percent** relative to comparable Tier 3 equipment due to the sophisticated emissions-control systems they require, including diesel

particulate filters and selective catalytic reduction technologies.³⁷ Tier 4 engines also require additional maintenance, specialized service, and diesel exhaust fluid, contributing to higher operating costs over time. However, while acquisition and maintenance costs are higher, Tier 4 systems are widely recognized as best-in-class for reducing emissions and protecting public health.³⁸

For operators seeking to strengthen relationships with host communities, voluntary adoption of higher-performing technologies may provide an opportunity to demonstrate environmental leadership that extends beyond minimum regulatory requirements. Throughout this paper, a recurring theme has emerged: legal compliance and public confidence are not always synonymous. Facilities may meet all applicable regulatory requirements while still facing questions regarding environmental performance and community impacts. In these situations, voluntary adoption of cleaner technologies can help demonstrate a commitment to responsible development while addressing concerns that may otherwise contribute to public opposition.

³⁴ U.S. Environmental Protection Agency. "Final Rule for Control of Emissions of Air Pollution From Nonroad Diesel Engines and Fuel." June 29, 2004. <https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-control-emissions-air-pollution-nonroad>

³⁵ Manufacturers of Emission Controls Association. "U.S. EPA Clean Air Nonroad Diesel Rule." <https://www.meca.org/regulation/us-epa-clean-air-nonroad-diesel-rule/>

³⁶ Kirkland & Ellis LLP. "New EPA Guidance Clarifies When Data Centers and Other Operators May Utilize Emergency Backup Generators to Support

³⁷ Local Power Supply." May 12, 2025. <https://www.kirkland.com/publications/kirkland-alert/2025/05/new-epa-guidance-clarifies-when-data-centers-and-other-operators-may-utilize-emergency-backup>

³⁸ Power Generation Enterprises, "EPA Tier 3 vs. Tier 4 Final: Generator Emissions Guide 2026" (April 2026).

U.S. Environmental Protection Agency, "Final Rule for Control of Emissions of Air Pollution From Nonroad Diesel Engines and Fuel" (June 2004).

★ Case Study: Emerging Alternatives to Conventional Backup Generation

As developers seek to increase reliability while reducing environmental impacts, a growing number of facilities are exploring alternatives to conventional diesel backup generation. Fuel cells, which generate electricity through electrochemical reactions involving gases and oxygen, provide reliable and efficient energy while producing water as a byproduct. Because fuel cells can operate continuously and independently of weather conditions, many developers view them as an attractive complement to traditional backup generation resources.³⁹

Geothermal energy has also attracted growing interest as a low-emission source of reliable baseload power. Generated by tapping into the Earth's internal heat through deep wells, geothermal energy can provide continuous electricity regardless of weather conditions. Although geothermal development can involve significant upfront costs and geographic limitations, technology companies have increasingly explored partnerships aimed at evaluating its potential for future data center applications. Meta has partnered with Sage Geosystems on a **150-megawatt** geothermal project in Texas, while Google has collaborated with Fervo Energy on geothermal development efforts in Nevada.⁴⁰



Source: Google | Google's partnership with clean energy startup Fervo on a new geothermal project in Nevada.

³⁹ Roundy, "Hydrogen Fuel Cells Advantages, Disadvantages in Data Centers," TechTarget (October 2024).

⁴⁰ Robson, Seth, "Google Secures Approval for Geothermal to Power Data Centers," Engineering News-Record (May 2025).

Many operators are likewise evaluating small modular reactors (SMRs) as a potential long-term solution for providing reliable, carbon-free electricity. Unlike traditional nuclear facilities, SMRs are designed for factory production and modular assembly, potentially reducing construction timelines while providing continuous power with a relatively small physical footprint. Although the technology remains under development, it is increasingly discussed as a future component of data center energy strategies.⁴¹

The future of data center development will require balancing reliability, affordability, and environmental performance. Backup generation systems will remain an important component of facility operations for the foreseeable future. At the same time, continued improvements in emissions-control technologies, fuel cells, geothermal energy, advanced nuclear technologies, energy storage systems, and other emerging resources provide opportunities to reduce environmental impacts while maintaining the reliability that modern digital infrastructure requires. As communities and developers navigate these challenges together, transparency, accountability, and voluntary adoption of best practices may play an increasingly important role in sustaining public trust and supporting continued growth.

⁴¹ International Energy Agency, "Data Centre Electricity Use Surged in 2025" (April 2026).

Responsible Siting and Land Use: Reducing Environmental Conflict and Community Friction

Data centers have historically attracted less public attention than many forms of industrial development due to their relatively small workforce, limited visible emissions, and often low profile within surrounding communities. That dynamic has shifted as facilities have grown in size, power demand, and physical footprint. **Modern campuses may occupy hundreds of acres, require supporting substations and transmission infrastructure, alter local road networks, and introduce associated systems such as cooling infrastructure, water management, and backup generation equipment.**^{42,43}

As development expands, communities are increasingly evaluating data centers through a land use lens rather than solely as economic development projects. Local governments and planning agencies have increasingly examined how rapid

development affects zoning, infrastructure capacity, and long-term growth planning.⁴⁴ Concerns frequently include conversion of agricultural land or open space, proximity to residential neighborhoods, impacts to wildlife habitat, visual changes to the landscape, and pressure on local infrastructure.⁴⁵ In some areas, opposition has also emerged around cumulative impacts where multiple facilities are proposed within the same region rather than concerns associated with a single project.

Many of the most contentious siting debates have not emerged because communities oppose data centers outright, but because residents and local governments perceive a mismatch between project scale and local planning expectations.⁴⁶ Projects proposed near existing neighborhoods, environmentally sensitive areas, or landscapes valued for

⁴² DOE, DOE Releases New Report Evaluating Increase in Electricity Demand from Data Centers.

⁴³ World Resources Institute, "From Energy Use to Air Quality, the Many Ways Data Centers Affect US Communities" (2025).

⁴⁴ National Association of Counties, Counties Try to Keep Data Center Development in Bounds, National Association of Counties, 2025. <https://www.naco.org/news/counties-try-keep-data-center-development-bounds>

⁴⁵ U.S. Environmental Protection Agency, Reuse Considerations for Data Centers on Brownfield Sites, U.S. Environmental Protection Agency, January 28, 2026. <https://www.epa.gov/brownfields/reuse-considerations-data-centers-brownfield-sites>

⁴⁶ Times Union, "Data Center Proposal Sparks Backlash in East Fishkill," May 26, 2026.

<https://www.timesunion.com/hudsonvalley/news/article/east-fishkill-data-center-plan-sparks-backlash-22270553.php>

recreation and open space have often generated greater scrutiny. Similar concerns have emerged where development advanced more quickly

than local comprehensive plans anticipated or where supporting infrastructure substantially expanded the visible footprint of projects.



★ **Case Study: Managing Growth in Established Data Center Corridors**

Rapid clustering of data centers in Northern Virginia helped establish the region as one of the largest data center markets in the world, but it also introduced new questions regarding cumulative development, transmission infrastructure, visual impacts, and land use compatibility. Local governments have increasingly revisited siting standards, setback requirements, and development expectations as project density expanded. Similar conversations have emerged elsewhere as localities attempt to balance economic opportunity with long-term planning objectives.⁴⁷

These challenges do not necessarily indicate that data centers are incompatible with surrounding communities. Rather, they suggest that location, design, and engagement practices increasingly influence public acceptance.

A growing number of developers have already adopted practices intended to reduce these conflicts. Preference for previously disturbed lands, industrial corridors, brownfields, and locations with existing infrastructure may reduce pressure on undeveloped areas while improving access to roads, substations, transmission, and utility connections.

In some cases, redevelopment of industrial properties may also accelerate project timelines by leveraging infrastructure that already exists.⁴⁸

Landscape buffers, setbacks, screening vegetation, berms, and architectural standards have likewise emerged as tools to improve compatibility between facilities and neighboring land uses. Habitat avoidance measures, floodplain considerations, wetland reviews, and biodiversity planning are increasingly being incorporated during earlier stages of project development in order to identify conflicts before designs are finalized.⁴⁹

⁴⁷ Loudoun County, Virginia, *Data Center Capital of the World: History of Data Center Growth and Land Use Management*, Loudoun County Department of Planning and Zoning, July 1, 2024. <https://www.loudoun.gov/ArchiveCenter/ViewFile/Item/13979>

⁴⁸ Federation of American Scientists, *Adaptive Reuse of Legacy Coal Infrastructure to Support Data Centers*, Federation of American Scientists, June 23, 2025. <https://fas.org/publication/adaptive-reuse-legacy-coal-infrastructure/>

⁴⁹ U.S. Fish and Wildlife Service, *Information for Planning and Consultation (IPaC): Project Planning for Sensitive Habitats, Wetlands, and Species Review*, U.S. Department of the Interior. <https://ipac.ecosphere.fws.gov/>

★ **Case Study: Reuse of Previously Disturbed Lands**

Redevelopment of industrial and brownfield properties provides one example of how siting decisions may reduce conflict without slowing deployment. The U.S. Environmental Protection Agency highlights the reuse of former industrial sites for data center development, including projects that converted previously disturbed manufacturing properties into operational facilities. These approaches reduced pressure on undeveloped land while taking advantage of existing infrastructure and supporting local redevelopment goals.⁵⁰

Additional proposals have explored reuse of retired industrial and energy assets, including legacy coal infrastructure, where existing transmission access, transportation networks, and utility connections may reduce the need for entirely new greenfield development. While project circumstances vary, these examples suggest that environmental considerations and development efficiency are not necessarily competing objectives.⁵¹

Emerging practices across the industry suggest that responsible siting and efficient development can reinforce one another. Early engagement with local governments, preference for previously disturbed lands where practicable, stronger compatibility measures near residential areas, and earlier

consideration of habitat and land use impacts may reduce conflict while improving project certainty. As opposition and calls for moratoria continue to expand, these approaches may help maintain community support and preserve flexibility for future development.

⁵⁰ EPA, *Reuse Considerations for Data Centers on Brownfield Sites*.
⁵¹ Pacific Northwest National Laboratory, *Redeveloping Coal Power Plants: Data Centers*, Pacific Northwest National Laboratory, September 2024.
<https://www.pnnl.gov/sites/default/files/media/file/PNNL-SA-201505-CoaltoDataCenter.pdf>

Community Impacts and Shared Benefits: Strengthening Community Relationships

Communities once largely viewed data centers as low-conflict economic development projects that promised construction jobs, expanded tax bases, infrastructure investment, and the opportunity to attract technology-driven growth. Only a few years ago, states and local governments actively competed to attract new data center development, promoting projects as engines of economic investment and long-term competitiveness.⁵²

In recent years, however, public sentiment surrounding data center development has shifted significantly as projects increased in scale and communities became more aware of associated electricity demand, infrastructure expansion, environmental impacts, and quality-of-life concerns.

A May 2026 Gallup survey found that roughly 70 percent of Americans oppose construction of an AI data center in their local area, including nearly half who said they were strongly opposed.⁵³

While data centers continue to generate substantial tax revenue and construction-related economic activity in many regions, communities have increasingly questioned whether the long-term local benefits associated with projects align with the scale of development and supporting infrastructure required to sustain them. In some areas, public concerns have centered on the perception that environmental impacts, infrastructure burdens, and construction disruptions are concentrated locally while economic benefits are dispersed more broadly.⁵⁴ Questions regarding road expansion, substations, transmission infrastructure, noise, visual impacts, and utility demand have therefore become increasingly important components of local debates surrounding project approval and long-term growth planning.

⁵² Governor Ned Lamont, “Governor Lamont Applauds House Approval of Legislation Promoting Development of Data Centers,” State of Connecticut, February 2021. https://portal.ct.gov/governor/news/press-releases/2021/02-2021/governor-lamont-applauds-house-approval-of-legislation-promoting-development-of-data-centers?language=en_US

⁵³ Gallup, “Americans Oppose AI Data Centers in Their Area,” May 13, 2026. <https://news.gallup.com/poll/709772/americans-oppose-data-centers-area.aspx>

⁵⁴ Brookings Institution, *The Local Implications of Data Centers for Rural Communities in the U.S.*, March 2, 2026. <https://www.brookings.edu/articles/local-implications-data-centers-rural-communities-us/>

In many communities, the issue has not been that expected economic benefits disappeared, but that project scale, supporting infrastructure, and operational demands became more visible as development accelerated. As projects expanded in size and clustered

within specific regions, local governments and residents increasingly sought greater transparency regarding long-term infrastructure needs, environmental impacts, construction timelines, and the cumulative effects associated with continued growth.

★ Case Study: Changing Community Expectations in Small-Town America

In Festus, Missouri, local opposition emerged around a proposed AI data center despite the promise of significant investment and economic activity. Residents raised concerns regarding electricity demand, environmental impacts, transparency, and long-term community effects, while local debates increasingly focused on how large-scale digital infrastructure might alter the character and development trajectory of the surrounding area. The dispute illustrates how public conversations surrounding data center development increasingly extend beyond traditional economic development arguments and now include broader questions regarding infrastructure compatibility, environmental stewardship, and community identity.⁵⁵



⁵⁵ The Wall Street Journal, "The Small Midwest Community Leading America's Crusade Against Data Centers," 2026. <https://www.wsj.com/us-news/the-small-midwest-community-leading-americas-crusade-against-data-centers-92621c55>

Public acceptance of future data center development may therefore depend not only on the scale of economic investment associated with projects, but also on whether communities view developers as transparent, collaborative, and responsive to local priorities. A growing number of companies have already begun adopting practices intended to strengthen community relationships and improve public trust during both the planning and operational phases of development.

Early engagement with local governments and residents has increasingly emerged as one of the most important factors influencing project acceptance. In many cases, conflict has intensified where communities believed that major project decisions had already been finalized before meaningful public input occurred. By contrast, developers that engage local stakeholders earlier in the planning process are better positioned to identify community concerns, incorporate mitigation measures, and build stronger long-term relationships before projects advance into formal permitting stages.

★ Case Study: Community Partnerships and Workforce Investment

Several major technology companies have expanded workforce development, educational partnerships, and local investment initiatives in regions hosting large-scale data center development. Google has partnered with local educational institutions and workforce training programs in multiple states to support technical training and long-term workforce development associated with digital infrastructure and advanced computing industries.⁵⁶ Microsoft has likewise announced community investment initiatives tied to sustainability programs, broadband access, and local nonprofit partnerships in communities hosting major facilities.⁵⁷ Amazon Web Services has also developed community engagement programs focused on infrastructure improvements, educational partnerships, and local workforce development in regions supporting major data center operations.⁵⁸

In addition to direct economic investment, communities have increasingly emphasized the importance of transparency regarding construction timelines, infrastructure expansion, environmental performance, and operational impacts. Public reporting, regular community engagement, and clear communication regarding project expectations may help reduce uncertainty and improve long-term public confidence as projects expand in scale.

Sustainable construction and site integration practices may also play an

important role in improving community relationships. Landscaping, visual screening, traffic mitigation, construction management planning, and compatibility measures near residential areas can influence how communities experience projects over time. While no single approach will eliminate conflict entirely, emerging practices across portions of the industry suggest that stronger engagement, earlier planning, and more visible local investment may help maintain public support while allowing continued deployment of critical digital infrastructure.

⁵⁶ Google, “4 Ways Google Data Centers Benefit Our Communities,” June 11, 2025. <https://blog.google/innovation-and-ai/infrastructure-and-cloud/global-network/google-data-centers-grow-advance-communities/>

⁵⁷ Microsoft, “Microsoft’s Datacenter Community Pledge: To Build and Operate Digital Infrastructure That Addresses Societal Challenges and Creates Benefits for Communities,” June 2, 2024. <https://blogs.microsoft.com/blog/2024/06/02/microsofts-datacenter-community-pledge-to-build-and-operate-digital-infrastructure-that-addresses-societal-challenges-and-creates-benefits-for-communities/>

⁵⁸ Amazon Web Services, “AWS Plans to Invest \$11 Billion in Indiana, the Largest Capital Investment in the State’s History,” April 25, 2024. <https://www.aboutamazon.com/news/aws/aws-indiana-investment-11-billion>

Water Stewardship and Resource Management: Balancing Cooling Needs and Community Resources

Water use has become one of the most frequently discussed environmental issues associated with data center development. As facilities increase in size and computing intensity, cooling systems play a critical role in maintaining reliable operations and preventing equipment failure. Because hyperscale facilities may house thousands of servers operating continuously, effective cooling infrastructure is essential. At the same time, communities have increasingly raised questions regarding how much water data centers use, where that water comes from, and whether growing demand may place additional pressure on local water resources.⁵⁹

The answer depends largely on the cooling technology employed and the geographic conditions in which a facility operates. Data center developers utilize several different cooling methodologies, each with a distinct water-use profile. Depending upon climate, facility design, and cooling technology, water

consumption can range from virtually zero to millions of gallons per year.⁶⁰

Air-cooling methodologies are commonly used in water-scarce regions and cooler climates and generally consume little to no water. These facilities rely upon mechanical chillers, heat exchangers, air conditioning systems, and chilled air circulation to remove heat from servers. While air cooling minimizes water use, it often requires greater electricity consumption to power compressors, fans, and cooling equipment.⁶¹

Many larger data centers instead rely upon evaporative cooling, sometimes referred to as open-loop cooling systems. In these systems, warm water absorbs heat from servers and is cooled through evaporation in cooling towers or evaporative chillers. Evaporative cooling is highly energy-efficient because evaporation naturally removes heat

⁵⁹ Privette, et al. "Data Centers Water Footprint: The Need for More Transparency." AGU Advances, February 27, 2026.

<https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2025AV002140>

⁶⁰ MOST Policy Initiative. "Data Center Water Use." April 8, 2026. <https://mostpolicyinitiative.org/science-note/data-center-water-use/>

⁶¹ Levy, Steven. "The Real Story on AI Water Usage at Data Centers." IEEE Spectrum, September 10, 2025. <https://spectrum.ieee.org/ai-water-usage>

while reducing electricity consumption associated with mechanical cooling equipment. However, these systems also require substantial water use and often rely on municipal water supplies.⁶²

Closed-loop cooling systems offer an alternative approach. In these systems, water circulates through sealed pipes or coils without direct exposure to air. Because water is not continuously evaporated, losses are significantly reduced and the same water can be reused repeatedly. Closed-loop systems can reduce freshwater consumption substantially relative to traditional evaporative cooling systems, although they generally involve higher costs and greater engineering complexity.⁶³ Oracle has committed to deploying a variety of cooling methods at hyperscale data

centers, including closed-loop cooling, that do not rely on continuous consumption of potable water.⁶⁴

Direct-to-chip liquid cooling and immersion cooling represent newer approaches that are becoming increasingly common in artificial intelligence and high-performance computing facilities. Direct liquid cooling delivers coolant directly to server components, while immersion cooling submerges servers in non-conductive fluids that efficiently absorb and transfer heat. Both approaches can reduce overall water requirements by targeting heat more directly and reducing dependence on traditional air-conditioning systems. As computing density increases, these technologies are expected to play a growing role in future facility designs.⁶⁵



⁶² MOST Policy Initiative, "Data Center Water Use" (April 2026).

⁶³ Privette et al., "Data Centers Water Footprint" (February 2026).

⁶⁴ Grizzel, Travis. "Closed-Loop Cooling in Oracle AI Data Centers." Oracle News, February 9, 2026.

<https://www.oracle.com/news/announcement/blog/closed-loop-cooling-in-oracle-ai-data-centers-2026-02-09/>

⁶⁵ Levy, "The Real Story on AI Water Usage at Data Centers," IEEE Spectrum (September 2025).

★ Case Study: The Water–Energy Tradeoff

The diversity of cooling technologies highlights an important reality: reducing water consumption often requires greater energy consumption, while reducing energy use can require additional water. Industry estimates suggest that approximately **75 to 90 percent** of data centers worldwide rely on water-based cooling as their primary cooling method, and many of those facilities utilize evaporative cooling systems because of their energy efficiency advantages.⁶⁶

As a result, developers frequently face tradeoffs when selecting cooling technologies. A facility located in a cooler climate may operate with little to no water consumption, while a large evaporatively cooled facility located in a hotter climate may require millions of gallons of water annually. These differences illustrate why broad generalizations regarding data center water use often fail to capture the significant variation that exists across facilities and geographic regions.⁶⁷

While national water consumption associated with data centers remains relatively small compared to sectors such as agriculture and power generation, local impacts can be much more significant. Data centers in the United States were estimated to consume approximately **449 million gallons** of water per day in 2021, representing less than **one percent** of total daily water withdrawals nationally.⁶⁸ However, water

use associated with data centers is often concentrated within specific regions, making local impacts more visible and more relevant to surrounding communities. Approximately **40 percent** of U.S. data centers are located in areas experiencing high or extreme water stress, increasing the importance of careful resource planning and water stewardship.⁶⁹

⁶⁶ Ascierio, Rhonda. "Water Is Local: Generalities Do Not Apply." Uptime Institute Blog, May 28, 2025. <https://journal.uptimeinstitute.com/water-is-local-generalities-do-not-apply/>

⁶⁷ Kane, Joseph. "AI, Data Centers, and Water." Brookings Institution, November 20, 2025. <https://www.brookings.edu/articles/ai-data-centers-and-water/>

⁶⁸ Environmental and Energy Study Institute. "Data Centers and Water Consumption." <https://www.eesi.org/articles/view/data-centers-and-water-consumption>

⁶⁹ Thompson, Dan, et al. "Data Center Sustainability Faces Challenges Amid Growth." S&P Global, 2025. <https://www.spglobal.com/en/research-insights/special-reports/look-forward/data-center-frontiers/data-center-sustainability-faces-challenges-amid-growth>

Communities have increasingly focused on where cooling water originates and whether facilities rely on potable drinking water supplies. Available research indicates that a majority of data center water use continues to come from

municipal water systems and groundwater resources. In some regions, rapid growth has prompted questions regarding long-term water availability, infrastructure planning, and competing community needs.⁷⁰

★ Case Study: Expanding the Use of Recycled Water

A growing number of technology companies have begun exploring alternatives to potable water supplies. Google reports that more than one-quarter of its data center campuses utilize reclaimed or non-potable water resources, including a facility in Douglas County, Georgia, that operates entirely on recycled municipal wastewater.⁷¹ Amazon has similarly announced plans to expand the use of reclaimed water across portions of its data center portfolio by 2030.⁷²

These projects demonstrate how water stewardship can be incorporated into facility design without compromising operational performance. While reclaimed water systems require additional infrastructure, coordination with local utilities, and site-specific planning, they offer one pathway for reducing pressure on potable water resources while supporting continued growth.

⁷⁰ Privette et al., "Data Centers Water Footprint" (February 2026).

⁷¹ Hölzle, Urs. "Our Commitment to Climate-Conscious Data Center Cooling." Google Blog, September 2022. <https://blog.google/outreach-initiatives/sustainability/our-commitment-to-climate-conscious-data-center-cooling/>

⁷² "Reclaimed Wastewater to Be Used at 20 AWS Locations." Data Centre Magazine, November 2023. <https://datacentremagazine.com/articles/reclaimed-wastewater-to-be-used-at-20-aws-locations>

★ Case Study: Water Infrastructure Co-Investment and Community Capacity

The water stewardship conversation surrounding data center development has largely focused on how much water facilities consume and whether that consumption strains local resources. ***A parallel challenge has received far less attention: many of the small and rural communities now being targeted for data center development lack the water and wastewater infrastructure necessary to support large-scale industrial development and often lack the financial capacity to build it on their own.***

Across rural America, aging water distribution systems, undersized treatment plants, and failing wastewater infrastructure are facts of daily life for millions of residents. The EPA estimates that the nation faces a funding gap of more than **\$1 trillion** over the next two decades to maintain and expand drinking water and wastewater systems to meet current and projected needs. Low-income rural communities, precisely those most likely to welcome large capital investments like data centers, are often disproportionately unable to close that gap through local revenues or traditional financing. Many are already struggling to meet Safe Drinking Water Act and Clean Water Act requirements.

When a hyperscale data center proposes to locate in one of these communities, it arrives with water and wastewater demands that existing systems may not be able to accommodate. The result can present difficult choices for local governments: pursue expensive and often debt-financed infrastructure expansion to attract investment whose long-term commitment to the community may be uncertain, or forego economic opportunities that might otherwise transform the local economy.

There is another path. Data center developers have both the financial capacity and the long-term operational interest to co-invest in the water and wastewater infrastructure their facilities require. When cooling needs or wastewater volumes necessitate system upgrades, shared infrastructure investment can help ensure that developer capital funds capacity that serves both the facility and the surrounding community, transforming a potential burden into a durable community benefit.

This approach is not without precedent. In other sectors, large industrial users have partnered with municipalities to fund treatment plant expansions, pipeline extensions, and water storage improvements as a condition of development. Some data center developers have already begun exploring similar arrangements. Microsoft's Datacenter Community Pledge includes commitments to support local infrastructure and community priorities, reflecting a broader recognition that responsible development extends beyond the boundaries of the facility itself.

The benefits extend beyond simply expanding infrastructure. ***Data centers can become long-term anchor customers for public water systems, providing demand stability that may strengthen the financial position of rural utilities and improve their ability to access future financing.*** As development expands into smaller communities, infrastructure co-investment represents an opportunity to align economic growth with lasting improvements to public water and wastewater systems.

As data center development continues to expand, water management will remain an important consideration for developers, utilities, and local communities. No single cooling technology is appropriate in every circumstance, and the most effective solutions will often depend on local climate conditions, water availability, energy costs, and facility requirements. However, emerging technologies, recycled water systems, improved

cooling efficiency, and thoughtful resource planning provide opportunities to reduce impacts while maintaining reliable operations. Facilities that prioritize transparency, evaluate local water conditions early in the planning process, and pursue responsible water stewardship practices may be better positioned to maintain public confidence and support long-term community relationships.

Operational Transparency and Accountability: Building Trust Through Information and Engagement

As data center development has accelerated, transparency has emerged as one of the most frequently cited concerns among local communities, policymakers, and stakeholders. While many discussions surrounding data centers focus on electricity demand, water use, land conversion, or air emissions, public concern is often amplified when information about these impacts is difficult to access or understand. In many cases, opposition to projects is driven not only by the potential impacts themselves, but by uncertainty regarding how those impacts will be managed, monitored, and communicated over time.⁷³

Data centers are often highly technical facilities, and many aspects of their operations can be difficult for local residents to evaluate. Questions regarding electricity consumption, water use, backup power generation, noise levels, construction impacts, and future expansion plans can create uncertainty

when information is limited or inconsistent. As a result, communities increasingly expect greater transparency regarding both the anticipated impacts of proposed facilities and the performance of projects once they become operational.

Greater transparency can benefit both developers and host communities. Early engagement and clear communication may help address misconceptions, identify potential concerns before they escalate, and strengthen relationships between developers, local governments, and residents. Transparency can also provide communities with greater confidence that developers are taking environmental stewardship and community commitments seriously. While transparency alone will not eliminate disagreements, it can help create a foundation for more productive conversations and informed decision-making.

⁷³ Maurer, Mark. "Community Opposition Emerges as New Gatekeeper for AI Data Center Expansion." Data Center Frontier, 2026.
<https://www.datacenterfrontier.com/site-selection/article/55359925/community-opposition-emerges-as-new-gatekeeper-for-ai-data-center-expansion>

★ Case Study: Community Engagement and Public Information in Northern Virginia

Northern Virginia has become one of the world's largest concentrations of data center infrastructure, bringing significant economic investment while also generating increased public scrutiny regarding energy demand, land use, noise, and community impacts.⁷⁴ As development accelerated, local governments, residents, and developers found themselves navigating increasingly complex discussions regarding future growth and infrastructure planning.

In response, many local jurisdictions expanded public engagement efforts through community meetings, planning commission hearings, publicly available project materials, and long-term planning processes designed to improve transparency surrounding proposed developments.⁷⁵ While debates regarding future growth continue, these efforts illustrate how greater access to information can help communities better understand the tradeoffs associated with large-scale infrastructure projects and participate more effectively in local decision-making.

Several developers have also begun adopting voluntary reporting and disclosure practices that extend beyond regulatory requirements. These efforts may include sustainability reports, environmental performance metrics, water stewardship commitments, greenhouse gas reporting, renewable energy procurement disclosures, and community engagement initiatives. Although reporting approaches vary across companies, these practices can provide stakeholders with greater visibility into how facilities are managed and how environmental commitments are being implemented.

Operational transparency may become increasingly important as data center development expands into new regions with limited experience hosting large-scale digital infrastructure. Communities that have not previously encountered these facilities often seek information regarding anticipated impacts and long-term operating practices. Developers that proactively share information regarding resource use, environmental performance, and community investments may be better positioned to build trust and reduce uncertainty throughout the development process.

⁷⁴ Virginia Joint Legislative Audit and Review Commission, *Data Centers in Virginia* (December 2024).

⁷⁵ Prince William County, Virginia. "Prince William County Launches Interactive Data Center Map to Improve Public Access to Development Information." February 10, 2026. <https://www.pwcva.gov/news/prince-william-county-launches-interactive-data-center-map-improve-public-access-development>

★ Case Study: Voluntary Sustainability Reporting by Major Technology Companies

Several major technology companies have adopted public reporting frameworks that disclose information related to energy use, renewable energy procurement, greenhouse gas emissions, water stewardship, and sustainability goals. Companies such as Microsoft, Google, Amazon, and Meta regularly publish environmental and sustainability reports that provide stakeholders with information regarding operational performance and long-term commitments.⁷⁶

While these reports do not address every concern raised by host communities, they demonstrate how voluntary disclosure can improve transparency and provide a common basis for evaluating environmental performance. As data center development continues to expand, similar approaches may help establish broader expectations regarding operational accountability and community engagement across the industry.

Transparency is ultimately less about reporting metrics than building trust. Communities are more likely to support development when they understand how decisions are made, how impacts will be managed, and how developers intend to fulfill their commitments over time. As data center development expands into new regions and communities, developers may increasingly be asked not only to explain how facilities will operate, but also to demonstrate the economic, environmental, and

community benefits they are expected to provide. Transparent communication regarding these benefits can help build public confidence and strengthen the social license necessary to support continued growth. As the industry continues to grow, transparent communication, meaningful engagement, and voluntary accountability measures should play an increasingly important role in supporting responsible development and maintaining public confidence.

⁷⁶ Microsoft. 2025 Environmental Sustainability Report. May 29, 2025. <https://blogs.microsoft.com/on-the-issues/2025/05/29/environmental-sustainability-report/>

Toward Better Neighbors: Voluntary Practices for Responsible Growth

Throughout this paper, a recurring theme has emerged: many of the concerns surrounding data center development are not rooted in opposition to technology itself, but in questions about how that technology is deployed. Communities have raised legitimate concerns regarding land use, electricity demand, water resources, environmental impacts, and transparency. At the same time, examples from across the country demonstrate that through a collection of best practices, we can simultaneously achieve technological innovation, economic growth, and environmental stewardship.

The examples highlighted throughout this paper suggest that responsible development is less about any single technology or project design and more about a broader commitment to planning, transparency, resource stewardship, and community engagement. While no single framework can eliminate every conflict or address every local concern, the following practices consistently emerge as helping reduce uncertainty, strengthen public confidence, and support long-term project success.

Energy Reliability, Innovation, and Affordability

The future growth of artificial intelligence and advanced computing will require substantial investments in energy infrastructure. Successful projects increasingly recognize that data center development and energy planning must proceed together. Early coordination with utilities, grid operators, and local stakeholders can help align facility growth with available infrastructure while reducing uncertainty regarding reliability and affordability.



Developers are also exploring a growing range of technologies, from energy storage and geothermal energy to fuel cells and advanced nuclear technologies, that may help support future electricity demand while improving system resilience. Efforts to align facility growth with broader grid planning can help ensure that infrastructure investments support both economic development and reliable service for surrounding communities.

Water Stewardship and Resource Management

Water availability varies significantly across regions, watersheds, and climate conditions. Responsible water stewardship begins with understanding local resource constraints and selecting cooling technologies that reflect those realities. Closed-loop cooling systems, direct liquid cooling, recycled water use, and other emerging technologies provide opportunities to reduce freshwater consumption while maintaining reliable operations.

Particularly in water-stressed regions, thoughtful resource planning can help reduce pressure on local supplies while strengthening community confidence. Facilities that evaluate watershed conditions early, coordinate with local utilities, and pursue opportunities to

conserve potable water resources may be better positioned to support both long-term growth and environmental sustainability.

Responsible Siting and Land Use

Project location remains one of the most important factors shaping community acceptance and environmental outcomes. Early consideration of land-use compatibility, environmental constraints, and local planning priorities can help reduce conflict while supporting continued development.

Practices such as redevelopment of previously disturbed lands, reuse of industrial sites, avoidance of sensitive habitats and wetlands where practicable, protection of working lands, and incorporation of landscape buffers and screening measures can help minimize impacts to natural resources while improving compatibility with surrounding communities. In some regions, developers are also exploring opportunities to repurpose underutilized commercial and industrial properties, allowing existing infrastructure and previously developed sites to support new digital infrastructure while reducing pressure on undeveloped land. Thoughtful siting decisions not only reduce project risk but also help preserve the environmental assets and landscapes that communities value.

Community and Economic Benefit

Communities are more likely to support development when local benefits are visible, tangible, and enduring. Meaningful engagement should begin early in the planning process and continue throughout construction and operation. Residents and local governments are often better positioned to support projects when they understand how facilities will operate, how concerns will be addressed, and how local priorities will be incorporated into project planning.

Workforce development initiatives, educational partnerships, infrastructure investments, and support for local economic priorities can help ensure that the benefits of development extend beyond the project boundary. Successful projects increasingly recognize that community engagement is not simply a permitting exercise, but an ongoing commitment to maintaining strong local relationships.

Operational Transparency and Accountability

Transparency and accountability play an important role in building and maintaining public trust. As data center development expands into new regions and communities, stakeholders increasingly seek clear information

regarding facility operations, resource use, environmental performance, and future growth plans. While reporting approaches will vary by company and project, voluntary disclosure of key metrics related to energy use, water stewardship, emissions, and community engagement can help reduce uncertainty and strengthen public confidence. Independent verification, periodic reporting, and ongoing communication with local stakeholders may further demonstrate a commitment to responsible development and long-term accountability.

Stewardship as a Competitive Advantage

The examples highlighted throughout this paper suggest that responsible development and continued growth are often aligned objectives. In many cases, the practices that help reduce environmental impacts, strengthen community relationships, and improve transparency also help reduce project risk, avoid delays, and improve long-term certainty for developers and investors.

As the demand for data centers continues to expand, developers will increasingly be asked to demonstrate not only what they are building, but how they are building it. Projects that prioritize responsible resource management,

community engagement, and long-term planning may be better positioned to earn and maintain the public trust necessary to support continued growth.

Ultimately, the goal is not to slow development, but to ensure that future development occurs in a manner that is compatible with local priorities,

protective of natural resources, responsive to community concerns, and capable of sustaining public confidence over the long term. The projects that successfully balance these objectives will not only be better neighbors — they will also be better positioned to lead the next generation of infrastructure development.



Conclusion: The Future of Responsible Data Center Development

The debate surrounding data center development is often framed as a choice between economic growth and environmental stewardship, technological innovation and community priorities, or infrastructure development and quality of life. The examples examined throughout this paper suggest that these are false choices. Across the country, developers, utilities, local governments, and community stakeholders are already demonstrating that thoughtful planning and responsible development can help balance these objectives while supporting continued investment in critical digital infrastructure.

As demand for artificial intelligence, cloud computing, and advanced digital services continues to expand, communities will increasingly be asked to host the infrastructure that makes these technologies possible. The long-term success of that buildout will depend not only on engineering, capital, and technological innovation, but also on

the ability of developers to earn and maintain public trust. Public support for future growth cannot be assumed. It must be earned through responsible siting, resource stewardship, transparent engagement, environmental accountability, and a demonstrated commitment to being a good neighbor.

The challenge facing the industry is therefore not whether data centers should be built, but how they should be built. Projects that thoughtfully balance innovation, environmental responsibility, infrastructure planning, and community priorities will be better positioned to reduce conflict, strengthen local relationships, and secure the certainty needed to support continued investment.

Ultimately, responsible development is not simply a matter of good corporate citizenship; it may become a prerequisite for sustaining the public confidence necessary to power the next generation of American innovation.

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Building Better Neighbors: Best Practices for Responsible Data Center Development

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