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BEYOND THE CLOUD:
ASSESSING THE IMPACT OF DATA CENTER EXPANSION ON RESOURCES AND COMMUNITIES

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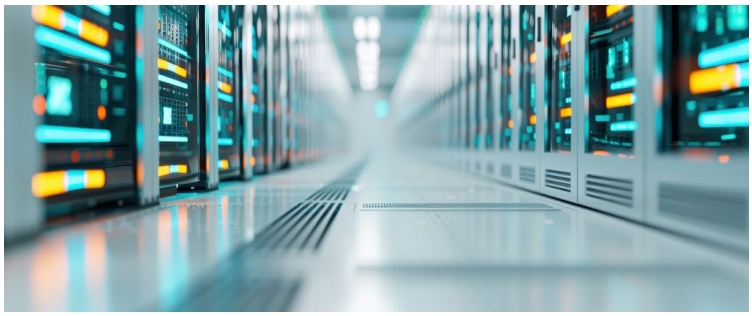

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Data centers, which house the high-speed servers that power our phone and computer activities, currently consume about 4% of U.S. electricity, with the latest projections suggesting that demand could double or triple by 2028. This increase reflects the rapid growth of artificial intelligence and cloud computing services, especially given that technologies like AI model training are significantly more energy-intensive than traditional computing processes.

Data Center Alley in Northern Virginia

Northern Virginia exemplifies the data center expansion trend. With its strategic location, well-developed infrastructure, relatively low electricity costs, and favorable zoning policies, the region has become a global hub for data centers.

Loudoun County, Virginia, often dubbed "Data Center Alley," hosts over 300 data centers and handles an estimated (and stunning) 70% of global internet traffic. While other states are attracting development, they remain far behind Northern Virginia in scale and impact. In fact, it houses 15% of global hyperscale capacity, surpassing other hubs like Beijing, Dublin, and Silicon Valley.

Land Use Challenges

Beyond energy demand, data centers have a significant impact on land use. They require large tracts of land, access to reliable power grids, and robust infrastructure. These facilities, often several hundred thousand square feet big, are located near residential or mixed-use areas, sparking conflicts over zoning, environmental impact, and community aesthetics. This topic was the focus of a recent webinar co-hosted by the Environmental Law Institute (ELI) and Network for Digital Economy and Environment.

Jim McElfish, Senior Advisor for Research and Policy at ELI, noted that local governments increasingly face challenges (and community opposition) when making siting and zoning decisions for data centers. He highlighted some drawbacks of these facilities, including that they generate relatively few jobs despite their substantial physical footprint. Moreover, their large-scale industrial design often conflicts with mixed-use areas, consuming space that could otherwise accommodate transit-oriented developments or community-focused projects.

> "Globally, data centers are projected to consume **450 million gallons of water daily by 2030**, with many concentrated in water-stressed areas."

Community Impacts

The physical presence of data centers also affects communities in other ways. Cooling systems, essential for preventing server overheating, rely heavily on water. Globally, data centers are projected to consume 450 million gallons of water daily by 2030, with many concentrated in water-stressed areas. In Loudoun County, Virginia, data center water usage increased 250% between 2019 and 2023, creating tension between data center water demands and residential and agricultural water needs. Water quality can also be affected.

> "[L]ocal governments frequently overlook ... cumulative environmental impacts when deciding on locations for data centers, which can adversely affect surrounding communities."

Community concerns about data centers focus on the environmental impact of increased emissions from backup generators, often powered by fossil fuels, and the construction of additional power plants to meet escalating energy demands. Tim Cywinski, Sierra Club of Northern Virginia's Director of Communications, stressed during the ELI webinar that local governments frequently overlook these cumulative environmental impacts when deciding on locations for data centers, which can adversely affect surrounding communities.

Local Governments Imposing New Restrictions

Local governments grappling with data center siting are taking steps to address these impacts. Fairfax County, Virginia, for instance, recently passed an ordinance prohibiting new data centers within one mile of metro stations to preserve urban development areas. It also imposed new restrictions on the distance of ground equipment from residential properties, requirements for noise studies, and mandates for architectural enhancements to improve visual appeal.

Chandler, Arizona's data center ordinance outlines strict location and operational protocols for data centers, specifying that they can only be located within Planned Area Development (PAD) zoning districts. It also includes provisions for noise mitigation, public communication requirements, and annual compliance monitoring to minimize community impact.

Repurposing Existing Sites, Federal Lands

Pranava Raparla, a Presidential Innovation Fellow at the U.S. Department of Energy's Office of Policy/Office of Critical & Emerging Technologies, highlighted the importance and benefits of repurposing existing infrastructure for data centers during the ELI webinar. He discussed initiatives to transform retired and retiring industrial sites, such as coal plants and manufacturing facilities in Energy Communities, into data centers and clean technology hubs, noting these sites have existing grid connections and the communities are hungry for development.

The Biden administration was exploring executive action to use federal lands for data centers and dedicated power plants to supply electricity independently from regional power grids. During the ELI discussion, Raparla noted that DOE's National Lab sites offer significant opportunities to expand renewable energy, increase grid capacity, and potentially co-locate data centers on these lands. With the Trump administration now in office, there is still the potential for executive or legislative action.

The Path Forward

Data centers are essential to the digital economy, but rapid growth requires coordinated, strategic planning. Northern Virginia offers key insights into the impacts of data centers nationwide. Addressing energy and land use challenges will require collaboration among tech companies, developers, and local governments, focusing on practical solutions such as repurposing existing infrastructure and land, refining zoning policies, and incorporating community input.