XDI
Cross Dependency Initiative

XDI BENCHMARK SERIES

2026 Global Analysis of Planned Data Centres for Physical Climate Risk and Resilience

The hidden climate risks facing the world's data centre infrastructure boom

KEY FINDINGS

June 2026

Cross Dependency Initiative

Published by XDI
(Cross Dependency Initiative)

About XDI

Experts in physical climate risk since 2007

Backed by a team of specialists across science, engineering and software development, XDI (Cross Dependency Initiative) combines asset, climate change and contextual data to determine asset vulnerability, hazard exposure and the likely physical and financial impacts on assets from climate change and extreme weather.

Our data has been helping global leaders price physical climate risk since 2007, making the group the world's longest standing independent specialist in physical climate risk and adaptation analytics.

Today, XDI works with governments, corporates and the international finance sector, providing cutting edge analysis to help make informed decisions. XDI is part of The Climate Risk Group, a group of companies committed to quantifying and communicating the costs of climate change.

XDI believes that physical climate risk data needs to be accessed and understood by everyone, including citizens and civil society organisations. To support this, XDI regularly releases public datasets to generate debate and understanding about the costs of climate change.

In 2025 XDI was named market leader in two of the world's most prestigious independent evaluations of climate risk analytics - the Forrester Wave™: Climate Risk Analytics Software and Verdantix's Smart Innovators: Physical Climate Risk Solutions.

XDI's goal is to accelerate action on climate change by embedding physical climate risk data in all decisions

FORRESTER®
Wave Leader
Forrester Wave Report, Climate Risk Analytics Software, Q2 2025

verdantix
Smart Innovator
Verdantix Smart Innovator Report, Physical Climate Risk Solutions 2024

“

The question is no longer simply where the next generation of digital infrastructure gets built - but whether those assets can remain operational, insurable and economically resilient over their intended life.

Dr Karl Mallon

XDI Founder and Head
of Science and Technology

Contents

Foreword

The global race to build AI and digital infrastructure is accelerating at extraordinary speed.

Governments are competing to attract investment. Hyperscale operators are expanding rapidly. Infrastructure funds, asset managers and institutional investors are committing billions of dollars to new data centre developments around the world.

This new infrastructure will help shape the future economy.

But while much of the public debate has focused on energy demand and water consumption, another challenge is emerging: **physical climate risk**.

As the climate changes, extreme weather events including flooding, coastal inundation, forest fire, cyclones and extreme heat are becoming more frequent and severe. For data centres - infrastructure built around near-continuous uptime expectations - even short periods of disruption can have outsized financial and operational consequences.

The risk extends beyond direct damage. Modern data centres are increasingly concentrated, high-value assets, with a single AI-enabled facility capable of representing many billions of dollars in investment and supporting critical economic activity. At the same time, they remain dependent on surrounding infrastructure systems - including electricity networks, telecommunications, water supply, transport access and global supply chains.

A data centre designed to remain operational during an extreme weather event may still fail if surrounding infrastructure is not.

As data centres grow in scale and concentration of value, insurers are paying increasing attention to catastrophe exposure and operational risks. Swiss Re[1] projects global insurance premiums associated with data centres could rise from US$10.6 billion today to US$24.2 billion by 2030.

Importantly, however, future risk is not fixed.

Unlike existing infrastructure, planned data centres create a window of opportunity. Decisions made today about **site selection, engineering standards and resilience investment** may materially influence future performance, insurability and operational continuity.

This report provides an early global view of where planned data centre infrastructure may require greater resilience to withstand future climate conditions - and where investment in resilience may materially improve outcomes.

[1] *Swiss Re Institute (2026), Insuring AI: data centre value accumulation risks (Sigma Insights).*

About this report

This '**2026 Global Analysis of Planned Data Centres for Physical Climate Risk and Resilience - Key Findings**' report presents selected findings from XDI's global analysis of physical climate risk and resilience across planned data centre infrastructure. It builds on the 2025 Global Data Centre Physical Climate Risk and Adaptation Report, with the inclusion of new hazards, indirect risk and the focus on planned data centres. Data centre location data used in this analysis was provided by Data Center Map.

The analysis considers:

- Physical damage to data centre infrastructure
- Operational disruption from heat
- Infrastructure dependency considerations
- Indirect risk, including supply chain risk
- Different resilience specifications for construction
- Forward looking risk under different climate scenarios.

Because detailed engineering specifications are not publicly available for most planned facilities globally, the report uses engineering-based infrastructure archetypes to represent different resilience specifications and assess how design choices may influence future performance.

Although analysis is available across multiple climate scenarios and years from 1990–2100, this public report focuses primarily on 2026 to identify locations where resilience planning and deeper due diligence may already be warranted.

What was analysed?

2,595

Planned data centres globally.

5 categories of data centres

Data centres categorised by type: hyperscale, co location, neocloud, enterprise, government.

11 climate hazards

Risk of damage and disruption from 11 climate change hazards.

Indirect Risk

Indirect risk including supply chain risk.

High Risk Properties 2026

Number and percentage of high risk data centres in 2026 and how average risk changes over time under a high emissions scenario (RCP 8.5 / SSP 5-8.5).

Hazards

Riverine Flooding
A riverine flood occurs when a river, stream, or other watercourse exceeds its capacity and overflows onto surrounding land.

Surface Water Flooding
A surface water flood occurs when rainfall exceeds the capacity of the ground, drainage systems, or infrastructure to absorb or manage it.

Coastal Inundation
Sea water flooding due to high tides, wind, low air pressure and waves can damage coastal land, infrastructure and buildings.

Extreme Wind
Unusually strong winds that exceed typical wind speeds associated with weather systems.

Extreme Heat
Extreme Heat refers to sustained periods of unusually high temperatures compared to the historical climate of a location.

Forest Fire
A destructive fire that spreads via trees and forest. This definition does not include grass fires.

Freeze-Thaw
Freeze-thaw is the process by which porous materials such as concrete, brick and stone are damaged when liquid water freezes and the ice expands inside them, causing microscopic damage.

Tropical Cyclone Wind
Tropical cyclone winds are the strong, rotating winds associated with tropical cyclones (also known as hurricanes or typhoons depending on the region).

Tropical Cyclone Storm Surge
Tropical cyclone storm surge is the abnormal rise in sea level that occurs when a tropical cyclone (also known as a hurricane or typhoon depending on region) makes landfall or moves over coastal areas.

Soil Movement
Soil movement as a result of drought, causing contraction of clay soils, that can lead to the foundations of an asset shifting.

Landslide
The downward movement of rock, soil, and debris under the influence of gravity. Intense rainfall is one of the most common causes of landslides.

How to interpret the findings

Why focus on planned data centres?

This report focuses on planned infrastructure because decisions made before construction may influence future outcomes.

The global expansion of AI and digital infrastructure is creating a new wave of infrastructure investment. Decisions made today about site selection, engineering standards and resilience may influence future operational performance.

Why use a high emissions scenario for analysis of future risk?

RCP 8.5/SSP5-8.5 is used as a stress-testing scenario. Data centres are critical infrastructure where even short periods of disruption can have significant operational and financial consequences. Assessing risk under severe but plausible future climate conditions helps identify vulnerabilities and resilience requirements that may not be visible under lower-impact scenarios.

How is risk measured?

High, Moderate or Low Risk Properties (HRP, MRP or LRP).

In this report, data centres are categorised into High, Moderate or Low Risk Properties. These classifications are calculated by determining each property's probability of incurring direct financial loss from climate-related damage to infrastructure in any given year, and is expressed as a percentage of the replacement cost of each building. This percentage is known as Value at Risk. It does not include the cost of contents such as servers.

As the analysis looks at Value at Risk over decades, and because climate change damage risk is assumed to only ever be increasing, not decreasing, we use the term 'Maximum-to-Date Value at Risk', known as MVAR. This removes any short term anomalies.

High Risk: MVAR ≥ 1.0%

High probability of physical damage of a data centre within the design life of the building resulting from climate change hazard impacts. Data centres in this category face a high risk of insurance becoming increasingly expensive or dangerously underinsured. Adaptation is essential to ensure the ongoing viability of the data centre.

Moderate Risk: MVAR ≥ 0.2% - MVAR < 1.0%

Data centre is exposed to extreme weather and climate change hazards capable of causing significant damage and resulting in increasing insurance costs - though probabilities or severities are moderate. Insurance is likely to be available, but expensive. Adaptation is recommended.

Low Risk: MVAR < 0.2%

Data centre is either not exposed to known extreme weather and climate change related hazards, or the probabilities and severities are very low. The net probability of significant disruption or damage is low and within typical industry and insurance provider risk tolerances for these data centres.

Increase in damage risk from extreme weather and climate change hazards

This metric looks at the increase in risk of damage across all data centres and from all hazards, from 2026 until 2100. This metric is important, because an asset's risk may increase significantly over a given period of time, but it still may not cross over a risk band threshold e.g. from Moderate Risk to High Risk.

What this report is designed to help readers do

This report is intended as an early global screening analysis to support comparison, prioritisation and further investigation.

It is designed to help readers:

- Identify locations where resilience requirements may become increasingly important
- Understand which hazards may shape future operating conditions
- Compare resilience requirements across major investment markets
- Explore how resilience requirements may evolve over time
- Understand where operational continuity may be challenged by extreme heat
- Consider how infrastructure dependencies may influence outcomes
- Prioritise locations for deeper due diligence and resilience assessment.

When interpreting the findings:

- Rankings indicate locations where further due diligence is warranted
- Results are shown under both low resilience and advanced resilience construction settings to illustrate how resilience may influence outcomes
- Extreme heat findings should be interpreted separately from physical damage findings as they are measured using different metrics.

North America

1599	73	5%
Assets Analysed	High Risk Properties	% of High Risk Properties

87% Increase in average damage risk 2026-2100

Europe

623	45	7%
Assets Analysed	High Risk Properties	% of High Risk Properties

289% Increase in average damage risk 2026-2100

East Asia

96	12	13%
Assets Analysed	High Risk Properties	% of High Risk Properties

209% Increase in average damage risk 2026-2100

Oceania

67	3	4%
Assets Analysed	High Risk Properties	% of High Risk Properties

339% Increase in average damage risk 2026-2100

Latin America and Caribbean

64	7	11%
Assets Analysed	High Risk Properties	% of High Risk Properties

237% Increase in average damage risk 2026-2100

South East Asia

45	9	20%
Assets Analysed	High Risk Properties	% of High Risk Properties

183% Increase in average damage risk 2026-2100

South Asia

43	5	12%
Assets Analysed	High Risk Properties	% of High Risk Properties

267% Increase in average damage risk 2026-2100

West Asia

30	0	0%
Assets Analysed	High Risk Properties	% of High Risk Properties

44% Increase in average damage risk 2026-2100

Russia and Central Asia

16	0	0%
Assets Analysed	High Risk Properties	% of High Risk Properties

59% Increase in average damage risk 2026-2100

Sub Saharan Africa

10	0	0%
Assets Analysed	High Risk Properties	% of High Risk Properties

57% Increase in average damage risk 2026-2100

North Africa

2	0	0%
Assets Analysed	High Risk Properties	% of High Risk Properties

17% Increase in average damage risk 2026-2100

Key Findings

Climate resilience is already an operational risk for digital infrastructure - and the risks are increasing

Data centres are designed for high-availability environments. However, XDI's physical damage and operational disruption analysis indicates that both current and future climate conditions may increasingly affect operational continuity, insurance, maintenance requirements and long-term asset performance.

The findings suggest climate resilience should now be treated as a strategic infrastructure consideration alongside power availability, connectivity and land access.

Key indicators from the analysis include:

- **154** planned data centres around the world were identified in this analysis as being high risk in 2026 when low resilience settings were applied. Almost half of these are in North America.
- South East Asia, East Asia and South Asia have the highest proportion of data centres at risk, at **20%, 13%** and **12%** respectively. This risk is modelled to more than triple in these regions by the end of the century.

Indirect risk has long been underestimated

Data centres do not operate in isolation. Even highly resilient facilities remain dependent on surrounding infrastructure systems including electricity networks, transport access, telecommunications, water supply and supply chains.

- XDI analysis of a synthetic portfolio of data centres across Europe indicates that the risk of disruption to their operations **increased ten-fold** when indirect risk was included.
- In the extreme heat analysis, surrounding infrastructure systems in several countries were modelled to face substantially higher disruption risk than the data centres themselves. This was particularly notable in Indonesia, Brazil, Mexico, Spain, India, the United States and Malaysia.

These findings indicate indirect operational disruption risk will increasingly become a critical resilience challenge for global digital infrastructure.

Major global investment hubs are emerging as climate risk hotspots

Several leading destinations for data centre investment also recorded elevated concentrations of planned facilities at high risk of physical damage and/or operational disruption, highlighting growing tension between infrastructure expansion and long-term climate resilience.

France: Coastal inundation and regional risk concentration

- At US$69 billion in 2025, foreign investment in France's data centre infrastructure dwarfs anywhere else in the world (see map p10-11). Yet in this analysis, France ranked as **the world's fifth riskiest country** for planned data centres when assessing modelled physical damage risk from climate change hazards.
- This risk was modelled to i**ncrease more than four-fold** (+300%) by the end of the century.
- Nouvelle-Aquitaine emerged as a major hotspot, with all planned data centres analysed as high risk under both low and advanced resilience settings.

United States: Lower national risk, large state-level variation

While the United States ranked lower globally for modelled physical damage risk than many emerging data centre markets, the scale of development means even relatively small percentages translate into large numbers of potentially affected facilities.

- 69 US planned data centres were modelled to be high risk in this analysis using low resilience settings. In **9 US states, 20% or more** planned data centres analysed were classified as high risk highlighting the need for due diligence in these locations.
- Oklahoma recorded the highest concentration of risk, with 67% of planned facilities modelled to be high risk.
- In Oklahoma, Arkansas, Kansas and New Jersey, 16–38% of planned facilities remained high

risk even when advanced resilience design specifications were applied.

- Utah, Wyoming, Montana, Nevada, Colorado and Idaho also recorded some of the highest operational disruption indicators linked to extreme heat.
- In 2025 the United States received US$29 billion foreign investment in data centres.

National averages often mask concentrated resilience challenges

Results varied significantly within countries. Subnational analysis identified locations where modelled resilience requirements diverged materially from national averages.

Examples include:

- Nouvelle-Aquitaine (France)
- São Paulo and Ceará (Brazil)
- Queretaro (Mexico)
- Oklahoma (United States)
- Jawa Barat (Indonesia).

South East Asia is the world's most climate-challenged region for planned data centre infrastructure

- **One in five** (20%) planned data centres in South East Asia are modelled to be high risk using low resilience settings - the highest in the world. Even when the advanced resilience settings are applied, more than **1 in 10** (11%) remain at high risk.
- Thailand recorded the highest proportion of planned high risk data centres among major investment markets analysed, with **33–56%** of planned facilities classified as high risk.
- Vietnam and Thailand ranked first and second globally for modelled physical damage risk under low resilience settings.
- Across South East Asia, the majority of data centre hubs showed elevated risk of operational disruption from extreme heat, and most concerningly, the risk from this hazard was modelled to be increasing over time at an alarming rate ("very fast" for most South East Asian countries).

Higher resilience standards materially reduce risk - but do not eliminate it everywhere

- Results showed that data centres designed to prioritise resilience to extreme weather faced substantially lower modelled physical damage risk in multiple markets.
- However, some locations continued to model elevated damage risk even when using advanced-resilience specifications, suggesting resilient design may materially reduce risk but not fully offset location-specific climate challenges.
- Locations where modelled risk remained elevated even when using advanced-resilience settings included Nouvelle-Aquitaine (France), New Jersey (United States), Vietnam and Thailand.

Extreme heat is emerging as a major operational resilience challenge

Unlike flooding or cyclone damage, extreme heat often disrupts operations without permanently damaging the asset itself.

Particularly notable:

- Planned data centres analysed in Brazil, India, Mexico, Indonesia and Spain recorded some of the most acute projected operational disruption risk from extreme heat globally, with 75% or more of assets analysed at high risk, and with risk projected to escalate rapidly over time.
- In multiple US states - Utah, Wyoming, Nevada and Montana - all datacentres recorded extremely high operational disruption indicators linked to heat.

Operational heat risk is accelerating in unexpected markets

Some of the most rapid increases in modelled risk linked to heat occurred in markets not traditionally viewed as major heat-risk hotspots for data centre operations, including France, Canada and Australia.

These findings suggest operational heat risk may increasingly become a resilience consideration even in regions historically perceived as climatically favourable.

Global map showing data centre investment hubs and climate risk

Climate resilience indicators for major data centre investment hubs

Recent global investment analysis shows foreign investment in data centres is concentrated in a relatively small number of markets, several of which also emerge as notable climate risk hotspots in this analysis. The following map shows key physical climate risk indicators for some of these countries.

Results for low resilience settings were applied.

Investment figures provided by UNCTAD Global Investment Trends Monitor No. 50.

While not included in the UNCTAD analysis, the United Kingdom and Japan have also emerged as significant destinations for recent AI and data centre investment. In the United Kingdom, technology companies are expected to invest approximately £25 billion in AI and digital infrastructure over the next five years, supported by the government's AI Growth Zone programme and a substantial pipeline of new data centre developments.

In Japan, AWS, Microsoft and Oracle have collectively announced approximately US$26 billion in AI and data centre investment, highlighting the country's growing importance as a regional hub for cloud and AI infrastructure.

Japan

55 Assets Analysed | 5 High Risk Properties | 9% % of High Risk Properties

283% Increase in average damage risk 2026-2100

Risk of disruption from extreme heat 2026: MODERATE

Rate of increase of risk of disruption from extreme heat 2026-2050: MID PACE

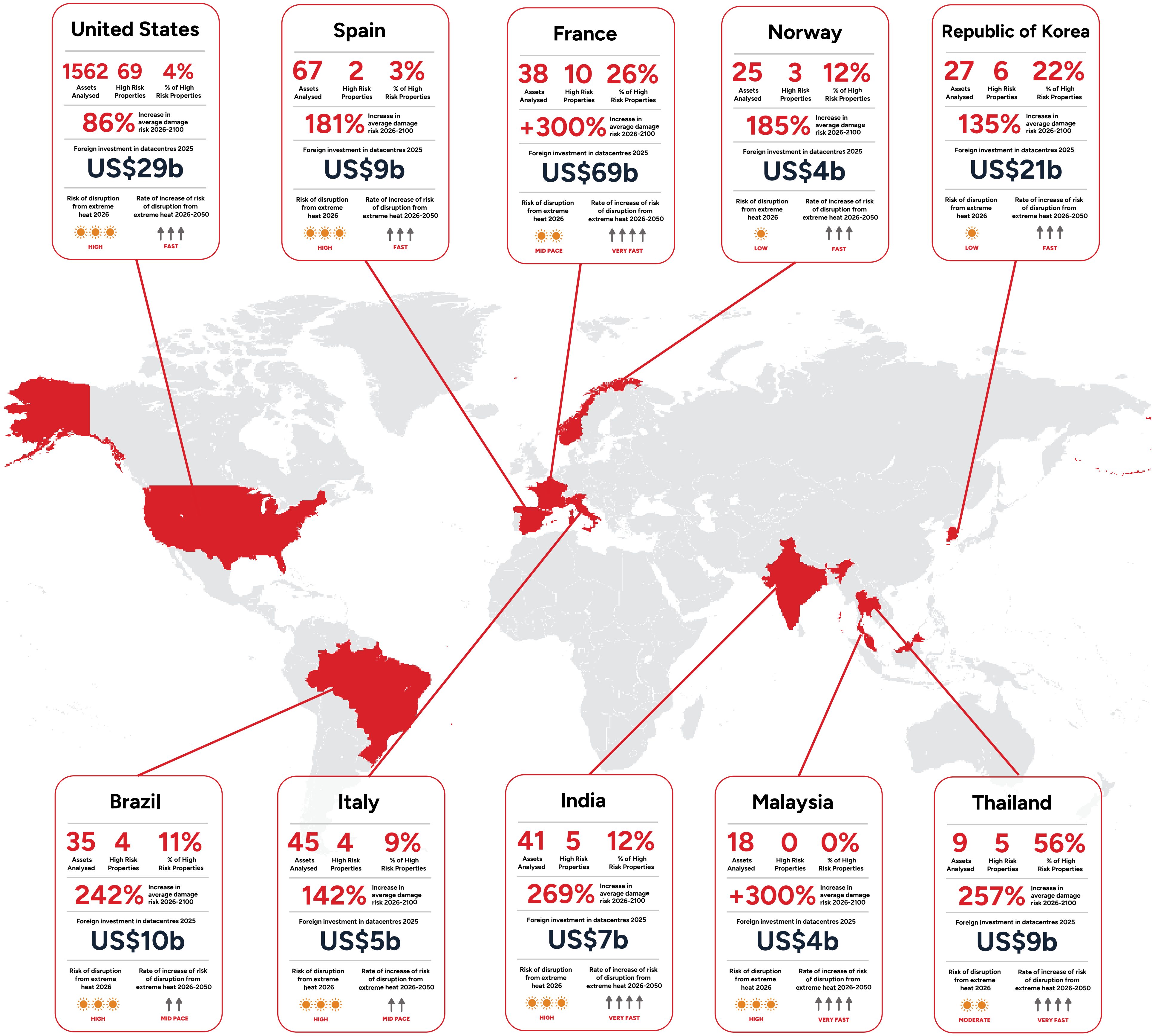
United Kingdom

162 Assets Analysed | 6 High Risk Properties | 4% % of High Risk Properties

330% Increase in average damage risk 2026-2100

Risk of disruption from extreme heat 2026: LOW

Rate of increase of risk of disruption from extreme heat 2026-2050: SLOW



Global Rankings: Where resilience requirements may be greatest

This section highlights locations where planned data centre infrastructure may require greater resilience or even relocation to maintain long-term performance under future climate conditions.

Rankings are intended to identify broad patterns and support further investigation.

- Only countries and states with **three or more planned data centres analysed** are included in ranking tables.
- Rankings are based on modelled physical damage risk in 2026 using low resilience settings.
- Results under **advanced resilience settings** are also shown to illustrate how different engineering and resilience specifications may influence outcomes. These results should be interpreted as an achievable benchmark for resilient design rather than an assumption about actual construction standards.
- Extreme heat is not included in the rankings. Heat is assessed separately because it primarily influences operational continuity rather than direct physical damage.
- Heat indicators are shown in the tables below, and are only included for locations where the planned data centres analysed exceeded elevated operational disruption thresholds linked to extreme heat, or where this risk - even if low today - is increasing rapidly, suggesting it may quickly exceed existing heat design thresholds.

Understanding the ranking tables

Metric	Definition
HRP% 2026 Low resilience settings	The percentage of High Risk Properties identified in 2026 using low resilience engineering specifications for data centre construction. Used as the primary basis for ranking. Data centres in this category can expect to find insurance increasingly challenging.
HRP% 2026 Advanced resilience (adapted) settings	The percentage of High Risk Properties identified in 2026 using advanced resilience engineering specifications. Included to illustrate how resilience measures may influence outcomes and should be interpreted as an achievable benchmark rather than an assumption about actual construction standards.
Change in modelled damage risk 2026–2100	The modelled increase in average damage risk between 2026 and 2100 under a high emissions scenario. This indicates how resilience requirements may change over time even where current risk remains relatively low. Extreme heat is not included.

Heat disruption indicators

What is 'Extreme Heat'?

Extreme Heat refers to sustained periods of unusually high temperatures compared to the historical climate of a location. Rather than being defined by a single universal temperature, Extreme Heat is generally measured relative to local conditions and occurs when temperatures remain significantly above typical maximum temperatures over multiple days.

Extreme temperatures can cause the failure of various systems that an asset needs to function. An asset's Extreme Heat Failure Threshold refers to a specific temperature limit that a particular asset can withstand before it malfunctions, degrades, or fails due to excessive heat.

The heat disruption indicators below are specific to this data centre analysis and reflect the high uptime requirements of data centre infrastructure.

Note: Indicators are only provided for locations at elevated risk. Absence of heat indicators does not mean no risk from heat.

Symbol	Indicator	Interpretation
☀☀☀	**High disruption indicator**	At least one analysed data centre has been identified as being at high risk of operational disruption associated with extreme heat. Failure frequency is inconsistent with Uptime Institute Tier III–IV uptime expectations of ≤1.6 hours downtime per year. In the most severe cases, heat-driven disruption is a recurring operational expectation, not a tail risk.
☀☀	**Moderate disruption indicator**	At least one analysed data centre has been identified as being at moderate risk of operational disruption associated with extreme heat. No analysed facilities were identified as being at high disruption risk.
☀	**Low disruption indicator**	No analysed data centres were identified as being at moderate or high disruption risk under the assumptions used in this analysis.

Heat trajectory indicators

Symbol	Indicator	Interpretation
↑	**Slow**	Slow modelled increase in heat disruption risk over time
↑↑	**Mid-pace**	Moderate modelled increase in heat disruption risk
↑↑↑	**Rapid**	Rapid modelled increase in heat disruption risk
↑↑↑↑	**Very Rapid**	Very rapid modelled increase in heat disruption risk

Country Rankings: Top 25 countries ranked for risk of damage from climate change extreme weather in 2026

Rank	Country	Number of new data centres analysed	HRP% 2026 Low resilience settings	HRP% 2026 Advanced resilience settings	Change in modelled damage risk 2026–2100	Driving hazard 2026	Risk of operational disruption from extreme heat 2026	How is risk from extreme heat increasing over time?
1	**Vietnam**	3	67%	67%	81%	Coastal Inundation	☀☀ *	↑↑↑↑ *
2	**Thailand**	9	56%	33%	257%	Coastal Inundation	☀☀	↑↑↑↑
3	**Switzerland**	3	33%	0%	147%	Riverine Flooding		
4	**México**	11	27%	0%	203%	Surface Water Flooding	☀☀☀	↑↑↑↑
5	**France**	38	26%	18%	>300%	Coastal Inundation	☀☀	↑↑↑↑
6	**Netherlands**	12	25%	0%	83%	Surface Water Flooding		
7	**Singapore**	4	25%	0%	>300%	Surface Water Flooding		
8	**Republic of Korea**	27	22%	7%	135%	Surface Water Flooding	☀	↑↑↑
9	**Indonesia**	8	13%	0%	103%	Riverine Flooding	☀☀☀	↑↑↑↑
10	**Finland**	41	12%	0%	85%	Surface Water Flooding		
11	**India**	41	12%	7%	269%	Tropical Cyclone Storm Storm	☀☀☀	↑↑↑↑
12	**Norway**	25	12%	0%	185%	Surface Water Flooding		
13	**Brazil**	35	11%	0%	242%	Coastal Inundation	☀☀☀	↑↑
14	**Canada**	37	11%	3%	145%	Surface Water Flooding	☀☀☀	↑↑↑

15	**China**	11	9%	0%	96%	Surface Water Flooding	☀	↑↑↑↑
16	**Japan**	55	9%	5%	283%	Tropical Cyclone Storm Surge	☀☀	↑↑
17	**Italy**	45	9%	0%	142%	Riverine Flooding	☀☀☀	↑↑
18	**Portugal**	12	8%	0%	>300%	Riverine Flooding	☀☀	↑↑
19	**Ireland**	55	7%	4%	>300%	Coastal Inundation		
20	**Denmark**	37	5%	3%	>300%	Coastal Inundation		
21	**Germany**	79	5%	1%	135%	Surface Water Flooding	☀☀	↑↑↑
22	**Australia**	61	5%	0%	>300%	Surface Water Flooding	☀☀	↑↑↑↑
23	**US**	1562	4%	1%	86%	Surface Water Flooding	☀☀☀	↑↑↑
24	**UK**	162	4%	0%	>300%	Riverine Flooding		
25	**Spain**	67	3%	1%	181%	Coastal Inundation	☀☀☀	↑↑↑

** The heat indicators for Vietnam are for the Ho Chi Minh region only, where 2 out of the 3 planned data centres analysed for the country are located.*

Subnational Rankings: Top 30 states around the world ranked for risk of damage from climate change extreme weather in 2026

Rank	Country	State	Number of new data centres analysed	HRP% 2026 Low resilience settings	HRP% 2026 Advanced resilience settings	Change in modelled damage risk 2026–2100	Hazard - physical damage risk	Risk of operational disruption from heat	How is risk from extreme heat increasing over time?
1	France	Nouvelle-Aquitaine	6	100%	**100%**	>300%	Coastal Inundation	☀	↑↑↑↑
2	US	Oklahoma	8	63%	**38%**	27%	Forest Fire	☀☀☀	↑↑↑
3	Brazil	Rio de Janeiro	6	50%	**0%**	209%	Coastal Inundation		
4	Republic of Korea	Seoul	7	43%	**14%**	49%	Surface Water Flooding	☀	↑↑↑
5	Italy	Lazio	5	40%	**0%**	29%	Surface Water Flooding	☀☀	↑↑
6	México	Querétaro	8	38%	**0%**	>300%	Surface Water Flooding	☀☀☀	↑↑↑
7	France	Hauts-de-France	3	33%	**33%**	>300%	Coastal Inundation		
8	US	Arkansas	3	33%	**33%**	194%	Riverine Flooding	☀☀	↑↑
9	Spain	Comunidad Valenciana	3	33%	**33%**	9%	Coastal Inundation	☀☀	↑↑
10	US	Kansas	6	33%	**17%**	21%	Riverine Flooding	☀☀☀	↑↑↑
11	Netherlands	Noord-Holland	9	33%	**0%**	83%	Surface Water Flooding		
12	US	Louisiana	12	33%	**0%**	14%	Riverine Flooding	☀☀	↑↑↑
13	US	New York	6	33%	**0%**	162%	Surface Water Flooding	☀☀	↑↑↑
14	Norway	Nordland	3	33%	**0%**	28%	Surface Water Flooding		
15	Portugal	Lisboa	3	33%	**0%**	>300%	Riverine Flooding		
16	Brazil	Ceará	3	33%	**0%**	>300%	Surface Water Flooding	☀☀☀	↑
17	Australia	Queensland	3	33%	**0%**	>300%	Riverine Flooding		

18	Finland	Southern Finland	12	25%	**0%**	116%	Surface Water Flooding		
19	Germany	Berlin	8	25%	**0%**	99%	Surface Water Flooding		
20	Indonesia	Jawa Barat	4	25%	**0%**	86%	Riverine Flooding	☀☀☀	↑↑↑↑
21	Singapore	Whole Country	4	25%	**0%**	>300%	Surface Water Flooding	☀☀	↑↑↑↑
22	Republic of Korea	Gyeonggi-do	9	22%	**0%**	37%	Riverine Flooding	☀	↑↑↑
23	Canada	Alberta	14	21%	**7%**	105%	Riverine Flooding	☀☀☀	↑↑
24	US	Missouri	62	21%	**3%**	48%	Forest Fire	☀☀☀	↑↑
25	US	Oregon	25	20%	**0%**	17%	Forest Fire	☀☀	↑↑↑
26	US	Washington	10	20%	**0%**	58%	Forest Fire	☀☀	↑↑↑
27	Denmark	Hovedstaden	5	20%	**0%**	>300%	Coastal Inundation		
28	Spain	Comunidad Foral de Navarra	5	20%	**0%**	27%	Surface Water Flooding	☀☀	↑↑↑↑
29	Canada	British Columbia	5	20%	**0.%**	>300%	Surface Water Flooding	☀☀	↑↑↑
30	US	New Jersey	5	20%	**20%**	>300%	Tropical Cyclone Storm Surge	☀☀	↑↑↑

Extreme Heat: Top 30 states globally

The map below shows the 30 states where XDI's analysis identified the highest modelled operational disruption risk linked to extreme heat for planned data centres.

Note: States are listed in alphabetical order by country, and are not ranked.

1. Mato Grosso do Sul, Brazil
2. Ceará, Brazil
3. São Paulo, Brazil
4. Cundinamarca, Colombia
5. Guam, Guam
6. Tamil Nadu, India
7. Telangana, India
8. Karnataka, India
9. Jawa Barat, Indonesia
10. Jakarta Raya, Indonesia
11. Campania, Italy
12. Querétaro, Mexico
13. Distrito Federal, Mexico
14. Lagos, Nigeria
15. Castilla-La Mancha, Spain
16. Comunidad de Madrid, Spain
17. Abu Dhabi, United Arab Emirates
18. Utah, United States
19. Wyoming, United States
20. Montana, United States
21. Nevada, United States
22. Colorado, United States
23. Nebraska, United States
24. Idaho, United States
25. Indiana, United States
26. Iowa, United States
27. Missouri, United States
28. Kansas, United States
29. Ohio, United States
30. South Dakota, United States

Indirect Risk: Operational disruption and infrastructure dependency

A facility engineered to withstand extreme weather may still experience disruption if supporting systems fail around it.

This matters because the infrastructure a data centre depends on may not be built to the same resilience standard as the facility itself. Power networks, roads, supply chains and regional economies may all face their own climate-related disruption pathways, materially influencing long-term operational performance, insurability and resilience.

How to measure indirect risk

To assess broader operational vulnerabilities beyond direct asset damage, XDI incorporates indirect risk analysis alongside direct physical climate risk modelling.

This includes:

- **First Mile Indicator (FMI):** assesses risks associated with the immediate surroundings of an asset, including local infrastructure dependencies such as electricity networks, water supply, telecommunications and transport access.
- **Regional Economic Indicator (REI):** assesses broader regional disruption risks that may affect labour availability, economic activity, supporting services and operational continuity.
- **Supply Chain Proxy (SCP):** assesses potential supply chain impairment based on the national and international sectors upon which assets may rely, using trade and sector dependency modelling to estimate exposure to climate-related disruption.

Together, these indicators help identify operational vulnerabilities that may not be visible through direct asset-level damage analysis alone.

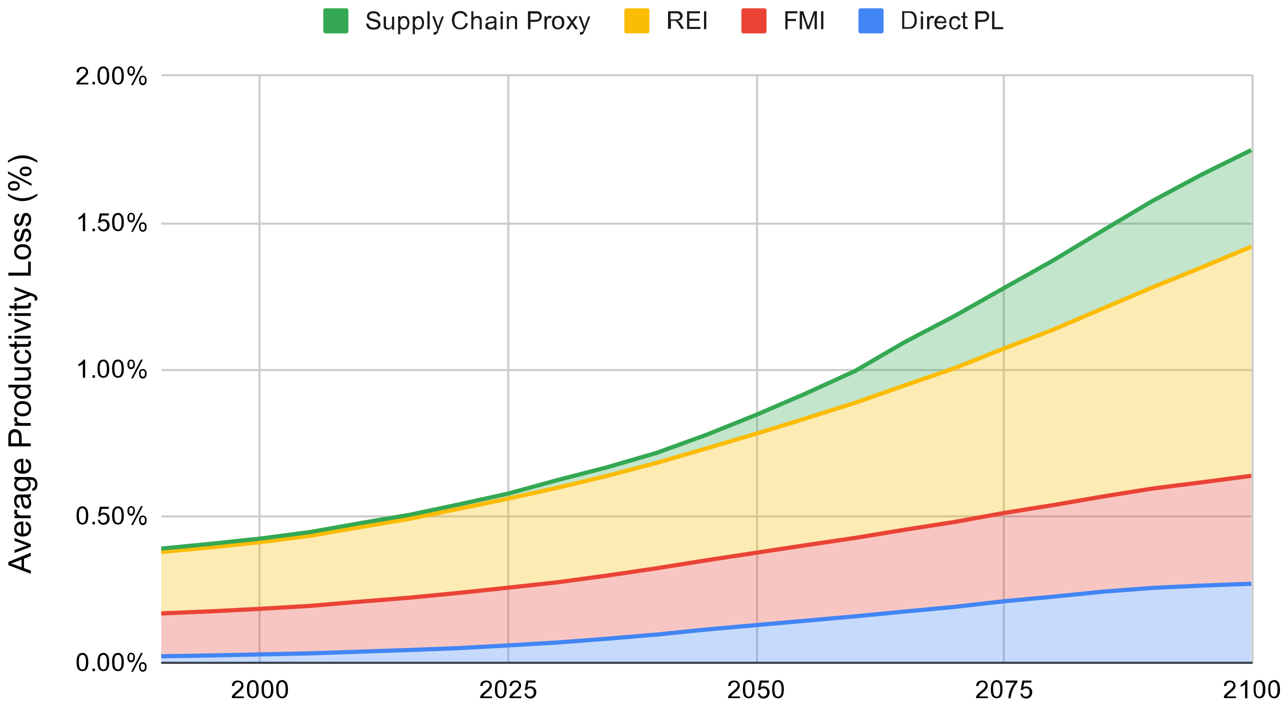
What does indirect risk look like?

As part of this report, XDI created a synthetic investor portfolio of **138 existing and planned data centres across Europe** - using real asset details. These were then analysed for both direct and indirect risk.

Risk of operational disruption was measured using the XDI metric **Productivity Loss**. This measures the expected proportion of time in a year during which an asset may become unavailable due to climate-related disruption. It considers different types of operational interruption, including periods of closure associated with hazard events and infrastructure failure.

Location of data centres analysed in the portfolio.

Chart: Impact of indirect risk across the data centre portfolio



XDI uses Productivity Loss to measure the effects of different types of disruption, including periods of closure associated with different hazard events. Productivity Loss is expressed as a proportion of the expected days of asset unavailability in a year.

Key findings

- Indirect impacts affecting critical infrastructure, regional economies and global supply chains impair revenue to a much greater extent than direct damage to the assets themselves.
- When indirect risk is included in the analysis, productivity loss across the portfolio is modelled to be 10 times higher than when considering direct risk on its own.
- This suggests direct asset analysis may capture only part of the climate-related risks facing corporate operations.
- Productivity loss arising from direct and indirect risk combined is modelled to triple by the end of the century.
- The analysis also exposed vulnerabilities arising from supply chain dependencies, particularly where critical suppliers are located in countries with elevated exposure to coastal inundation.
- Average productivity losses approaching 2% were observed across the portfolio. While seemingly small, a 2% reduction in productivity or revenue can translate into a substantial share of corporate profits, particularly in sectors where margins are already tight.

Conclusion

The global expansion of AI and digital infrastructure is creating one of the largest waves of infrastructure investment in modern history.

Much of the discussion surrounding this growth has focused on energy demand, water use and the economic opportunities associated with digital infrastructure. This analysis suggests physical climate risk also deserves a place in that conversation.

Across multiple regions, planned data centres were identified in locations where modelled physical damage risk, operational disruption risk or infrastructure dependency risk may challenge long-term performance. While the specific hazards varied between locations, the findings consistently demonstrated that climate resilience is becoming an increasingly important consideration for infrastructure designed around near-continuous availability.

Importantly, the analysis also showed that outcomes are not predetermined.

In many locations, higher-resilience design specifications materially reduced modelled risk, highlighting the influence that engineering standards, site selection and resilience investment can have on future performance. At the same time, some locations continued to record elevated risk even under advanced resilience settings, reinforcing the importance of location-specific due diligence.

The findings also highlight a broader challenge. Data centres do not operate in isolation. Their performance depends on the resilience of surrounding infrastructure systems, including electricity networks, telecommunications, transport access, water supply and global supply chains. As climate risks increase, resilience will increasingly need to be considered across these interconnected systems rather than at the asset level alone.

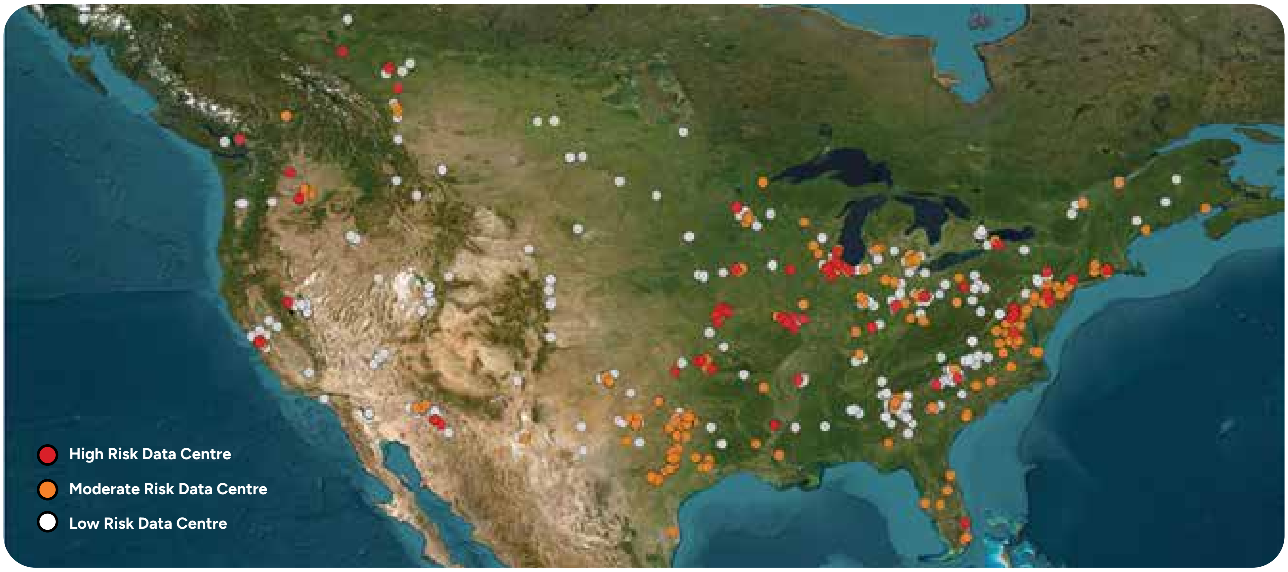
For investors, operators, governments and planners, the opportunity remains significant. Planned infrastructure creates a window to identify vulnerabilities before they become liabilities and to embed resilience before construction begins.

As investment in digital infrastructure continues to accelerate, climate resilience is likely to become an increasingly important determinant of long-term asset performance, operational continuity and value creation.

For access to the full analysis report please go to the XDI website.

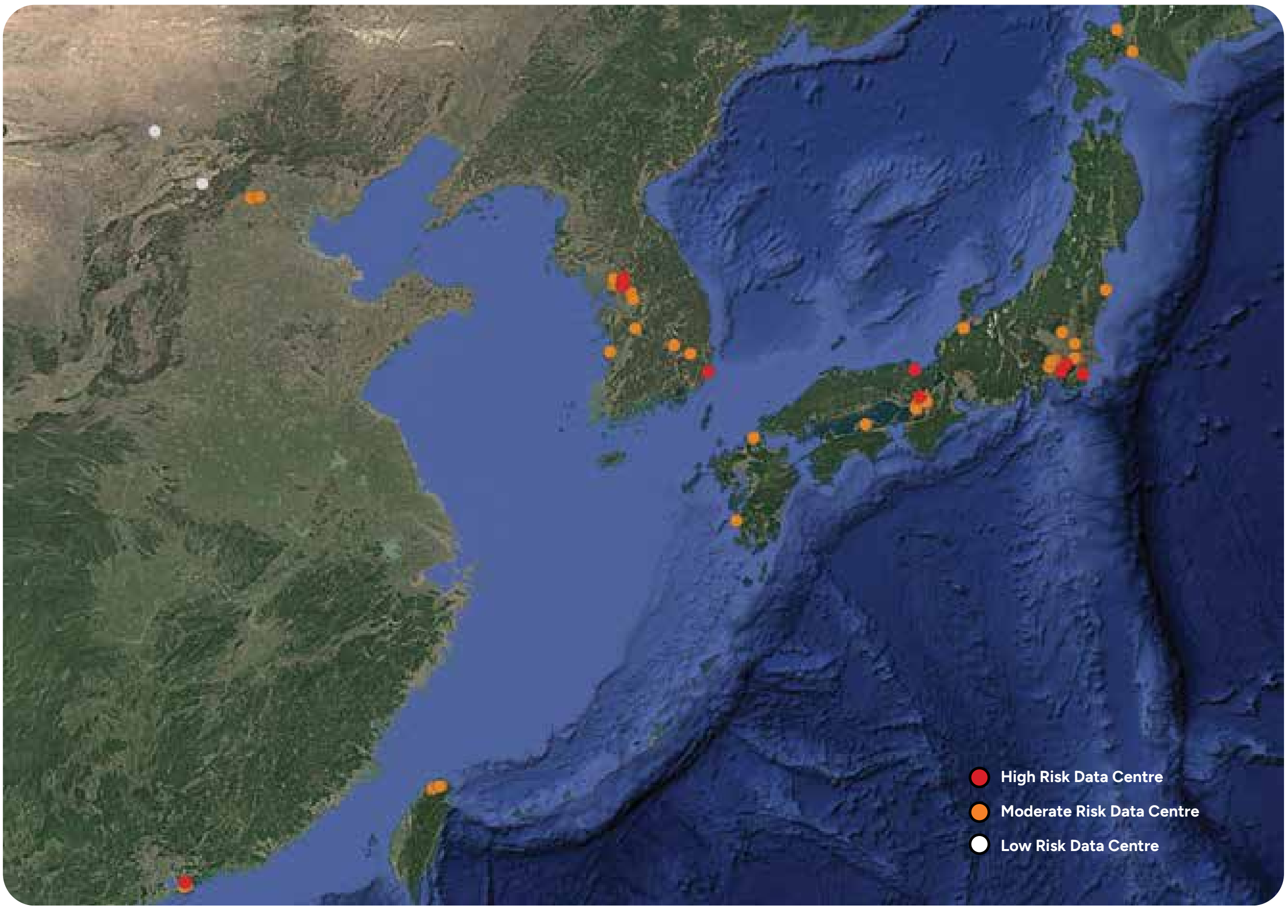
Appendix: Additional Regional Maps - Physical Damage Risk Only

North America



Europe

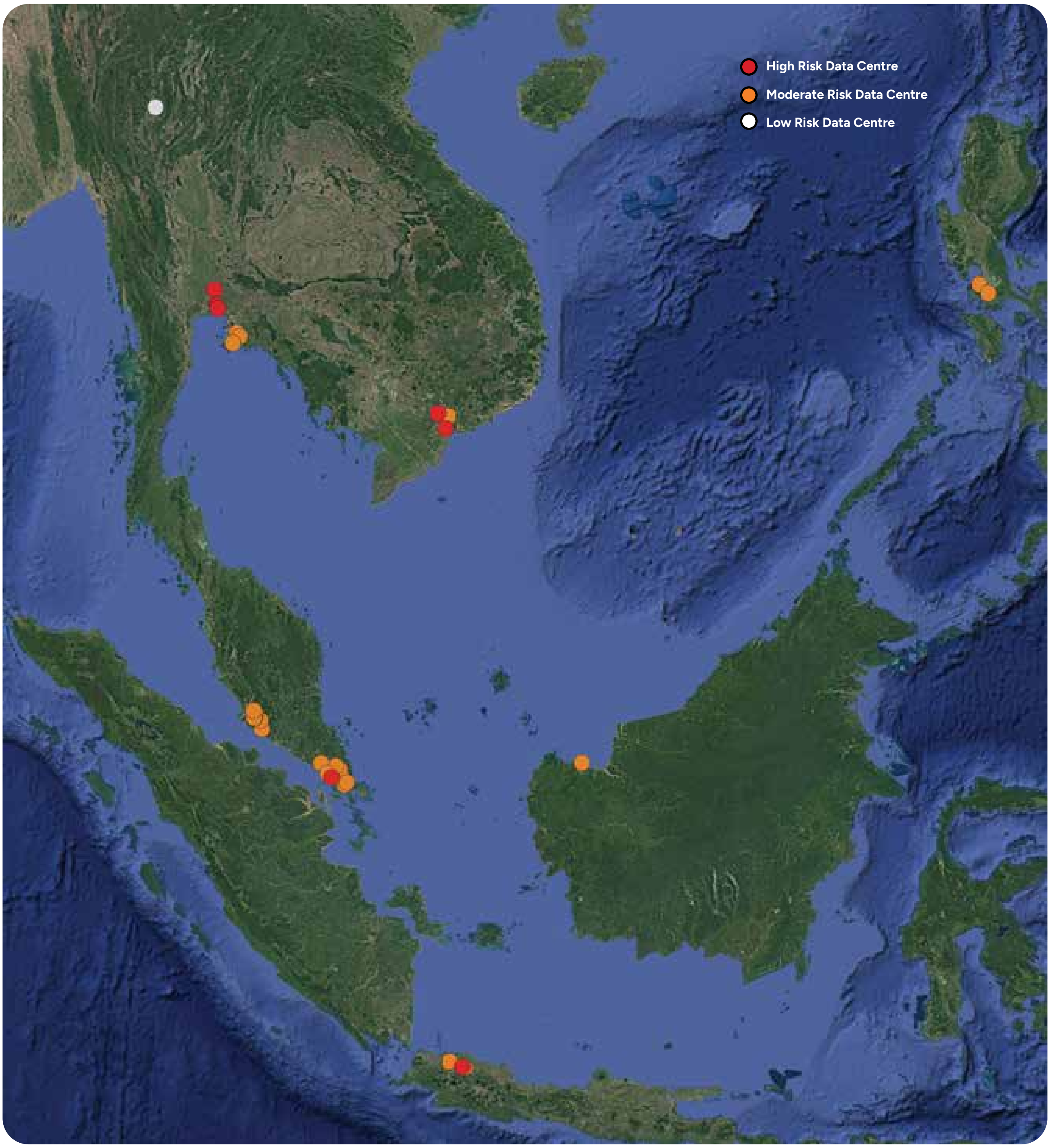
East Asia



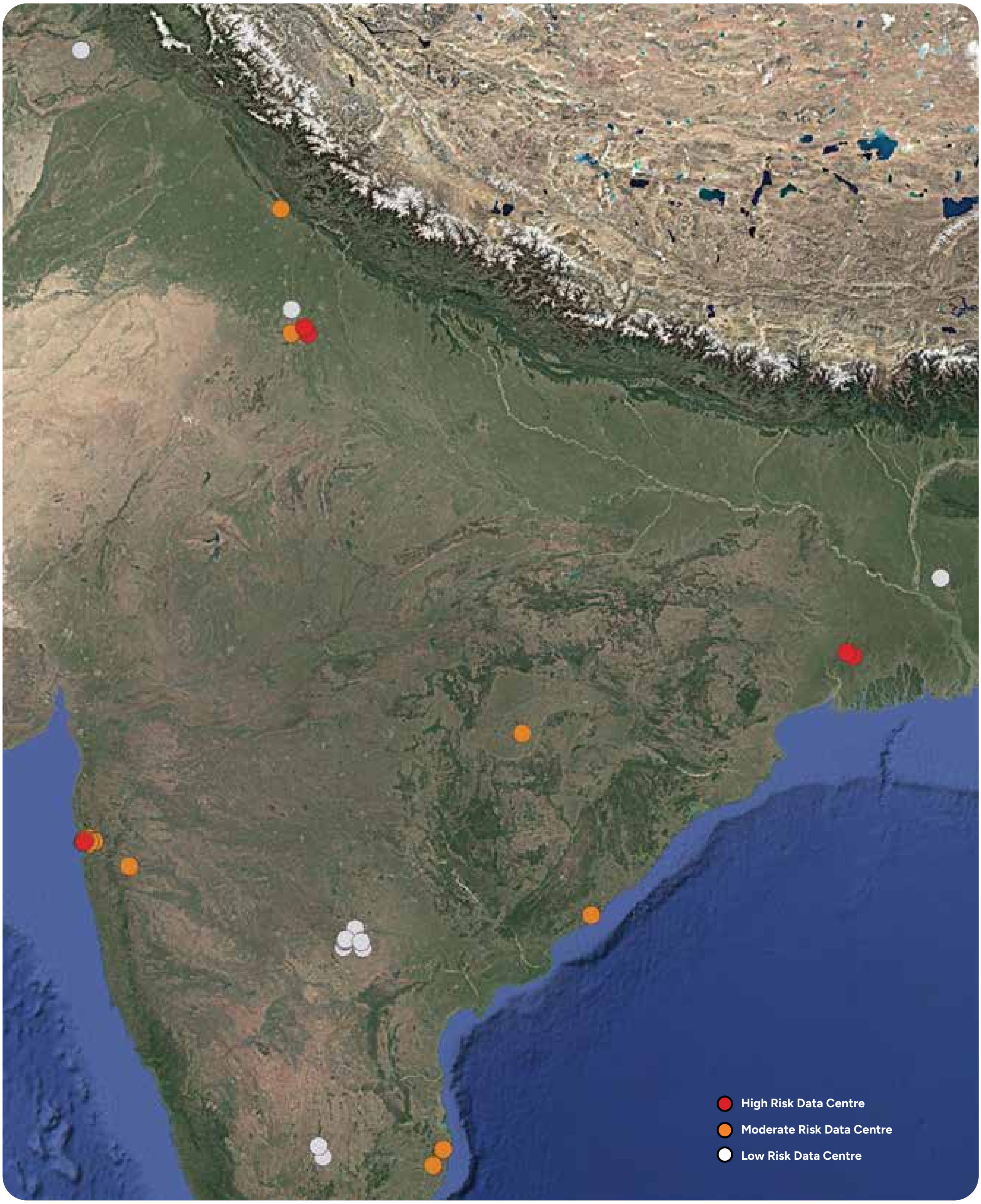
High Risk Data Centre
Moderate Risk Data Centre
Low Risk Data Centre

Latin America and Caribbean

South East Asia



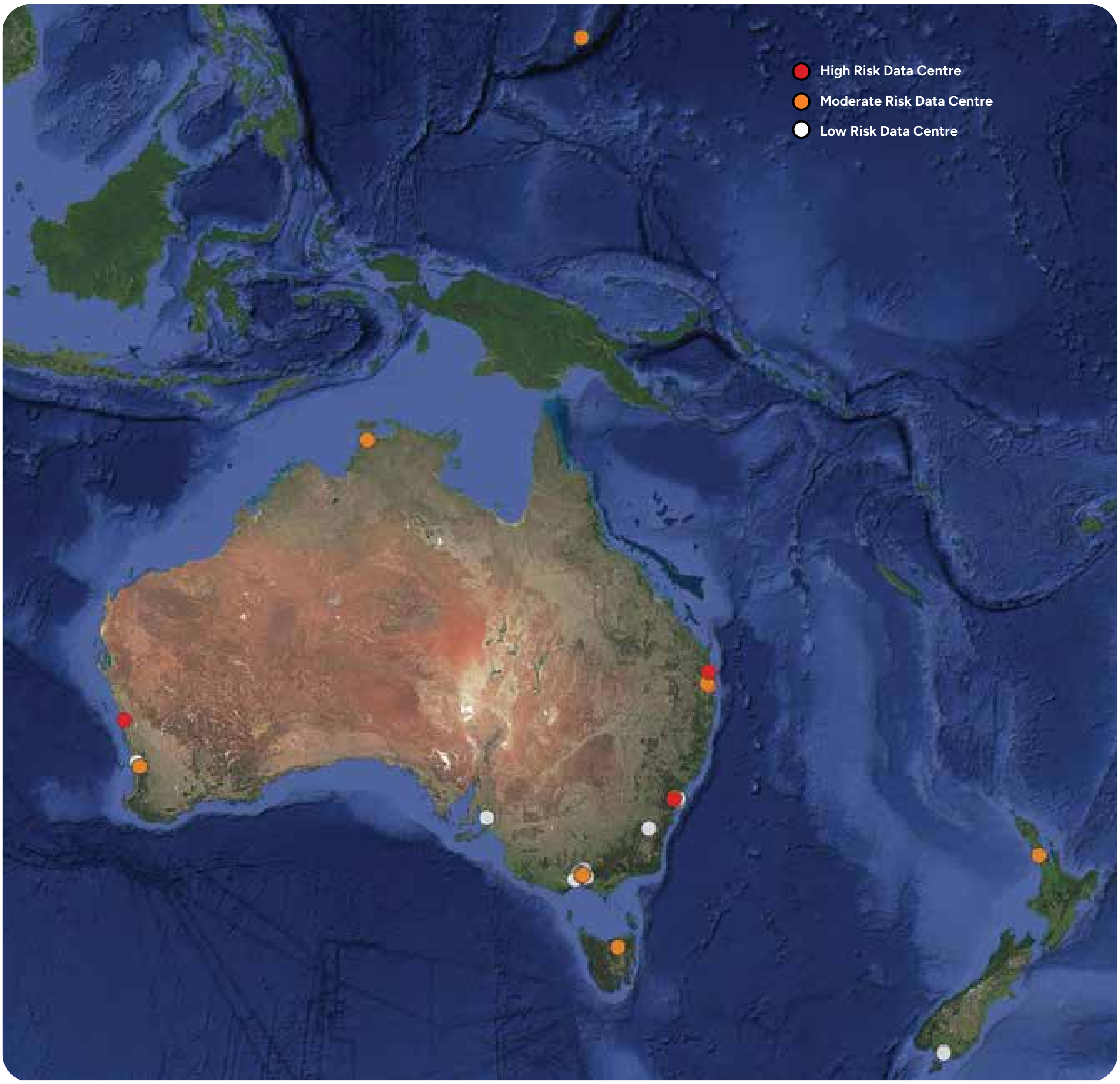
South Asia

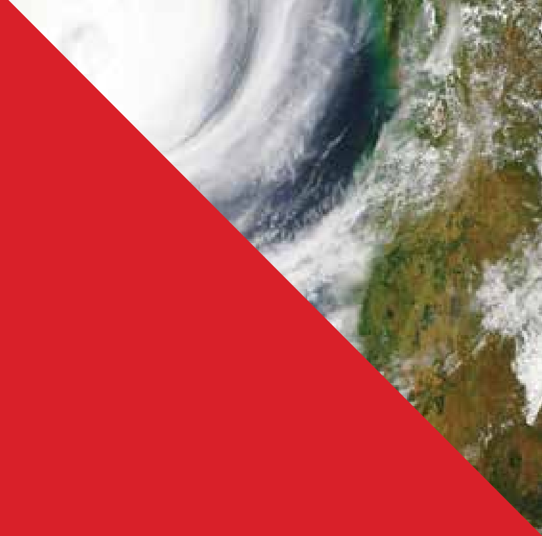

High Risk Data Centre
Moderate Risk Data Centre
Low Risk Data Centre

West Asia

High Risk Data Centre
Moderate Risk Data Centre
Low Risk Data Centre

Oceania


High Risk Data Centre
Moderate Risk Data Centre
Low Risk Data Centre



XDI
Cross Dependency Initiative

www.xdi.systems

FORRESTER®
Wave Leader
Forrester Wave Report, Climate Risk Analytics Software, Q2 2025

verdantix
Smart Innovator
Verdantix Smart Innovator Report, Physical Climate Risk Solutions 2024