Executive Summary:

Bits and Mortar: The Microspatial Economics of Data Centers

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Overview

Data centers are becoming one of the most important forms of physical infrastructure in the digital economy. Planned U.S. capacity growth could reach roughly 200 gigawatts over 2026–2032, implying an infrastructure buildout on the order of $8 trillion. Where these facilities are located matters for investors, utilities, local governments, and communities because data centers require unusually large bundles of power, fiber connectivity, water access, land, and regulatory approval.

This study maps the U.S. data center landscape at high spatial resolution (500-meter grids) and identifies which locations are most likely to attract future development. Using a building-level inventory of 4,447 U.S. data centers, we train a predictive model to evaluate each candidate location's development potential based on nearby power infrastructure, fiber networks, water risk, land costs, labor conditions, tax incentives, and regulation.

The results show a clear market split: hyperscale cloud providers are predominantly driven by connectivity and power infrastructure, but they also place significant weight on labor and demographics, as well as regulatory stability; third-party colocation operators, which lease data center space to multiple tenants, prioritize power infrastructure above all else, followed by connectivity. Notably, colocation operators place significantly greater weight on real estate and land affordability than hyperscale providers do, while treating labor and demographics as a negligible factor.

Ultimately, these findings indicate that data center value is now dictated by the local utility bundle, making sites with strong infrastructure combinations and favorable policy environments highly underpriced acquisition targets before the broader market recognizes their advantage.

What This Study Asks

To provide a predictive roadmap for real estate investors and policymakers navigating impending infrastructure bottlenecks, this study addresses three critical questions:

- Which physical and economic factors most reliably predict where new data centers are built?
- How do site requirements differ between hyperscale cloud and third-party colocation facilities?
- How would future shocks, such as demand growth, grid congestion, climate stress, on-site power generation, and regulatory pushback, reshape the geography of data center investment?

Data and Approach

To understand where developers actually choose to build, we assembled a comprehensive dataset of 4,447 data centers, including more than 1,600 new facilities that came online between 2011 and 2024. Instead of relying on aggregate averages, we divided the country into a high-resolution grid (500-meter squares). For each parcel, we measured access to high-voltage power grids, fiber-optic

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networks, water risk, land costs, labor demographics, and local tax incentives. We then trained a deep learning model that acts like a digital surveyor to learn the spatial patterns that distinguish successful data center sites from nearby undeveloped alternatives. The model scores every parcel in the contiguous U.S. on its investment potential.

Key Findings

- **Prerequisites vs. Incentives:** Power access and high-capacity fiber are the first-order requirements for development. Tax incentives and zoning conditions matter most after these physical prerequisites are satisfied. A favorable tax package cannot compensate for a weak grid connection or inadequate fiber access.

- **Distinct Market Strategies:** Hyperscale cloud providers behave more like industrial utilities, prioritizing large-scale power capacity, fiber connectivity, and regulatory stability. Third-party colocation providers behave more like specialized commercial real estate operators, balancing power and fiber access, land affordability, and proximity to enterprise customers.

- **AI Boom Reshuffling:** Soaring demand for AI compute pushes development beyond established hubs into infrastructure-rich secondary markets. Under our 2030 simulation, Texas captures the largest gains, with projected capacity increasing sixfold (adding over 150K megawatts of demand). Heavily constrained historical hubs struggle to absorb new loads, signaling a structural reallocation toward regions with available power, land, and permitting capacity.

- **Behind-the-Meter Disruption:** If operators can bypass congested public utilities by building dedicated on-site power generation, such as small modular reactors or natural gas plants, proximity to the existing grid becomes less decisive. This raises the investment potential of remote markets with cheap land and favorable non-energy fundamentals.

- **Regulatory and Climate Risks:** Markets facing tighter permitting, reduced tax incentives, grid reliability problems, or severe water stress see lower projected suitability. These risks are especially important for investors underwriting long-lived assets in places where community opposition, water scarcity, or grid congestion is intensifying.

Implications for Practice

- **Targeted Land-Banking and Acquisition:** The most valuable parcels are not necessarily the cheapest or closest to existing hubs. They are sites where power capacity, fiber access, water availability, and land can be secured together. Predictive spatial screening can help identify underpriced parcels before they become visible to the broader market.

- **Underwriting Utility Risk:** Data center cash flows depend on secured interconnection rights, reliable electricity, cooling feasibility, and permitting stability, which should be evaluated alongside traditional real estate metrics such as tenant quality, lease structure, and construction costs.

- **Strategic Economic Development:** Tax incentives alone are unlikely to attract durable data center investment if local grid capacity, fiber infrastructure, water access, or permitting processes remain constrained. Regions seeking to compete for data center infrastructure should prioritize physical readiness over fiscal subsidies.