OUTLOOK
14 January 2025

Send Your Feedback

TABLE OF CONTENTS

Contacts

John Medina +1.212.553.3604
Senior Vice President
john.medina@moodys.com

Ranjini Venkatesan +1.212.553.3828
Vice President - Senior Credit Officer
ranjini.venkatesan@moodys.com

Veronica Huang, CFA +1.212.553.1829
VP-Senior Analyst
veronica.huang@moodys.com

Tracy Rice +1.212.553.4115
VP-Sr Credit Officer
tracy.rice@moodys.com

Ryan Wobbrock +1.212.553.7104
VP-Sr Credit Officer
ryan.wobbrock@moodys.com

Nidhi Dhruv, CFA +65.6398.8315
VP-Sr Credit Officer
nidhi.dhruv@moodys.com

Raj Joshi +1.212.553.2883
SVP – Corporate Finance Group
raj.joshi@moodys.com

A. J. Sabatelle +1.212.553.4136
Associate Managing Director
angelo.sabatelle@moodys.com

Data Centers – Global

2025 Outlook – Developer leverage, regulatory risk to rise as growth surges

Summary

Demand for data center capacity to support artificial intelligence (AI), cloud computing and data storage services will intensify in 2025. Large tech companies, or hyperscalers, such as Microsoft Corporation (Aaa stable), Amazon.com Inc.'s (A1 stable) Amazon Web Services (AWS) unit, Alphabet Inc.'s (Aa2 stable) Google business, Facebook parent Meta Platforms Inc. (Aa3 stable) and Oracle Corporation (Baa2 stable), are rapidly building and leasing new data centers and expanding into newer and smaller markets. This growth requires data center developers and landlords to raise substantial development capital in the form of equity, bank loans, corporate and securitized bonds, or project finance vehicles. Leverage levels will likely increase for developers focused on hyperscale buildouts to be completed in 2026-28.

» **Global data center capacity to surge again in 2025.** Most of the new capacity coming online is preleased to Microsoft, Google, AWS, Meta and Oracle, which will limit the risk of introducing a significant surplus of unoccupied capacity into the market. Additionally, new colocation data center capacity is being developed for small to medium-size tenants who pay higher lease rates on a per kilowatt per month basis. Vacancy rates may briefly uptick in some markets until this newly available colocation capacity is fully leased. But they will remain low given supply constraints in most markets.

» **Private equity to provide capital for growth, while hyperscalers invest in related technologies.** Medium-size and large data center REITs and developers have been eagerly snapped up by major private-equity investors. Even larger mega partnerships have formed in recent months, such as the $100 billion Global AI Infrastructure Investment Partnership involving Blackrock Inc. (Aa3 negative), Microsoft and MGX, as well as KKR and Energy Capital Partners' $50 billion partnership to invest in data centers and power generation over a number of years. After this recent surge in investment activity, the pace of M&A will remain high in emerging markets but is likely to moderate in established markets.

» **Data center projects to face resistance in some markets; regulatory actions could constrain demand as well as supply.** Public concerns about data centers' urgent need for massive amounts of electricity will increasingly come to the fore. Even as state and regional governments continue to offer tax incentives to attract new data centers, the industry is coming under greater political and regulatory scrutiny. Despite growing public pushback, large data centers will continue to proliferate in established markets and spread to new markets. While political and regulatory actions threaten to limit the supply of data center capacity in some markets, legal restrictions on the use of certain social media platforms or the training of AI models have the potential to constrain demand as well.

Developers will incur more debt to build and upgrade data centers as demand exceeds supply

Demand for data center capacity to support artificial intelligence (AI), cloud computing and data storage services will intensify in 2025, as reflected in our growth forecast for global data center power usage (see Exhibit 1). Hyperscalers, such as Microsoft, AWS, Google, Meta and Oracle, are rapidly building and leasing new data centers globally and expanding into newer and smaller markets. This growth requires substantial development capital, typically funded by equity, banks and corporate and securitized debt.

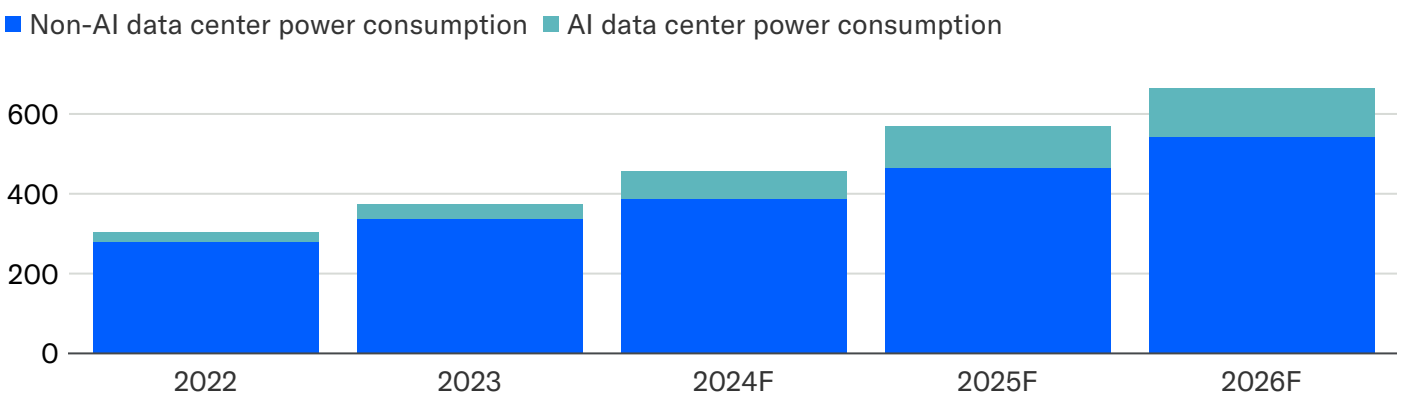
As a result, leverage levels will likely increase over the next 12 to 18 months and remain elevated as developers engage in an accelerated construction cycle. The revenue necessary to service this new debt will become available once these facilities are operational and accessible to tenants, often through prelease arrangements. This delay in the receipt of operating revenue until a data center becomes operational results in temporarily weaker financial metrics that improve over time, like a lower fixed charge coverage and higher leverage ratio. Meanwhile, data center loans included in project finance collateralized loan obligations (CLOs) are poised to rise as banks expedite their capital recycling processes and aim to redeploy capital into new data center loans. Additionally, development equity may be replaced by innovative structured credit solutions in private credit markets designed to deploy capital more efficiently.

Corporate real estate investment trusts (REITs), commercial real estate developers, telecommunication companies and private equity hyperscale data center developers continue to incur new debt to expand hyperscale data center capacity. Most of this new capacity is typically preleased to high-rated hyperscaler tenants, mitigating the risk of surplus capacity entering the market without tenants. But as eager developers court hyperscalers in hopes of serving their long-term data center needs, their financial risk exposure may rise as they offer increasingly favorable tenant lease terms, including shorter initial lease terms with shorter extension options at the tenant's will. Asia-Pacific (APAC) telecommunication companies are partnering with peers or data center operators to mitigate investment risk and protect their balance sheets.

Exhibit 1

Average annual global growth in data center power consumption likely to exceed 20% through 2026

Global data center power consumption in terawatt-hours (TWh)



Sources: International Data Corporation (historical data) and Moody's Ratings (forecasts)

As data center capacity rises, diversified manufacturing companies will benefit from growing demand for products used in data centers, such as medium and low voltage power distribution products; backup and uninterruptible power systems; heating, ventilation, air conditioning (HVAC) and cooling systems; security systems; and building automation systems.

Costs for key components will continue to rise as supplies remain tight

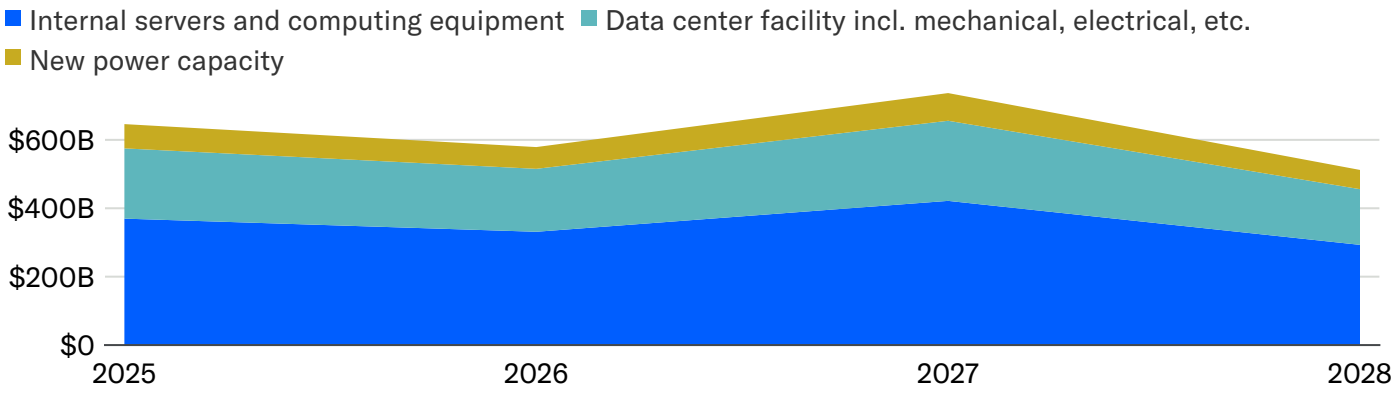
Companies within the data center value chain are either adjusting their operations or investing in new production capacity and products to meet high demand. Until additional capacity can be integrated into the supply chain, this heightened demand will drive up costs for key components, including mechanical cooling systems and electrical equipment for data centers, as well as internal components such as semiconductors and computing equipment. Developers and landlords are passing on these increased costs to tenants through higher lease prices, which continue to rise as vacancy rates remain at historically low levels in most markets.

Developers and contractors have adjusted their schedules to accommodate longer lead times for essential electrical equipment, such as transformers and backup generators. They also try to account for the time required to secure new grid connections for the new substations, yet these timelines can be extended unexpectedly if utilities halt new connections to manage grid reliability. This extended time to market has led to greater diversification among developers and hyperscalers, who are increasingly focused on identifying or developing locations with reliable and sustainable power and water supply, as well as fast connectivity. Furthermore, the global demand for electricians, electrical engineers and HVAC technicians exceeds supply, creating a constraint on both initial construction and long-term operations.

Geopolitical risks, such as the imposition of new tariffs on the AI and semiconductor industries, could affect multiple segments of the data center value chain and potentially slow down new data center development. Should trade barriers increase, costs across the data center supply chain are likely to rise, leading to higher lease rates for tenants and escalated construction expenses for hyperscalers, who account for most new global capacity under development. Despite the potential for increased costs in the short term, the high demand for additional data center capacity from hyperscalers remains strong. This is particularly critical given that insufficient new data center capacity may constrain hyperscalers' revenue growth opportunities in the coming years if development does not keep pace with demand (see Exhibit 2).

Exhibit 2

About $2.5 trillion of investment needed to meet unconstrained demand growth through 2028



Based on Moody's growth forecast and underlying cost assumptions, including US Energy Information Administration data on cost to build new generation
Source: Moody's Ratings

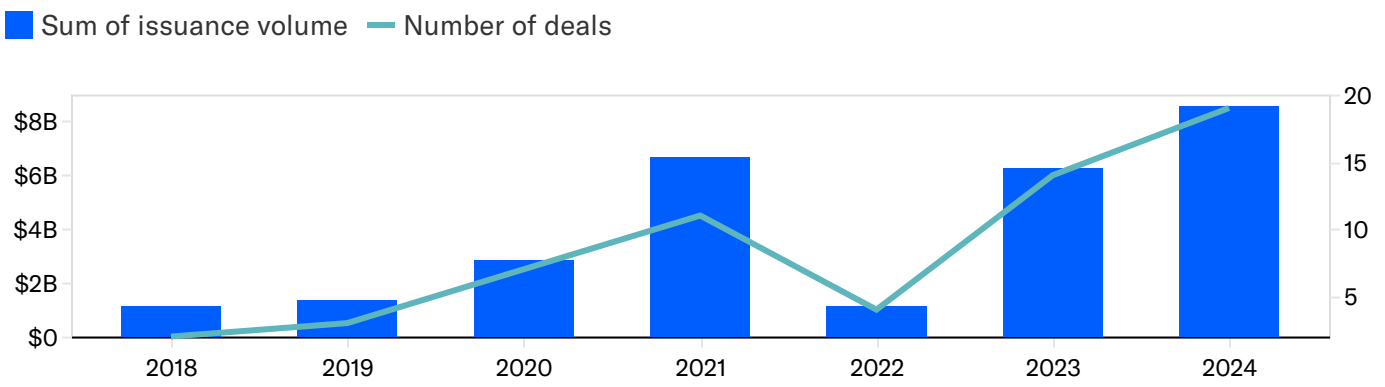
Global data center capacity to surge again in 2025

Global data center capacity will continue to rise sharply. Most of the new capacity coming online is preleased to Microsoft, Google, AWS, Meta and Oracle, which will limit the risk of introducing a significant surplus of unoccupied capacity into the market and avoid depressing lease rates. Additionally, new colocation data center capacity is being developed for small to medium-size tenants who pay higher lease rates on a per kilowatt per month basis, resulting in better margins for the landlord/owner. Vacancy rates may see a temporary uptick in some markets until this newly available colocation capacity is fully leased. But they will likely remain low in most markets, with the exception of China (A1 negative) and Hong Kong SAR, China (Aa3 negative) where owners have limited ability to sell excess capacity to clients in neighboring countries because of data localization and sovereignty laws. These restrictions, along with US-China geopolitical tensions, are supporting capacity growth in emerging APAC data center markets.

While colocation data centers command better margins, they also carry greater credit risk for owners because of their shorter lease terms (two to four years) for smaller amounts of capacity and the need for owners to manage their utility and capital costs while ensuring that they recover these costs from tenants to maintain margins. Most long-term leases with hyperscalers pass through all power costs to the tenant and some also pass through all variable operating expenses as well, thus protecting the landlord's margins, which remain primarily exposed to long-term capital reinvestment. Some newer tenants include AI and cryptocurrency startup companies that require substantial computing capacity, but generally have weak standalone credit profiles. As a result, landlords/owners will require additional tenant security to mitigate the risk associated with losing large leases with tenants of weaker credit quality.

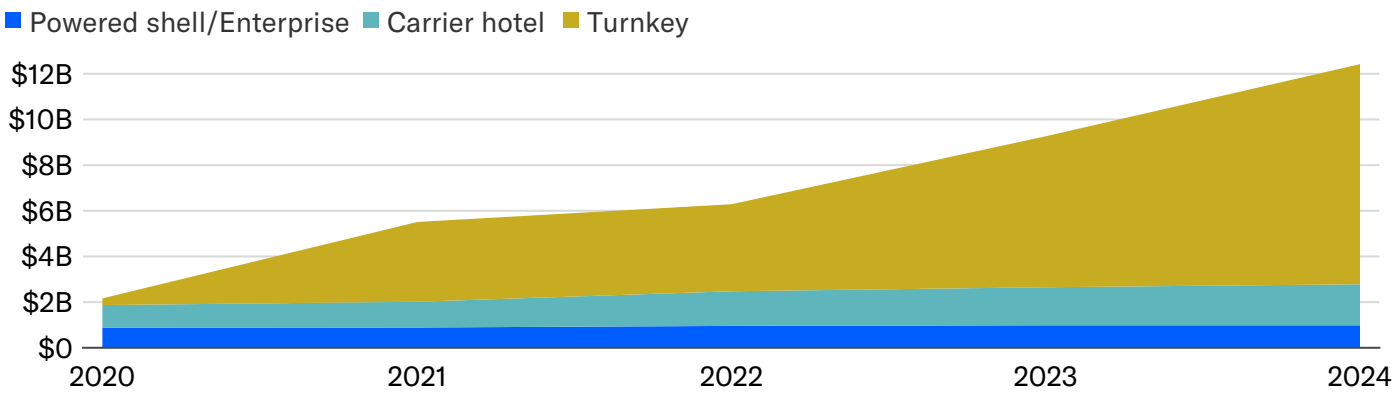
When data centers are completed, their initial construction financing is increasingly refinanced into the commercial mortgage-backed securities (CMBS) or asset-backed securities (ABS) markets. Both markets saw record activity in 2024, which is likely to extend into 2025, with new transactions for data centers located outside the US (Aaa negative) as well (see Exhibits 3 and 4). In June 2024, Vantage Data Centers closed the first ABS transaction outside the US and first data center ABS transaction in EMEA when it raised £600 million ($730 million) in securitized term notes and an additional £100 million in unfunded variable funding notes. The notes will be used to refinance £480 million ($584 million) of debt for two facilities on Vantage's 148 MW Cardiff, Wales campus.

Exhibit 3
US ABS transactions and debt issued reached record levels in 2024
Number of US asset-backed securities and volume of debt issuance by year



Sources: Finsight and Moody's Ratings

Exhibit 4
US data center CMBS cumulative global issuance volume reached record high in 2024
Annual issuance volume for US commercial mortgage-backed securities transactions by data center type



Sources: Trepp and Moody's Ratings

Private equity to provide capital for growth, while hyperscalers invest in related technologies

Private capital will continue to pour into data center development, which will help to meet hyperscaler demand for more and larger data centers. Medium-size and large data center REITs and developers have been eagerly snapped up by major private-equity investors, as illustrated most recently by Blackstone Inc.'s agreement in September to purchase Asia-Pacific data center developer AirTrunk for AUD24 billion (about $15 billion). The largest global data center REITs have also announced partnerships with significant private credit investors, including Equinix Inc. (Baa2 stable), which entered into a more than $15 billion joint venture in October with Singapore's (Aaa stable) sovereign wealth fund GIC and the Canada Pension Plan Investment Board (Aaa stable), and Digital Realty Trust Inc. (Baa2 stable), which formed a $7 billion joint venture with Blackstone in December 2023. Global Switch Holdings Ltd. (Baa2 stable) announced in December 2024 that it is exploring co-investment opportunities for its London data center portfolio as part of its financing strategy to drive future growth.

Even larger mega partnerships have formed in recent months, such as the Global AI Infrastructure Investment Partnership involving BlackRock, Microsoft, and MGX to invest $100 billion in data centers and power infrastructure and KKR and Energy Capital Partners' $50 billion partnership to invest in data centers and power generation. Meanwhile, privately owned data center developers like Vantage Data Centers will continue to benefit from substantial multibillion-dollar equity investments from prominent private digital infrastructure investors.

After this recent surge in investment activity, the pace of M&A transactions will remain high in emerging markets but is likely to moderate in established markets. The formation of large investor partnerships will also likely to proceed at a more measured pace until the initial capital commitments are deployed. Nevertheless, significantly larger investments will still be required, with new mega partnership investments likely to continue in the coming years. In some markets, government support will remain important. In December, the government of Canada (Aaa stable) announced that it is investing CAD240 million (about $166 million) in Toronto-based AI firm Cohere, the first investment of its new $2 billion Canadian Sovereign AI Compute Strategy.

Meanwhile, hyperscalers' net-zero commitments to be carbon-free and to sustainable operations in general drives new investments in clean power, cooling and processing technologies:

» The development of small modular nuclear reactors (SMRs) has emerged as a key area of focus. In October, Google announced an agreement to acquire multiple SMRs from Kairos Power, while Amazon announced partnerships with Dominion Energy Inc. (Baa2 stable) in Virginia and joint operating agency Energy Northwest in Washington state to explore the development of SMRs. Although SMR technology has not yet reached commercial viability, the scale and financial resources of these tech giants position them well to manage the long-term financial commitments associated with SMR development. However, delays are endemic to the development of new nuclear generating capacity. Global uranium supplies are also vulnerable to geopolitical tensions given that Russia accounts for about 40%-45% of the world's uranium enrichment capacity.

» To promote the deployment of more carbon-free dispatchable energy resources, such as SMRs and geothermal energy, Berkshire Hathaway Energy Company (A3 stable) subsidiary NV Energy Inc. and Google asked the Public Utilities Commission of Nevada last June to approve a new power supply agreement that includes a "clean transition tariff" to allow large customers to pay a higher rate for 24/7 clean energy. NV Energy plans to purchase electricity from Fervo Energy's 115-MW Corsac Station Enhanced Geothermal Project and sell it to Google at a fixed rate once the plant is operational. Google will receive credits for the project's energy and generation capacity on its electric bills for its data centers in the region, thereby reducing its exposure to rising power costs over time. Google also announced a strategic partnership in December with solar power developer Intersect Power and TPG Rise Climate to develop industrial parks with gigawatts of data center capacity adjacent to carbon-free power generation facilities.

» AI-related data centers are increasingly incorporating new technologies to reduce the significant amounts of power and water they consume to meet their cooling requirements. One solution used in different forms is direct-to-chip liquid cooling, which uses little to no water and relies instead on a liquid coolant mixture located closer to the chips or within a smaller containerized space, which improves energy efficiency by its proximity to the heat source. Other methods like reusing excess heat generated by servers, employing closed-loop systems for water reuse, or submerging data center hardware in cooling baths are being implemented or investigated by companies like Vertiv Group Corporation (Ba2 positive) and Schneider Electric SE (A3 positive).

» Some data center developers, such as Endeavour, which owns data center operator Edged Energy and waterless cooling technology provider ThermalWorks, have a relatively short operational history and lack extensive long-term experience with the latest waterless technologies they are using. As a result, these newer projects carry higher credit risks related to their initial construction and long-term operations as it is yet to be proven that these systems will meet the high performance requirements for the decades required.

Data center projects to face resistance in some markets; regulatory actions could constrain demand

Public concerns about data centers' urgent need for massive amounts of electricity will increasingly come to the fore, particularly in established US and European markets. Some state and regional governments continue to offer tax incentives to attract new data centers, which increases the concentration of data centers in their jurisdictions and potentially exposes utilities to heightened social risk as rising demand and higher capital costs increase power prices for customers. At the same time, the industry is already coming under greater political and regulatory scrutiny in other jurisdictions.

In December, the staff of the Virginia Joint Legislative Audit and Review Commission (JLARC) issued a report about data centers that identified the potential risks they pose to local economies. While the report acknowledged that data centers create construction jobs and generate substantial property tax revenue for host municipalities, it also observed that the associated surge in energy demand will be so great that building enough infrastructure to meet even half that demand will be difficult and that it is likely to increase the electricity bills of other utility customers.

Utilities and regulators in all markets are increasingly focused on how the immense electricity requirements of data centers will affect other ratepayers and utilities' long-term power supply resource planning to maintain reliability amid rising exposure to physical climate risks. This focus on affordability and reliability is already influencing the US ratemaking process. For example, American Electric Power Company Inc. (Baa2 stable) subsidiary Ohio Power Company (Baa1 stable) has requested approval from the Public Utilities Commission of Ohio (PUCO) for a settlement agreement that requires new large data center customers to pay for at least 85% of their monthly energy needs, regardless of actual usage. The objective is to ensure adequate cost recovery for the utility, while protecting other retail customers from bearing the expenses of infrastructure investments that might become unnecessary if data center demand does not meet projected levels. If approved, the settlement may serve as a model for similar agreements in other regions.

The rapid pace at which data center electricity demand is growing is prompting some utilities to take actions that will slow their near-term efforts to reduce greenhouse gas emissions, even though their long-term decarbonization commitments remain unchanged. In an effort to maintain service reliability for all customers while contending with surging data center demand, utilities are considering building new natural gas-fired generation and delaying previously announced retirement plans for existing fossil-fuel plants. In a limited number of cases, developers are even signing power purchase agreements with coal plants to ensure reliability.

In response to rapid growth in data center power demand, Spain is likely to roll out new regulations over the next year or two that seek to balance the need for utilities to provide reliable and affordable electricity as they navigate their transition to renewable power, while protecting ratepayers from the risk of unused generation capacity if data center demand falls short of projections. These regulations may mirror those of Ireland's Commission for Regulation of Utilities (CRU) from November 2021. In 2023, data centers accounted for 21% of Ireland's electricity use. The CRU criteria for data center connections include: location (constrained or unconstrained regions), onsite generation (dispatchable generation or storage), and demand flexibility (consumption reduction during constraints or increased onsite generation).

Despite growing public pushback, large data centers will continue to proliferate in established markets and spread to new markets. The training of larger AI models at AI data centers can occur anywhere in the world, but the deployment of AI services today is still most effectively done from data centers in established markets located near major population centers. At the same time, improvements in connectivity continue to diminish the need to locate cloud computing data centers close to highly populated areas. In Asia-Pacific, the combination of government incentives, US-China tensions and new restrictions on cross-border data transfers will support growth in emerging data center markets. Singapore's recent three-year moratorium on data center capacity expansion and its land availability limitations have contributed to increased data center investments in Malaysia and Indonesia. However, in Malaysia (A3 stable), one of the fastest growing data center markets in APAC, the Johor state data center development coordination committee rejected four proposed data center projects in 2024, mostly because of their lack of a sustainable water and power use plan. The committee, which

also approved 10 other new data center projects that satisfied its sustainable development criteria, said the rejected projects' proposed locations lacked the proper utility infrastructure, which would strain local resources.

Meanwhile, "self-sustaining" data center clusters will emerge in some markets where hyperscaler tenants will invest in the development of the local power, water and connectivity infrastructure needed for their data centers. This removes the pressure on the local utilities and results in higher development costs for the hyperscaler but more predictable long-term operating costs the hyperscaler has more control over.

Regulatory actions could pose a threat to data center demand as well as supply

While political and regulatory actions threaten to limit the supply of data center capacity in some markets, they also have the potential to constrain demand as well. Recent illustrations include Australia's (Aaa stable) November passage of legislation banning children under 16 from social media platforms and the December ruling by the US Court of Appeals for the District of Columbia upholding a federal law requiring that TikTok be banned in the US unless it cuts ties with its China-based parent company. While the ultimate outcome of these developments remains to be seen, they have significant implications for the data requirements of large technology companies operating in these markets, especially if they result in retaliatory measures in other markets.

More broadly, data center demand will also be affected by ongoing discussions about how to regulate AI technologies to guard against disinformation, copyright violations and privacy abuses. If regulations were to limit the application of AI, the projected computing needs for AI services may not materialize, potentially leading to excess capacity or stranded assets. This lack of clarity may constrain new supply over time as well.

The scope of such regulations will differ by jurisdiction. In December 2024, the senate approved AI legislation in Brazil (Ba1 positive) that would mandate copyright holders be reimbursed during the training of AI models, which may deter developers from using or investing in new Brazilian data centers. By contrast, the EU's (Aaa stable) Artificial Intelligence Act guarantees the right to delete proprietary data but does not mandate remuneration for its creation. The US currently lacks any such legislation, although numerous lawsuits on this matter are ongoing. Major technology companies like Google and Meta argue that data mining from the internet should remain free of copyright payments to original content creators.

Additional data center research from Moody's Ratings

This 2025 Outlook is the latest in a series of research reports that we have published during the past year on data centers.

Data Centers – Global: Rapid capacity growth to serve surging computing demand poses long-term risks, 15 July 2024

Data Centers - Artificial Intelligence: Tech giants' rapid buildout of data centers to meet AI demand is not without risk, 17 July 2024

Regulated Electric and Gas Utilities – US: Data center demand will increase credit risk without regulatory, contractual protections, 22 July 2024

Data Center REITs - US: Tenant demand will stay strong for at least five years; technology-update risk remains, 23 July 2024

Data Centers – Asia-Pacific: Rapid expansion broadens into new markets, offers benefits for some sectors, 24 July 2024

Infographic: Data center value chain will require more than $2 trillion to power the digital economy over the next five years, 25 July 2024

Electric Utilities and Power Companies – North America: Powering data centers with new nuclear capacity faces tech, regulatory challenges, 8 November 2024

Midstream Energy – North America: LNG and AI offer growth tailwinds, subject to regulatory and social hurdles, 14 October 2024

Manufacturing – Cross Region: Data center demand helps limit exposure to cyclical market forces for some companies, 8 October 2024

Regulated Electric and Gas Utilities – US: Potential for higher energy costs spurs efforts to address affordability concerns, 11 September 2024

Electric Utilities and Power Companies – US: Data center growth poses opportunities and credit risks for power providers, 8 April 2024

Talen Energy: Cumulus data center sale and associated power purchase agreement are credit positive, 18 March 2024

Data Centers – Mexico: Amazon's $5 billion Querétaro investment offers spillover benefits for data providers, 29 February 2024

REPORT NUMBER 1425327

Contacts

Ramzi Kattan +44.20.7772.1090
VP-Sr Credit Officer
ramzi.kattan@moodys.com

Jennifer Chang +1.212.553.3842
VP-Sr Credit Officer
jennifer.chang@moodys.com

Spencer Ng +65.6311.2625
VP-Sr Credit Officer
spencer.ng@moodys.com

Vincent Detilleux CFA +55.11.3043.7312
AVP-Analyst
vincent.detilleux@moodys.com

Celine Cherubin +33.1.5330.3366
VP-Sr Credit Officer
celine.cherubin@moodys.com

CLIENT SERVICES

Americas	1-212-553-1653
Asia Pacific	852-3551-3077
Japan	81-3-5408-4100
EMEA	44-20-7772-5454