First Street

FIRST STREET · 18TH RISK ASSESSMENT

Climate risk in global data center markets

Implications for Investment and Performance Across 97 Investible Markets.

June 2026

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Inside this report

ABOUT THIS REPORT

The 18th First Street Risk Assessment quantifies physical climate risk across 97 investible data center markets and its implications for underwriting, financing, and valuation.

OVERVIEW

Executive Summary

Global data center capacity is expanding rapidly, driven by AI and cloud demand, with capital flowing into both established and emerging markets. But site selection is increasingly constrained, not just by power, land, and permitting, but by long-term insurability and infrastructure reliability in a changing climate.

Climate risk already impacts data center markets. Approximately 54% of global capacity operates under chronic stress conditions such as extreme heat or water scarcity, while 79% is exposed to acute hazards, including flood, wind, or wildfire. These risks do not affect all markets equally, creating widening gaps in operating performance, financing conditions, and long-term valuation outcomes, as assets in higher-exposure locations face sustained cost pressures, greater outage risk, and increasing pressure on cash-flow durability.

Despite this, climate risk remains underpriced. Markets with similar demand and infrastructure fundamentals are being underwritten as equivalent, even as their long-term cost structures and reliability profiles diverge. This misalignment is beginning to show up in NOI stability, insurance availability, debt capacity, refinancing terms, and exit valuations.

For investors, lenders, and operators, the implications for data centers are clear: climate risk is no longer peripheral. It's a core driver of operating performance, valuation, and credit quality for data centers as an asset class, and it has to be built directly into underwriting, pricing, and capital allocation.

CHRONIC EXPOSURE · GLOBAL

54%

of global capacity exceeds defined thresholds for heat or drought.

ACUTE EXPOSURE · GLOBAL

79%

of capacity sits in markets with elevated flood, wind, or wildfire risk.

AT A GLANCE

Key Takeaways

01 Core data center markets are already responding to climate risk.

More than half of global data center capacity (54%) operates under chronic heat or water stress, and 79% faces elevated acute hazard exposure. These conditions are already affecting operating performance and should be reflected in base-case assumptions rather than downside scenarios.

02 Chronic and acute risks affect financial performance through different channels.

Chronic risks drive margin compression through higher energy and water costs and reduced efficiency, while acute risks introduce volatility through downtime, repair CAPEX, and insurance shocks. Together, they weaken NOI stability, increase cash flow uncertainty, and reduce the predictability of long-duration returns that institutional investors and lenders rely on.

03 Market equivalency assumptions are breaking down.

Markets with similar power costs and connectivity diverge materially once climate exposure is incorporated. High-growth hubs such as Northern Virginia, Johor, and Marseille face structurally different risk profiles than lower-exposure markets like the Nordics, with direct implications for underwriting assumptions, required returns, and portfolio allocation decisions.

04 Redundancy fails when regional infrastructure is stressed.

Backup systems depend on external power, water, and fuel infrastructure. During regional disruptions, these inputs can be constrained simultaneously, increasing the likelihood of performance degradation or downtime beyond modeled expectations.

05 Climate risk is underpriced, creating both risk and opportunity.

Current underwriting and valuation frameworks do not fully capture the impact of climate exposure on operating costs, uptime, and insurance costs. This creates a pricing gap between perceived and risk-adjusted value: a source of downside risk for mispriced assets, but also an opportunity for investors to differentiate markets and reprice risk more accurately.

MARKET CONTEXT

The Global Race to Build Data Centers

The expansion of cloud computing and artificial intelligence (AI) is increasing demand for digital infrastructure. Once a niche segment supporting enterprise IT, data center development has become a core engine of economic growth, now contributing significantly to global investment and GDP (World Economic Forum, 2025).

As demand grows, so does the investment landscape. Data centers combine real estate, power and utilities, semiconductors, and digital infrastructure into a single asset, making them increasingly systemically important to institutional real asset portfolios. Capital is flowing across this value chain, with UNCTAD identifying data centers as a major recipient of global foreign direct investment, reshaping cross-border capital flows (UNCTAD, 2025).

This capital deployment is funding a rapid expansion in capacity. Global installed capacity has increased from roughly 33 MW in 2015 to about 114 MW today (IEA, 2025a), and is expected to nearly double again by 2030, with more than 110 MW of additional capacity planned (IEA, 2025b) (Figure 1). The scale reflects the growth of AI workloads, which are far more compute-intensive than traditional applications, and the steady migration of the broader economy onto digital infrastructure.

Meeting this demand will require significant investment. Deal activity reached approximately $61 billion in 2025 (Reuters, 2025), and McKinsey estimates up to $5.2 trillion in global spending on data centers, IT equipment, and power infrastructure by 2030 (McKinsey, 2025).

Yet growth is increasingly constrained. Power availability, land access, and permitting timelines are already impacting delivery, especially in established hubs, with 30–50% of projects originally expected online in 2026 at risk of delay (Wang, 2026). In response, developers and investors are shifting toward secondary and emerging markets where power procurement, permitting, and land assembly are more achievable.

Site selection, as a result, now determines both data center viability and long-term risk-adjusted investment performance, depending heavily on grid capacity, transmission access, water availability, and regulatory alignment. This is creating a widening gap between sites that can be delivered on time and those that cannot.

Critically, climate risk remains insufficiently integrated into this process despite its direct impact on infrastructure reliability and long-term operability. Exposure to extreme heat, water stress, flooding, wind, and wildfire can materially affect power availability, cooling efficiency, insurance costs, and uptime, reshaping true site readiness beyond baseline infrastructure.

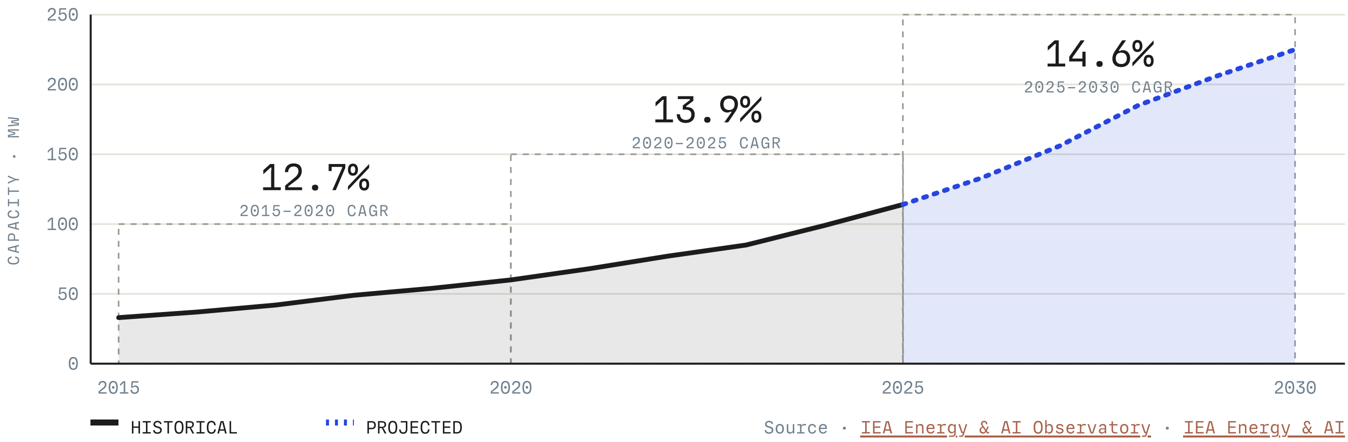


FIG. 01 Global Data Center Historical and Projected Capacity, 2015 - 2030

METHODOLOGY

A Framework for Understanding Climate Risk to Data Centers

Climate risk enters the data center through interconnected physical systems, each with distinct but interdependent failure modes (Figure 2). The building envelope, electrical infrastructure, and cooling systems operate as a coupled system, linked through shared dependencies on power, water, and external networks.

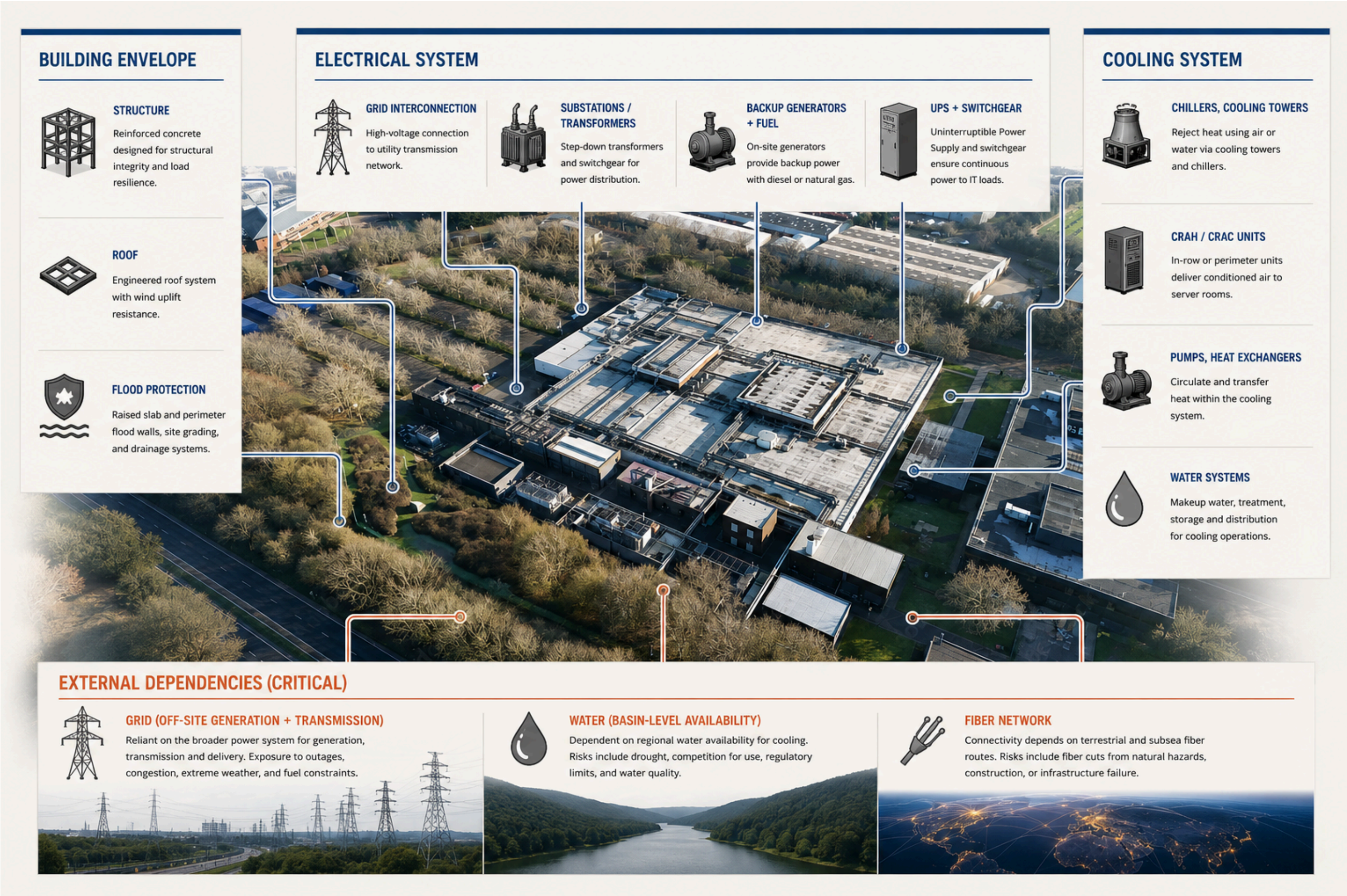


FIG. 02 Climate Risk Pathways in Data Center Infrastructure

Acute hazards such as flooding, wind, and wildfire drive rapid system disruption. Physical damage or upstream grid failure can cascade across systems, forcing a shift to backup power, destabilizing cooling, and ultimately interrupting IT operations. These are system-level outages, not isolated component failures.

Chronic stressors like heat and drought degrade performance over time. Higher ambient temperatures reduce cooling efficiency and increase energy demand, while water constraints limit cooling capacity or raise operating costs. These pressures feed through the electrical system as higher and more volatile loads, gradually reducing effective capacity and increasing maintenance intensity.

The distinction has real financial consequences and is increasingly relevant to underwriting, credit risk assessment, and portfolio stress testing. Acute risks generate event-based losses like downtime, repair CAPEX, and insurance claims, introducing volatility into cash flows. Chronic risks erode earnings through higher OPEX, reduced usable capacity, and shorter asset life, compressing margins in the base case. Both ultimately flow through NOI, debt service coverage ratios, asset valuation, and financing costs.

For underwriting, the critical issue is how risk moves through shared dependencies. The utilities that data centers rely on can be under stress simultaneously during regional events. Operators do account for this. Redundancy (backup power, cooling, and network paths) is built in to handle isolated failures. But it only works if those backups are available when needed. In normal conditions, systems perform as expected. But during more severe or prolonged disruptions, such as grid instability, fuel supply constraints, or water shortages, multiple inputs can be strained simultaneously. In these situations, backup systems may not fully offset the disruption, increasing the likelihood of reduced performance or downtime and directly affecting uptime reliability, operating costs, and cash flow stability.

How Climate Risk Has Impacted Data Centers

ACUTE

Texas Flooding: Acute Event Driving Outage and Loss

CENTRAL TEXAS, U.S.	FLOOD · ACUTE	2025	SUBSTATION · TRANSMISSION

In 2025, severe flooding across Texas disrupted power infrastructure, transportation networks, and access to critical facilities, affecting operations in one of the largest U.S. data center markets. The event followed a pattern seen in prior Texas storms, where grid instability and infrastructure disruption drive operational impact apart from just site-level damage.

Flooding impaired substations and transmission infrastructure, contributing to localized outages and forcing increased reliance on backup generation. During major storms in Texas, power outages have historically affected millions of customers, with restoration timelines ranging from hours to multiple days depending on severity.

For local data centers, the duration of downtime became the primary issue. Extended reliance on diesel generation increased fuel consumption and operational risk, while access constraints delayed maintenance and recovery. Even where facilities remained online, degraded operating conditions and risk exposure increased.

Financial impacts include business interruption, emergency operating costs, insurance losses, elevated future borrowing and insurance costs tied to increased perceived asset risk. Large-scale U.S. flood events have historically resulted in insured losses in the billions of dollars, with commercial properties—including data centers—facing rising insurance premiums and higher deductibles in subsequent underwriting cycles.

FLOOD RISK MAP

Depth of flooding for the asset and surrounding area

SOURCE · FIRST STREET FLOOD RISK MAP · 1-IN-500-YEAR SCENARIO

Example of flood risk to a data center located in central Texas with flooding in the surrounding area, affecting network access.

CHRONIC

UK Heatwave: Chronic Risk Breaching Design Limits

LONDON / UPMINSTER, UK	EXTREME HEAT · CHRONIC	JULY 2022	COOLING CAPACITY

In July 2022, record temperatures above 40°C in the UK forced outages at Google and Oracle data centers in London after cooling systems failed to maintain operating conditions. Google confirmed that cooling failures led to shutdowns in one of its London cloud regions, while Oracle reported similar service disruptions during the same event.

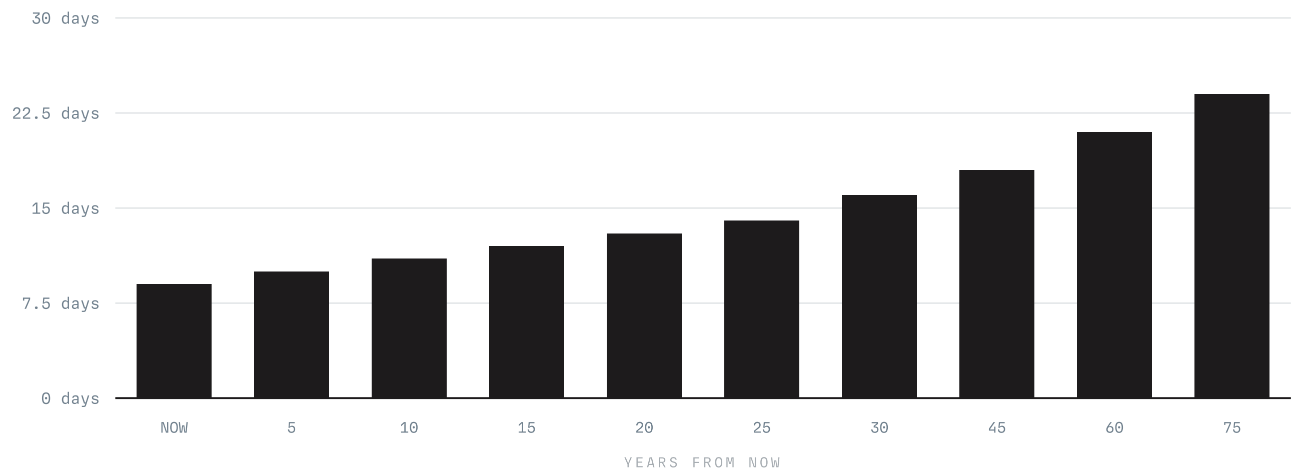
The issue was not physical damage, but cooling capacity exceeding design limits under extreme heat. UK temperatures surpassed prior records by more than 1.5°C, pushing conditions well beyond typical engineering assumptions for the region.

Operationally, this resulted in multi-hour outages and service degradation across cloud platforms, affecting enterprise customers relying on those regions. While direct financial losses were not publicly disclosed, downtime in hyperscale environments typically incurs SLA penalties and revenue impacts ranging from hundreds of thousands to millions of dollars per hour, depending on workload criticality.

More structurally, the event exposed a gap between modeled and actual cooling performance, raising questions around engineering assumptions embedded in underwriting and insurance models. In markets where extreme heat becomes more frequent, operators face rising energy consumption, accelerated equipment wear, and incremental CAPEX for cooling system upgrades or redundancy.

HEAT RISK OVER TIME

Number of hot days above 80°F



SOURCE · FIRST STREET HEAT FACTOR

Example of heat risk to a data center located in Upminster, UK, facing an increasing number of hot days.

How Climate Risk is Spread Across Data Center Investible Markets

To explore systematic risk across investible markets, First Street matched its hazard percentile rankings—aggregating acute risks (flood, fire, wind) and chronic risks (heat, drought)—to 97 global data center markets identified by Cushman & Wakefield.

The distribution shows that climate risk is already embedded in the majority of deployed capacity, with distinct implications for operating performance and asset durability.

CHRONIC EXPOSURE · GLOBAL

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of global capacity exceeds defined thresholds for heat or drought.

ACUTE EXPOSURE · GLOBAL

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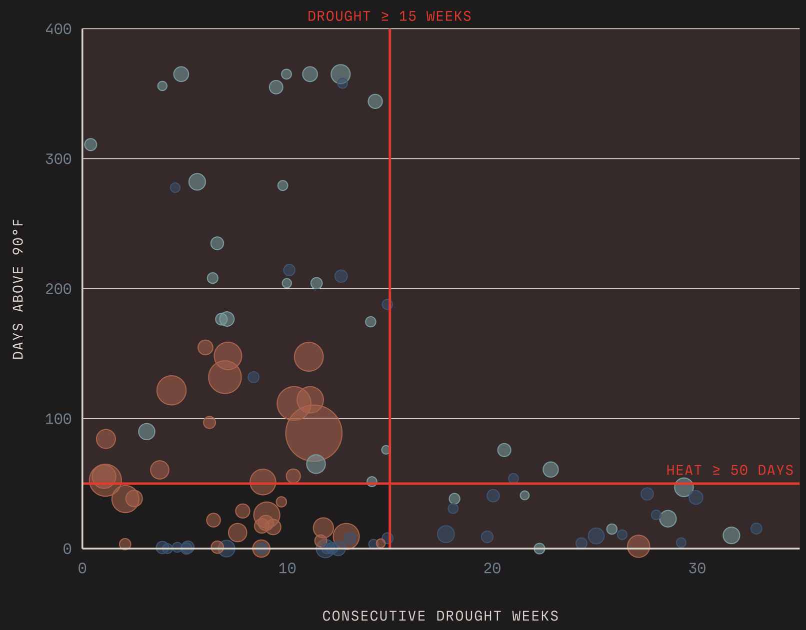
of capacity sits in markets with elevated flood, wind, or wildfire risk.

CHRONIC EXPOSURE



BUBBLE SIZE = CURRENT MARKET CAPACITY

FIG. 03 **Chronic risk to heat & drought across investible markets**

Note: Thresholds reflect validated climate risk levels associated with material disruption to data center operations, uptime, and infrastructure reliability.

54%

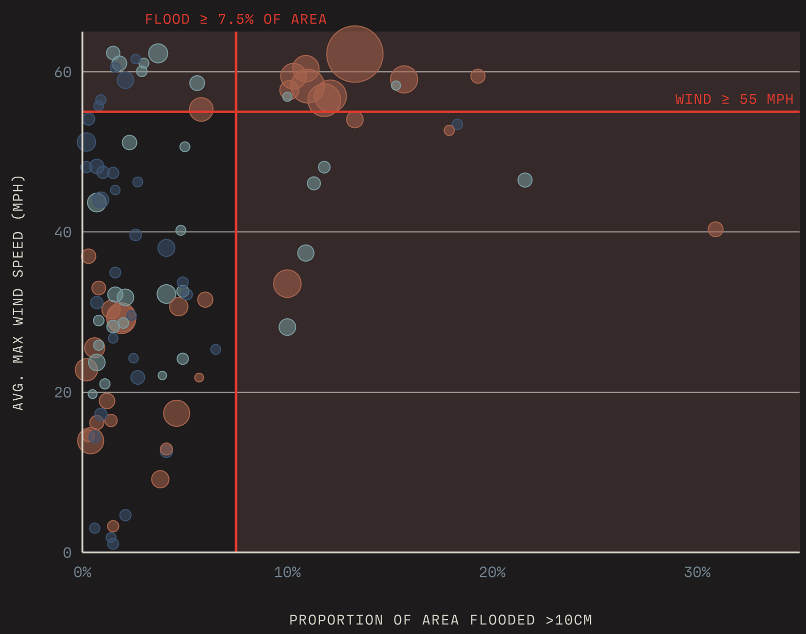
of data center capacity faces high chronic climate risk from heat or drought.

50%	46%	89%
AMERICAS	EMEA	APAC

Chronic exposure is both widespread and concentrated in high-capacity regions. Approximately 54% of global data center capacity operates in environments exceeding defined thresholds for heat or drought (Figure 3). Regionally, this exposure rises to 89% in APAC, compared to 50% in the Americas and 46% in EMEA. Past these thresholds—50+ days above 90°F annually, or droughts of 15+ consecutive weeks—baseline operating assumptions no longer hold.

In these markets, assets routinely run hotter and with more water constraints than they were designed for, eroding performance and putting sustained pressure on operating costs, capacity efficiency, and long-term NOI stability.

ACUTE EXPOSURE



BUBBLE SIZE = CURRENT MARKET CAPACITY

FIG. 04 **Acute risk to flood & wind across investible markets**

Note: Thresholds reflect validated climate risk levels associated with material disruption to data center operations, uptime, and infrastructure reliability.

79%

of data center capacity faces high acute climate risk from flood, wind, or wildfire.

86%	25%	60%
AMERICAS	EMEA	APAC

Acute risk exposure is even more pervasive. Approximately 79% of global capacity is located in markets exposed to elevated flood, wind, or wildfire risk, with regional exposure reaching 86% in the Americas, 60% in APAC, and 25% in EMEA (Figure 4). Severe acute risk thresholds, including average flood exposure exceeding 7.5% of the surrounding area or average wind speeds above 55 mph, mark the point where physical damage and outages become materially more likely, both at the site and across the infrastructure it depends on.

In these markets, outages are more frequent, and repair and insurance costs run above base case. The result isn't steady cost pressure but episodic disruption that adds volatility to cash flows and downside risk to NOI.

GEOGRAPHIC DISTRIBUTION

Geographically, these risks follow distinct but converging patterns. Chronic exposure is concentrated in regions already facing sustained heat and water constraints, including parts of the U.S., Southern Europe, the Middle East, India, and Southeast Asia (Figure 5). Acute risks cluster in coastal and fire-prone regions, including the southeastern United States, western U.S. wildfire corridors, and typhoon-exposed regions of East and Southeast Asia (Figure 6). Many of the largest and fastest-growing data center hubs sit within these zones, indicating that high-value infrastructure is systematically exposed to both forms of risk.

CHRONIC EXPOSURE PERCENTILE ● < 25% ● 25-50% ● 50-75% ● 75%+

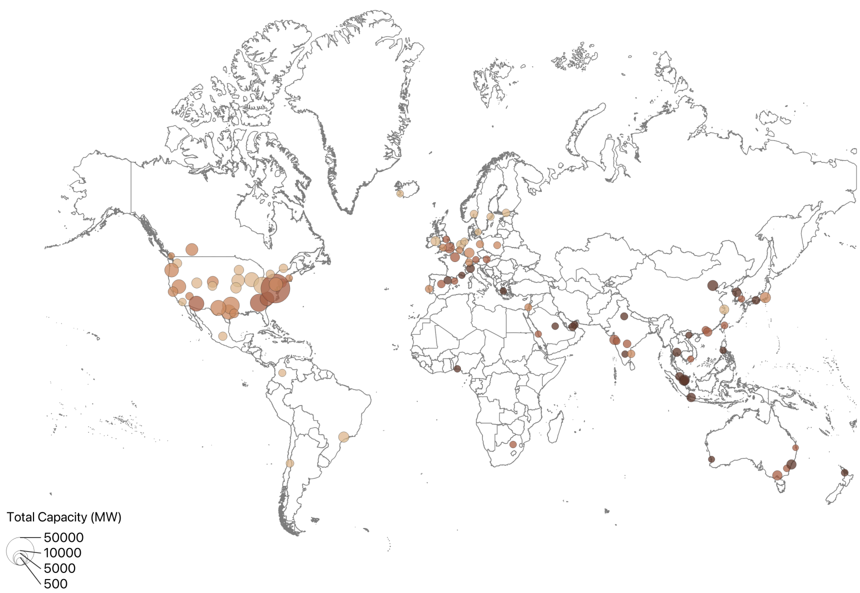


FIG. 05 Chronic climate risk · global distribution of data center markets

ACUTE EXPOSURE PERCENTILE ● < 25% ● 25-50% ● 50-75% ● 75%+

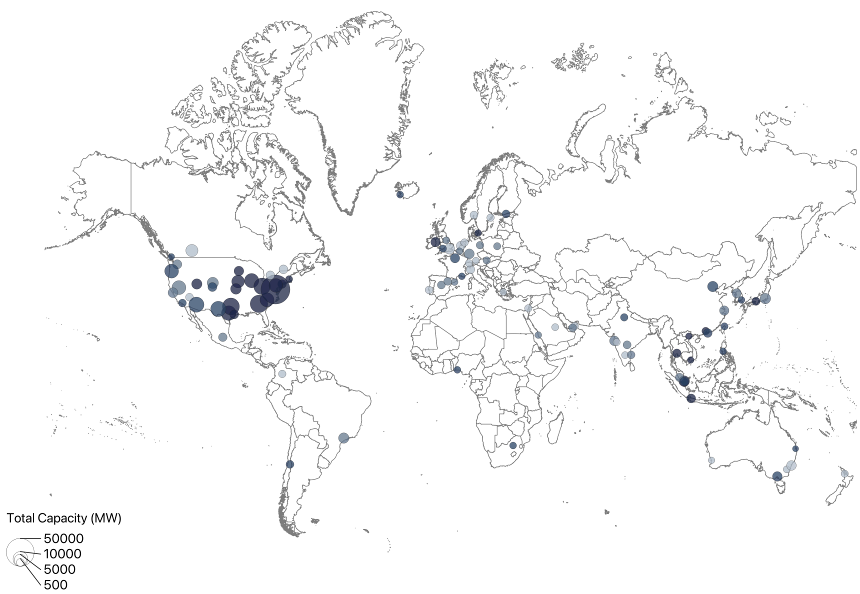


FIG. 06 Acute climate risk · global distribution of data center markets

THE NEW MARKET MAP

Climate Risk Differentiates Data Center Markets

When considered together, the interaction between chronic and acute exposure defines a more constrained investment landscape. Ranked across percentile climate exposure, investible markets' risk profile illustrates that a meaningful share of global capacity sits in areas with elevated exposure on both dimensions (Figure 7), where assets face a combination of higher baseline operating costs and increased outage risk.

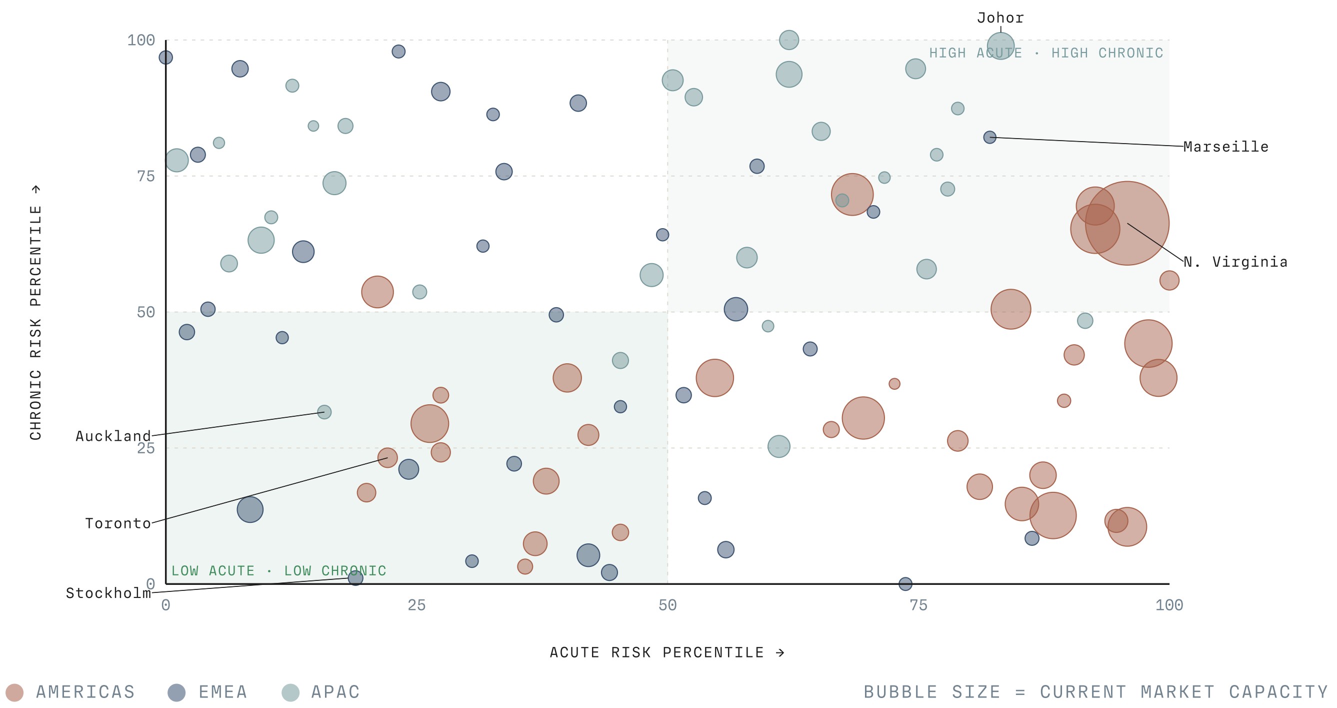


FIG. 07 Acute vs chronic climate risk rankings across investible data center markets

> The industry is concentrating some of its largest and fastest-growing hubs in some of the riskiest locations. Northern Virginia, Johor, and Marseille all sit in the highest exposure tier, while cooler, lower-hazard markets like Helsinki and the broader Nordics sit at the bottom. In other words, scale is being built where operating conditions are hardest, not where they're easiest.

THE NEW MARKET MAP · CONTINUED

In higher-exposure markets, climate risk affects both margin and volatility, compressing NOI through sustained cost pressure while increasing the likelihood of cash flow disruption. This creates a widening performance gap between markets capable of sustaining institutional return thresholds and those likely to experience structural degradation in operating economics.

The key takeaway isn't that climate risk is present, but that it's unevenly distributed in ways already shaping how these assets perform. As capital flows into both established and emerging markets, location will increasingly determine which data centers deliver the compute they were built for, and which quietly underperform for the life of the asset.

Tables 1 and 2 present the rankings of markets with the most and least climate risk, respectively.

TABLE 01

Top 10 markets · most climate risk

Rank	Region	Market	Country
01	APAC	Johor	MY
02	APAC	Singapore	SG
03	APAC	Batam	ID
04	EMEA	Marseille	FR
05	AMERICAS	Carolinas	US
06	AMERICAS	Virginia	US
07	APAC	Bangkok	TH
08	AMERICAS	Atlanta	US
09	AMERICAS	New York / N. New Jersey	US
10	APAC	Beijing	CN

TABLE 02

Top 10 markets · least climate risk

Rank	Region	Market	Country
01	EMEA	Stockholm	SE
02	EMEA	London	GB
03	EMEA	Copenhagen	DK
04	AMERICAS	Toronto	CA
05	AMERICAS	Bogotá	CO
06	AMERICAS	SF Bay Area	US
07	EMEA	Amsterdam	NL
08	AMERICAS	Montreal / Quebec	CA
09	EMEA	Oslo	NO
10	EMEA	Dublin	IE

● AMERICAS ● EMEA ● APAC

Note: Rankings are based on the composite risk score across acute and chronic climate risk, as defined in Figure 7.

THE PRICING GAP

Climate Risk Remains Underpriced Across Data Center Markets

The distribution of climate risk across investable data center markets has direct implications for underwriting and capital allocation. Markets that appear equivalent on power costs, connectivity, and demand fundamentals can perform very differently once climate exposure is priced in.

Chronic risk shifts base-case performance through higher and less predictable operating costs, while acute risk introduces episodic losses that increase cash flow volatility. Together, they weaken NOI durability, constrain debt capacity, and raise refinancing and repricing risk over the life of the asset.

This creates a pricing gap. Capital continues to flow into the highest-exposure markets, yet required returns, insurance structures, and underwriting models have not fully adjusted. The result is a growing disconnect between current valuations and forward-looking physical risk exposure.

As these risks materialize, they will not appear as isolated events but as a combination of margin compression and intermittent disruption. Over time, this will separate markets that can sustain stable operating performance from those facing persistent cost pressure and higher outage risk.

For investors and lenders, the implication is straightforward: climate risk must move from a secondary consideration to a core underwriting input. This includes adjusting operating assumptions, stress-testing downtime and insurance availability, and differentiating markets based on long-term infrastructure reliability. Where this gap persists, it represents both a source of downside risk and an opportunity to reprice assets more accurately.

> As capital flows into both established and emerging markets, location will increasingly determine which data centers deliver the compute they were built for, and which quietly underperform for the life of the asset.