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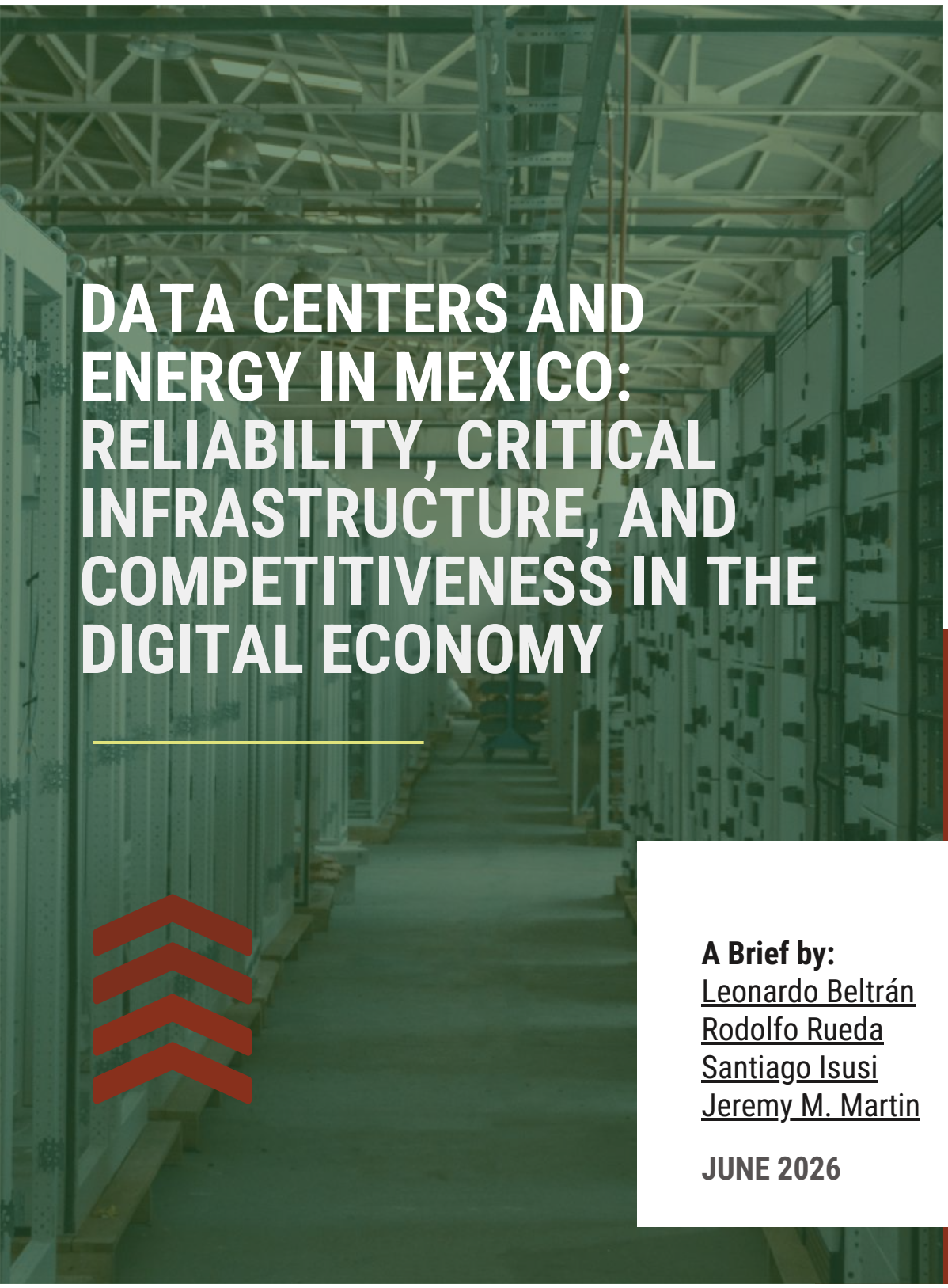

DATA CENTERS AND ENERGY IN MEXICO: RELIABILITY, CRITICAL INFRASTRUCTURE, AND COMPETITIVENESS IN THE DIGITAL ECONOMY

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Introduction

The accelerated expansion of the digital economy is reshaping the relationship between technological infrastructure and energy systems. Artificial intelligence, cloud services, large-scale data processing, and industrial digitalization have made data centers a strategic infrastructure asset rather than a purely real estate or telecommunications play.
For many years, data center location decisions were primarily associated with digital connectivity, land availability, latency, and access to end users. That logic has changed. Today, the availability of reliable, resilient, competitively priced, and increasingly clean electricity has become one of the main determinants of where digital infrastructure is built and how fast it can scale.

The International Energy Agency (IEA) recognizes this transformation, noting that the world is entering a true "Age of Electricity," characterized by accelerated growth in electricity demand driven by artificial intelligence, electric vehicles, and data centers. The IEA estimates that global electricity demand will grow by approximately 3.6% annually through 2030, a pace roughly 50% higher than the average observed during the previous decade. Additionally, the agency projects that electricity consumption will grow at least 2.5 times faster than total energy demand by 2030.

Bloomberg New Energy Finance (BNEF) reinforces the same structural conclusion from a market and infrastructure perspective. BNEF estimates that live (operating) global data center IT capacity reached 59 GW as of 3Q 2025, after increasing by 10.2 GW year-on-year and expects data center capital expenditure to reach approximately USD 3.3 trillion through 2029.

The sector is already reshaping power markets: in 2025, the world's largest data center operators signed 28.3 GW of clean power purchase agreements (PPAs), representing roughly half of global corporate clean PPA activity.

Mexico faces a historic opportunity to consolidate itself as one of Latin America's leading digital hubs. Its geographic proximity to the United States, regional connectivity, industrial ecosystem, availability of technical talent, and growing demand for artificial intelligence and cloud services make it an attractive platform for regional and cross-border digital infrastructure.

That opportunity, however, is not automatic. The Mexican Data Center Association (MEXDC) estimates investments exceeding USD 18 billion and more than 1,500 MW of additional installed data center capacity in Mexico by 2030. BNEF identifies 60 data center sites in Mexico and 244.9 MW of live (operating) capacity. The difference between announced capacity and live (operating) connected capacity is precisely the policy challenge: Mexico must convert investment announcements into operating, connected, reliable, and sustainable infrastructure.

This paper argues that the main constraint to consolidating Mexico as a competitive destination for digital investment is no longer simply attracting capital or demonstrating market demand. The central challenge is whether energy infrastructure — especially transmission, distribution, and interconnection — can expand with sufficient speed, reliability, and certainty.

Mexico as a Strategic Destination for Digital Investment

Mexico has become one of the most attractive markets for digital infrastructure development in Latin America. BNEF data indicate that Mexico is the second-largest Latin American market by number of data center sites, with 60 sites, behind Brazil with 116 and ahead of Chile with 56. Across Latin America, BNEF tracks 386 sites, 24 markets, and 1,182.6 MW of live (operating) capacity. This regional position strengthens Mexico's case as a platform between North America and the rest of Latin America.

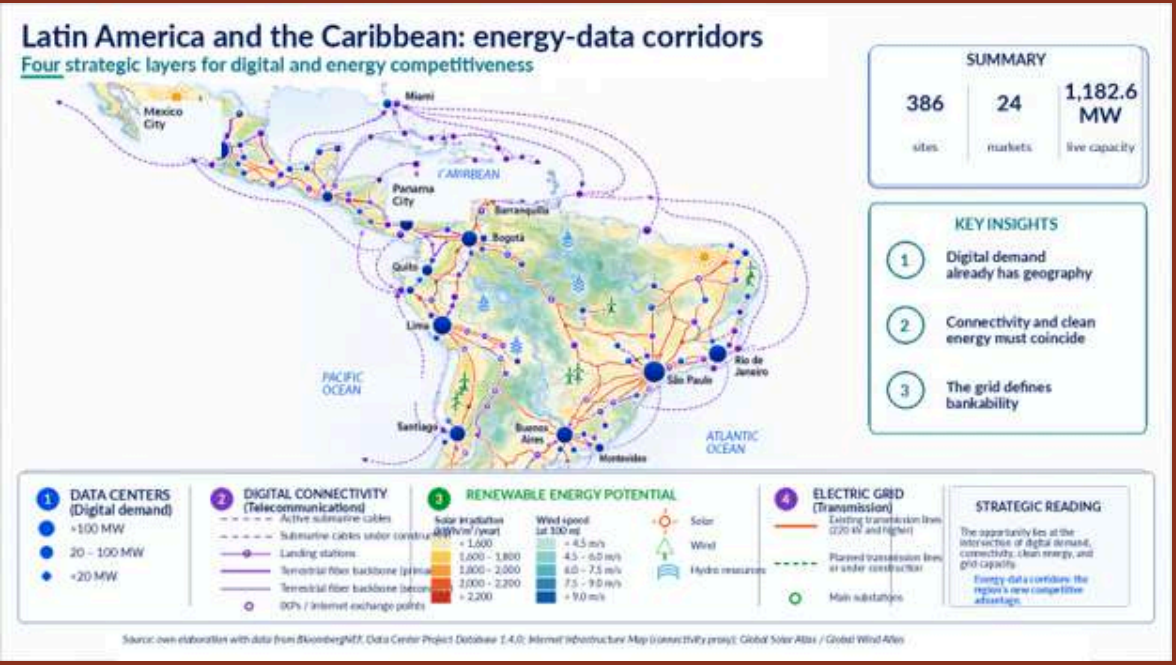


Figure 1. Latin America and the Caribbean: energy-data corridors. Source: own elaboration with data from BloombergNEF, Data Center Projects Database 1.4.0; Internet Infrastructure Map; Global Solar Atlas; Global Wind Atlas.

The regional map underscores that the data center opportunity is not distributed randomly; rather, it is emerging where digital demand, submarine and terrestrial connectivity, renewable resource potential, and transmission capacity intersect. This "energy-data corridor" lens is useful for identifying where Latin America can compete for digital infrastructure and where policy bottlenecks may constrain growth.

Within Mexico, the market is already geographically concentrated. BNEF identifies 25 data center sites in Querétaro and 17 in the Mexico City metropolitan area. In terms of live (operating) capacity, Querétaro accounts for approximately 175.4 MW out of 244.9 MW nationally, followed by the Mexico City metropolitan area with 49.5 MW, Guadalajara with 10.6 MW, and Monterrey with 7.8 MW.

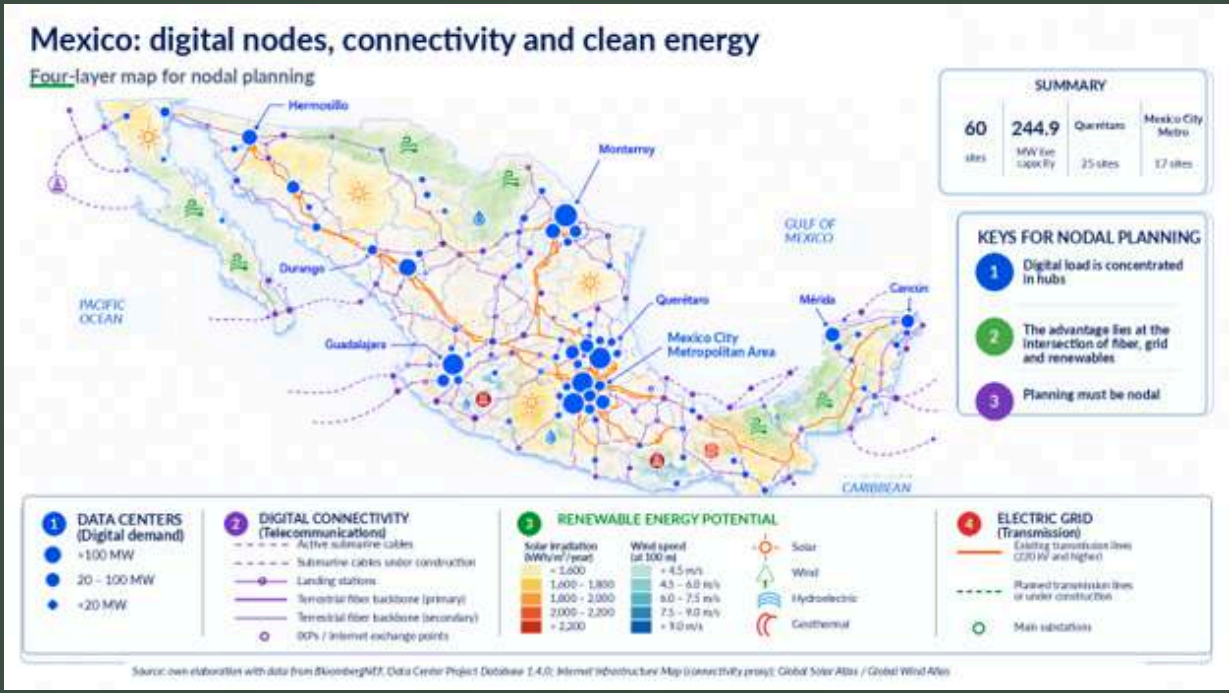


Figure 2. Mexico: digital nodes, connectivity, and clean energy. Source: own elaboration with data from BloombergNEF, Data Center Projects Database 1.4.0; Internet Infrastructure Map; Global Solar Atlas; Global Wind Atlas.

For Mexico, the same layered view shows that the next phase of competitiveness will be nodal. Querétaro and the Mexico City metropolitan area already concentrate demand, but the strategic opportunity lies in planning hubs where fiber, grid capacity, clean energy potential, water availability, permitting capacity, and local execution can be aligned from the beginning.

This concentration is both a strength and a vulnerability. It is a strength because clustering can create specialized labor markets, deeper supplier ecosystems, better connectivity, and learning effects. It is a vulnerability because concentrated demand can quickly overwhelm local electricity, water, land-use, and permitting systems. Querétaro illustrates this duality: it has become a leading regional hub, but its ability to continue scaling will depend on the timely expansion of substations, transmission links, distribution capacity, water management, and municipal-state-federal coordination.

The global expansion of artificial intelligence and cloud services has significantly increased the need for data processing and storage infrastructure. The IEA estimates that data centers consumed approximately 415 TWh of electricity globally in 2024, representing around 1.4% to 1.5% of global electricity consumption, and projects that this demand could more than double by 2030. In Mexico, this trend is already visible through hyperscale, colocation, and enterprise cloud demand.

In other words, the question is no longer whether Mexico has the potential to become a regional digital hub, but whether the country will be capable of developing the energy, regulatory, and institutional conditions necessary to compete against other markets also seeking to capture investments linked to artificial intelligence and the digital economy.

Energy as the Main Strategic Location Factor

There has been a relevant change in the global data center industry. Energy is no longer a secondary operational input; it has become a strategic determinant of location and competitiveness. Site selection was primarily based on criteria such as connectivity, land availability, and proximity to end users. Today, variables such as available electrical capacity, supply reliability, access to transmission infrastructure, operational resilience, and availability of clean energy have become decisive elements in investment decisions.

This shift responds to the nature of data centers as highly intensive electrical loads that are extremely sensitive to interruptions. Unlike other industrial consumers, data centers require near-continuous operation and minimal tolerance for electrical failures.

This changes the logic of energy planning. Traditional electricity expansion was designed around urban growth, manufacturing, extractive industries, or conventional commercial demand. Data centers introduce a different profile: permanent 24/7 loads, rapid deployment timelines, high requirements for redundancy, cooling, and power quality. Energy availability is becoming a prerequisite for digital competitiveness.

BNEF's data show why this issue is becoming more urgent. In 3Q 2025 alone, BNEF tracked 2.8 GW of new data center IT capacity connected globally, taking the live (operating) fleet to 59 GW. The Americas accounted for 72% of those new quarterly connections, while the United States alone hosted 1.8 GW of the 2.8 GW added. This concentration of growth in North America raises the competitive bar for Mexico: the country is geographically well positioned, but it is competing in a region where digital infrastructure is scaling very quickly.

The global response has been twofold. First, data center operators have become among the largest corporate clean power buyers. Second, as grid connection queues lengthen, developers are increasingly exploring on-site and behind-the-meter solutions. BNEF has identified 114 GW of announced on-site gas generation capacity across 115 projects to serve data center loads, mostly in the United States, with limited activity also identified in markets including Mexico. This trend does not remove the need for clean energy; rather, it reflects the urgency of "speed to power" when grid development lags digital demand. For Mexico, this creates both an opportunity and a risk. The opportunity is to use data center demand to accelerate investment in grids, storage, clean electricity, and energy management solutions. The risk is that delayed interconnection, uncertain permitting, or insufficient transmission capacity may force projects to slow down, relocate, or rely on less efficient stopgap solutions.

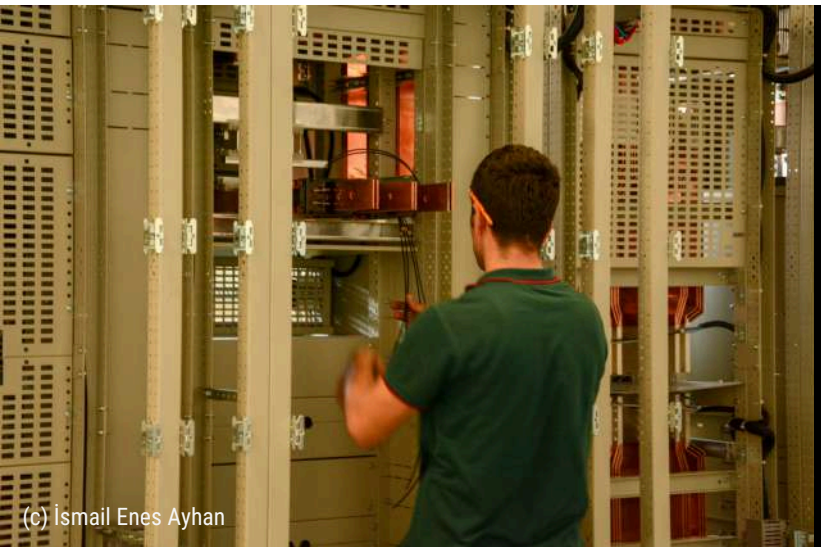
The policy implication is clear: data center competitiveness should be treated as an electricity-system planning issue. The sector requires transmission expansion, distribution reinforcement, grid resilience, operational flexibility, storage, clean firm energy options, and predictable interconnection procedures.

The Real Challenge: Transmission, Interconnection, and Execution Capacity

Public debate frequently oversimplifies the energy discussion surrounding data centers by arguing that the main problem is insufficient electricity generation. However, the challenge is considerably more complex. The binding constraint is often not the existence of generation capacity itself, but the ability to connect, transmit, distribute, and reliably deliver power at the location and time required by the project.

The data center industry in Mexico has pointed out that the main bottlenecks are transmission, distribution, and interconnection. This phenomenon is not exclusive to Mexico. The IEA estimates that more than 2,500 GW of projects are currently waiting in electricity connection queues worldwide, including renewable energy projects, storage systems, and large loads such as data centers. This reflects a broader global structural trend: the pace of digital expansion is beginning to outstrip the historical expansion capacity of energy infrastructure.

In Mexico, this challenge becomes particularly relevant due to the accelerated expansion of digital projects in specific regions. Querétaro is likely the most visible example. The concentration of data center investments has significantly increased pressure on transmission and electricity distribution infrastructure, forcing the acceleration of investments in substations, transmission lines, and grid reinforcement projects. Similar dynamics could emerge in Nuevo León, Jalisco, the Bajío, and the Mexico City metropolitan area if investment continues to scale.


(c) İsmail Enes Ayhan

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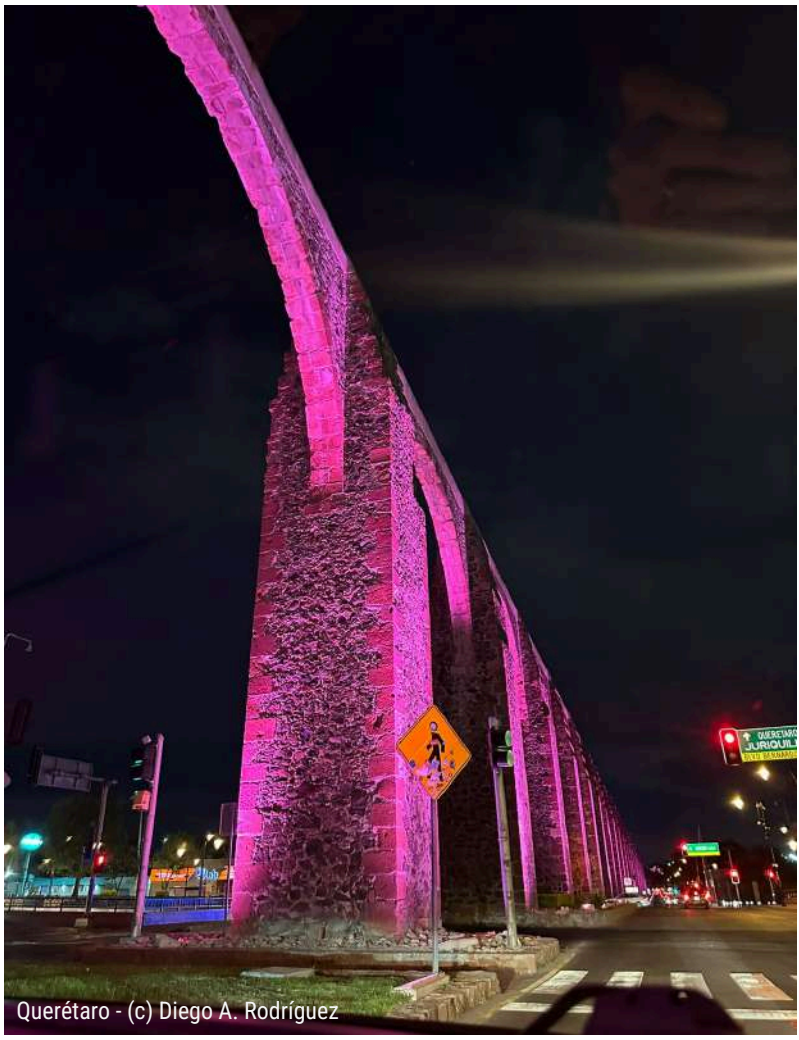
BNEF's construction data underscore the same point. More than 3.8 GW of new data center IT capacity entered construction in 3Q 2025, and BNEF tracked 23.1 GW of capacity under construction globally across 831 sites. The Americas accounted for 17 GW of that pipeline across 311 locations, and the United States alone hosted 15.9 GW of data center capacity under construction. These figures suggest that the countries able to reduce grid-connection uncertainty and execute infrastructure faster will have a meaningful competitive advantage.

Against this backdrop, the Mexican government and the Federal Electricity Commission (CFE) have begun promoting a new phase of electricity expansion based on priority projects and mixed investment schemes. As part of the National Electricity System Strengthening and Expansion Plan 2025–2030, the government plans to incorporate approximately 32 GW of new generation capacity by 2038. Within this expansion, CFE would contribute around 9.8 GW of firm capacity and approximately 11.3 GW of renewable energy, while the private sector would contribute around 10.9 GW of additional renewable generation.

Likewise, the strategy is not limited solely to generation. Strengthening the National Transmission Grid has become a central component of energy policy. The government announced 66 priority electricity transmission projects, 44 of which are expected to begin construction in the near term. This is directly relevant for data centers because their development timelines can be significantly shorter than those of transmission lines and substations.

Information presented by the Mexican government also explicitly recognizes that the development timeline for data centers is beginning to outpace the speed at which the electricity grid is expanding, particularly in regions such as Querétaro, where industrial corridors, residential developments, and new digital infrastructure converge. This pressure on transmission and distribution explains why grid expansion has become one of the central competitiveness issues for the sector.



Querétaro - (c) Diego A. Rodríguez

These efforts reflect an important reality: digital infrastructure development and electricity system strengthening are beginning to converge within the same national competitiveness agenda. This is why digital infrastructure, and electricity infrastructure should be treated as part of a single competitiveness agenda. In practice, the countries and regions that can connect reliable power faster will be better positioned to attract the next wave of AI and cloud investment.

The binding constraint is often not generation capacity itself, but the ability to connect, transmit, distribute, and reliably deliver power at the location and time required.

Sustainability, Resilience, and New Energy Architectures

Sustainability is no longer merely a reputational issue; it has become a core component of competitiveness and bankability. Investors, financial institutions, cloud operators, and end users increasingly assess projects based on access to clean energy, carbon footprint, energy efficiency, water risk, operational resilience, community impact, governance, and regulatory certainty.

This matters because many hyperscalers have adopted aggressive decarbonization and clean energy commitments. BNEF data show that data center operators were responsible for roughly half of global corporate clean PPA activity in 2025. The industry is also moving beyond conventional wind and solar procurement: around a quarter of capacity now combines renewable generation profiles with storage or another source of clean power, and data center operators accounted for 97% of nuclear PPA capacity signed in 2025. As a result, a country's ability to provide cleaner, more resilient, and more predictable energy infrastructure is becoming a significant competitive advantage.

For Mexico, the sustainability agenda should not be interpreted narrowly as an environmental constraint. It can become a source of competitive advantage if the country can provide credible pathways for clean electricity procurement, storage integration, efficient cooling, water stewardship, and transparent permitting. Conversely, weak water planning, unclear energy sourcing, or community resistance can undermine bankability and delay project execution.

Water is particularly important.[1] Site selection should integrate water availability, water stress, cooling technologies, use of reclaimed water where feasible, recirculation systems, municipal coordination, and transparent community engagement. For a sector often perceived as resource-intensive but employment-light, social license must be built early and credibly.

[1] https://www.wired.com/story/data-center-operators-fix-water-use-problems/#:~:text=Some%20tech%20giants%2C%20including%20Microsoft,water%2Dstressed%20region%20of%20Texas

A more strategic approach is to treat water not only as a local constraint, but as a core design variable. New cooling technologies are changing the water profile of data centers, particularly for AI and high-performance computing workloads. Direct-to-chip liquid cooling, immersion cooling, dry cooling, and hybrid cooling systems can reduce reliance on water-intensive evaporative cooling while supporting higher rack densities and more targeted thermal management. In practice, this means that water risk should be assessed together with power density, cooling architecture, local climate, and energy efficiency, rather than as a separate environmental compliance issue.[2]

Recent industry practice points in this direction. Microsoft has announced a next-generation data center design that uses chip-level cooling and closed-loop water circulation to avoid evaporative water use for cooling, estimating that this design could avoid more than 125 million liters of water per year per data center.[3] The broader innovation landscape also includes closed-loop liquid cooling, direct-to-chip systems, immersion cooling, advanced monitoring, and dry or hybrid cooling architectures designed to reduce freshwater dependence while maintaining performance for AI workloads.

Water circularity[4] should therefore become part of the bankability and social-license framework for data centers in Mexico. This includes using reclaimed or recycled water where feasible, designing closed-loop systems, monitoring water use in real time, setting transparent Water Usage Effectiveness (WUE) targets, treating and reusing wastewater, and supporting watershed-level replenishment initiatives in partnership with local authorities, utilities, communities, and industrial users. For states facing water stress or competing industrial, urban, and agricultural demand, such as parts of the Bajio and northern Mexico, water circularity can help reduce conflict risk and make digital infrastructure more socially legitimate.

In this context, the Mexican government has also begun promoting new regulatory frameworks associated with self-consumption and energy storage. Recently issued Administrative Provisions of General Application (DACGs) allow isolated and interconnected self-consumption schemes, as well as the incorporation of energy storage systems and the sale of electricity surpluses into the National Electricity System. For data centers, these tools can support hybrid architectures that combine grid supply, clean PPAs, on-site generation, storage, demand management, and redundancy.

[2] https://netzeroinsights.com/resources/solutions-cutting-data-center-water-consumption/

[3] https://www.microsoft.com/en-us/microsoft-cloud/blog/2024/12/09/sustainable-by-design-next-generation-datacenters-consume-zero-water-for-cooling/

[4] https://www.weforum.org/stories/2025/11/data-centres-and-water-circularity/

Digital infrastructure development can also catalyze public infrastructure improvements. Data center developers often participate in investments associated with substations, reinforcement works, and grid modernization. With the right regulatory design, such investments can benefit not only individual projects but also regional electricity systems and nearby industrial users.

Regulatory Certainty and Institutional Coordination

Mexico´s ability to capture the data center opportunity will depend heavily on institutional coordination and execution speed. Data center projects require simultaneous alignment across energy, environmental permitting, water, land use, interconnection, urban development, construction, telecommunications, security, and local community engagement.

The complexity of these processes can significantly delay projects operating under accelerated global investment cycles. BNEF's financing indicators show how quickly those cycles are moving: publicly listed data center operators revised their 2027 capex estimates upward by 56% since the prior BNEF market indicators update, to approximately USD 806 billion. Investors compare jurisdictions in real time, and the difference between capturing or losing a project depends less on whether demand exists and more on whether the host country can provide predictable timelines, transparent procedures, bankable energy arrangements, and coordinated public decision-making.

This is why the creation of the "Energy and Self-Consumption One-Stop Shop" ("Ventanilla Energía y Autoconsumo") is relevant. If implemented effectively, it can help streamline processes, reduce administrative friction, monitor permitting timelines, and provide greater predictability for energy-intensive investments. Its value will depend on whether it becomes a true coordination and execution mechanism rather than a purely informational portal.

Regulatory certainty should also extend to interconnection criteria, storage treatment, surplus sales, wheeling or delivery arrangements where applicable, clean energy procurement, and the allocation of costs for network reinforcements. For developers and financiers, these issues are not abstract regulatory debates; they directly affect construction timelines, debt sizing, risk allocation, and the cost of capital.

States and municipalities also have a central role. The competitiveness of a site depends not only on national energy policy, but on local land-use planning, water management, permitting capacity, community engagement, public security, and the availability of skilled workers. Data center development therefore requires a multi-level governance model.

Policy Priorities for Mexico

To capture the opportunity without compromising reliability or sustainability, Mexico should consider five policy priorities.

01. Integrate data center demand into electricity planning. Demand forecasts should distinguish between conventional industrial growth and new digital loads that are concentrated, continuous, and highly sensitive to reliability. Planning should also distinguish between announced capacity, capacity under construction, and live (operating) connected capacity, because the policy challenge is not announcements but energization.

02. Prioritize transmission, distribution, and substation investment in high-growth digital corridors. Generation expansion is necessary but insufficient if electricity cannot be delivered to the precise locations where demand is emerging. The BNEF maps and project data point to a nodal planning challenge in Querétaro, the Mexico City metropolitan area, Guadalajara, Monterrey, and emerging Bajío corridors.

03. Create bankable frameworks for hybrid energy solutions. Data centers will increasingly require combinations of grid supply, clean PPAs, storage, self-consumption, on-site generation, efficiency, and redundancy. Regulation should enable these architectures while preserving system reliability and transparency.

04. Treat sustainability and water as early-stage site-selection variables. Energy and water planning should be integrated into the first phase of project development, not addressed after land has already been acquired or permits requested. Water strategies should include source diversification, circular or low-water cooling design, reclaimed-water use where feasible, real-time monitoring, WUE targets, wastewater treatment and reuse, and watershed-level replenishment mechanisms developed with local stakeholders.

05. Strengthen institutional coordination. A competitive data center ecosystem requires predictable timelines and coordination across federal, state, and municipal authorities. The one-stop shop should be linked to measurable execution milestones, especially for interconnection, self-consumption, storage, permitting, and network reinforcements.

Conclusions

- The expansion of data centers is redefining the relationship between digital infrastructure and energy systems. Digital and energy competitiveness can no longer be analyzed separately. Electricity infrastructure is becoming a fundamental enabling condition for artificial intelligence, cloud services, advanced manufacturing, and the next phase of digital development.
- Mexico has a significant strategic opportunity. Is it already one of Latin America's leading center markets by number of sites, and Querétaro has emerged as a major regional hub. But the gap between announced projects and live (operating) connected capacity shows that the decisive challenge is execution.
- BNEF's global indicators sharpen the message: the sector is adding live (operating) IT capacity rapidly, clean power procurement is reaching record levels, construction pipelines are concentrated in the Americas, and on-site generation is expanding as a response to grid delays. For Mexico, this means that digital competitiveness will depend on the ability to translate location advantage into timely interconnection, reliable electricity delivery, and credible pathways to clean and resilient power.
- The core policy question is not whether Mexico can attract data center investment. It can. The question is whether Mexico can deliver reliable, resilient, sustainable, and connected energy infrastructure fast enough to convert that investment into operating projects.
- In this sense, Mexican energy authorities are right to argue that "digital infrastructure is also electrical infrastructure." Data centers are not merely large electricity consumers; they are part of the structural transformation of the electricity system and of the country's competitiveness agenda.
- The countries that can expand reliable, resilient, and sustainable energy infrastructure most rapidly will be best positioned to lead the next phase of global digital growth. For Mexico, the opportunity is real, but it will be captured only if energy planning, regulatory certainty, sustainability, and infrastructure execution move at the speed of the digital economy.

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