

XDI
Cross Dependency Initiative

Measuring corporate resilience

The case for performance-based adaptation

Whitepaper
June 2025





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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

Introduction

As climate change accelerates the frequency and severity of physical hazards, from floods and storms to droughts and heatwaves, companies across all sectors face mounting risks to their assets, operations and supply chains. While businesses increasingly disclose their greenhouse gas emissions and mitigation efforts, far less attention has been paid to how they are investing in adaptation: the actions taken to protect themselves from the unavoidable impacts of a changing climate. Yet adaptation actions are critical for safeguarding long-term value, ensuring operational continuity, and protecting workers, customers, and communities.

Developing robust approaches for measuring and reporting company actions and investments in adaptation are essential. Without clear metrics and transparency, investors, regulators, and other stakeholders are left in the dark about how effectively companies are managing climate risk, and companies themselves may underinvest or misallocate resources. Standardised reporting and analysis of adaptation effectiveness will enable more informed decision-making, support accountability, and help direct capital toward truly resilient business models in an era of growing climate disruption. Crucially, having recognising and rewarding companies' efforts to adapt also provides a powerful incentive for further investment in resilience at scale, and signals to other companies that inaction is inadequate.

However, adaptation is not a substitute for de-carbonising the economy. On the contrary, recognising the need for company asset adaptation also allows companies to quantify the value of avoiding emissions and the financial self-interest in advocating for rapid action toward a low carbon economy.

This whitepaper seeks to argue the case for introducing adaptation into standardised physical climate risk analysis and reporting, and lays out a mechanism by which this can be easily and effectively introduced and applied.

Goal: Encourage Emissions Reduction, Reward Investment in Climate Resilience

Our mission is to strengthen the business case for emissions reduction by quantifying costs associated with climate-related damage to infrastructure. Adaptation is both necessary and resource-intensive. Encouraging corporate investment in adaptation helps build resilience and ensures that the true cost of inaction is visible.

Tactic: Machine-Readable Adaptation Reporting

For adaptation reporting to be effective and widely adopted, it must be accessible, consistent, and scalable. This paper outlines a machine-readable framework that allows adaptation efforts to be quantified and integrated within broader physical climate risk analyses, rewarding investment in resilience.

Target Audience

This framework is intended for:

- Companies wishing to demonstrate and gain recognition for their adaptation investments as part of climate risk reporting
- Investors seeking to understand how companies are managing physical climate risk
- Regulators responsible for setting or monitoring climate disclosure requirements

Limitations

For simplicity, this proposal focuses exclusively on structural adaptations to the physical build of owned and leased properties. It does not cover non-structural measures such as risk management, risk transfer or the indirect social and economic impacts or opportunities, nor does it address government-led or regional adaptation initiatives.

Background: Measuring physical climate risk today

What is Physical Climate Risk?

Physical climate risk refers to the threats posed to assets and operations by climate-related hazards such as riverine floods, forest fires and coastal inundation from sea-level rise. It differs from transition risk, which arises from the policy, legal, market, and technological changes linked to the shift toward a low-carbon economy. Physical risks can be acute (e.g., storm events) or chronic (e.g., long-term temperature or sea-level rise).

How Does XDI Measure Forward-Looking Physical Climate Risk?

XDI is a global leader in physical climate risk analysis, recently 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 measures physical climate risk through a comprehensive methodology powered by its Climate Risk Engines, which use engineering-based methods to assess the exposure and vulnerability of property archetypes and their construction components. This approach allows XDI to understand the likely damage and failure probability of property assets caused by extreme weather and climate change hazards in any location in the world, and in any year until 2100. The results of this analysis are expressed in a range of engineering or financial metrics to inform decision-making at all scales.

XDI measures risk arising from climate change extreme weather by looking at the risk of direct damage to infrastructure – referred to as **damage risk**, and the loss of productivity from being unable to operate an asset – referred to as **productivity loss.** For instance, extreme heat can result in elements failing temporarily but it rarely actually damages infrastructure.

Insurability Traffic Lights: ABC Risk Bands

XDI uses risk bands to categorise assets according to their risk. The risk band ratings are informed by the Federal Emergency Management Agency (FEMA) designations used for pricing insurance premiums in the USA, and the method has been extended to include (a) a wider set of hazards and (b) the reduction in risk through adaptation. These risk band results provide insight into the possible longer-term availability and cost of insurance for assets.

Risk band classifications are calculated by determining each property's probability of incurring direct financial loss from climate-related damage to infrastructure in any given year, which is expressed as a percentage of the asset replacement cost. This percentage is known as Maximum-to-date Value-At-Risk (MVAR).

The ABC risk bands classify risk as follows:

A **Low Risk:**
MVAR less than 0.2%

B **Moderate Risk:**
MVAR between 0.2% and less than 1.0%

C **High Risk**:
MVAR equal to or greater than 1.0%

Company Relevant Risk Metrics

In addition to ABC risk bands, XDI provides a comprehensive set of metrics that provide different insights into a company's asset-based risk.

Term	Description
Maximum Value-At-Risk MVAR	MVAR is an asset's overall Maximum-to-date Value-At-Risk, and is a measure of an asset's maximum potential damage, caused by climate-related hazards in any previous year. The maximum-to-date adjustment ensures that no year has a lower risk than the previous year. It can be expressed as a decimal fraction (MVAR) or percentage (MVAR%). MVAR is based on the relative risk contribution of the structural elements that make up the assets in its engineering model. MVAR metrics are used to identify high risk assets within a portfolio (back book) or as part of a risk assessment (front book).
Technical Insurance Premium (TIP)	The TIP is the cost of damage to a property. It uses the replacement cost, expressed in current day currency with no discounting or adjustments for other transaction costs, combined with the MVAR per asset for all hazard impacts. TIP metric can be a factor in serviceability and therefore Probability of Default (PD).
Climate Adjusted Value (CAV)	Climate Adjusted Value (CAV) is an adjusted market value for an asset, reduced to account for expected impacts of climate change, expressed in current day currency. The CAV is calculated using the asset's Maximum-to-date Value-At-Risk (MVAR), the asset's reported market value, the replacement cost of the building and a nominal interest rate. CAV metrics is a factor in collateral assessments (Loss Given Default, LGD).
Failure Probability (FP)	The annual probability of a climate hazard causing an asset to stop working with or without damage. This is reliant on the vulnerability of an archetype's element to a particular hazard. FP typically supports operational risk assessments or engagement with clients owning or operating productive assets.
Productivity Loss (PL)	Productivity Loss (PL%) considers the effects of different types of disruption, including periods of closure associated with different hazard events. PL% is expressed as a proportion of the number of expected days of asset unavailability in a year. PL is typically used to assess income impairment due to downtime in productive assets / companies.
Damage Distribution	Damage ratios can be expressed to represent either the average proportion of damage to an asset for a given physical event severity, or the likelihood of an average asset being destroyed for a given event severity. Different ratios can be constructed using synthetic vulnerability functions underpinned by various asset types. Damage ratios are typically used in broad-scale portfolio stress testing.
Severities	Severity Analysis measures the severity of a fixed probability event as it changes over time.
Annual Exceedance Probability (AEP)	AEP Analysis provides the likelihood of fixed-severity events, which changes through time.

Adaptation: What do we mean?

In the context of physical climate risk, adaptation refers to the actions, strategies, and measures taken to reduce vulnerability and enhance resilience of people, infrastructure, ecosystems, and economies to the harmful impacts of climate-related hazards (perils).

Adaptation can refer to government policies, planning frameworks and regulatory actions that aim to reduce vulnerability and build resilience. Adaptation also includes government-led initiatives to increase resilience for whole communities such as strengthening dikes, building storm surge barriers and creating flood plains.

For this first stage approach, the focus is exclusively on physical structural adaptation to the physical construction of a company's asset to increase its resilience and reduce costs associated with physical damage and productivity loss. This applies to both owned and leased assets. Examples of this type of adaptation for a flood water risk might include:

- Raising the floor level above a specified flood height
- Switching a wooded floor to floor tiles which are impervious to water
- Making the electrical systems waterproof

Such adaptations might be planned over time as part of the asset management plan – creating an adaptation pathway.

Why Should Adaptation Be Included in Climate Risk Reporting?

Climate risk disclosure is becoming mandatory or regulated across an increasing number of jurisdictions. These frameworks are designed to help stakeholders and markets understand companies' exposure to physical and transition risks. However, without inclusion of adaptation measures, climate risk reporting presents an incomplete and potentially misleading view. Capturing adaptation efforts ensures disclosures reflect net, forward-looking risk and supports more accurate market signals.

Adaptation reporting also enables stakeholders—such as investors, insurers, customers, and regulators—to distinguish between companies that are passively exposed to climate risks and those that are actively managing their resilience. This differentiation is becoming critical for determining access to capital, cost of insurance, and reputation in the marketplace. Companies demonstrating clear adaptation strategies can strengthen trust and position themselves as leaders in managing climate risk, while those that fail to disclose may be viewed as laggards, regardless of actual risk exposure.

Embedding adaptation in climate risk reporting promotes a culture of forward planning and continuous improvement. Transparent reporting on adaptation ensures companies regularly review and refine their strategies as science, technology, and climate projections evolve. This helps align corporate action with broader societal and sectoral resilience goals.

Adaptation reporting also creates valuable feedback loops. As companies disclose adaptation measures and outcomes, stakeholders can assess their effectiveness, offer guidance, and share best practices. This iterative process drives higher-quality adaptation over time, accelerates learning across sectors, and supports system-wide resilience. By including adaptation in climate risk reporting, we move from a static snapshot of vulnerability to a dynamic process of risk management, mitigation, affordable risk transfer and resilience building.

Finally, by encouraging companies to engage with and report on adaptation, climate risk reporting provides a more accurate basis for calculating the true costs of climate change. When companies quantify their adaptation investments and the remaining residual risks, it sharpens the understanding of what damage or disruption would occur in the absence of mitigation and resilience efforts. This helps illuminate the financial, environmental, and social benefits of rapid mitigation, as it becomes clearer what costs are avoidable through decisive climate action. In this way, adaptation reporting strengthens the business case for emissions reductions and fosters alignment between adaptation and mitigation strategies.

Calculating the Impact of Adaptation on Risk

XDI's engineering-based approach, grounded in the creation of digital representation of buildings and infrastructure, provides a powerful tool for quantifying the impact of adaptation on physical climate risk. The use of 'digital twins' allows for detailed, asset-specific models that reflect the structure, materials, design, and vulnerability of physical infrastructure. These models can be modified to simulate the effect of multiple adaptation measures—such as raising floor levels, strengthening roofs, changing the heat tolerance of electrical systems, or using more resilient materials. XDI's system tests these adaptations against 10 different hazards (e.g. flood, wind, heat, fire) and applies climate projections over various time horizons. This enables a dynamic understanding of how resilience evolves as climate hazards intensify and scheduled adaptation measures are implemented or upgraded.

What makes this approach particularly valuable is its ability to analyse the combined effects of different adaptations under a range of future climate scenarios. For example, a building's resilience to coastal flooding might be assessed not only with raised floor levels but also with upgraded drainage and perimeter defences, each contributing to reduced risk. XDI's modelling shows how these measures combine, how effective they are against specific hazard intensities, and how their effectiveness changes over time as climate conditions shift. Further adaptation actions may be needed, and these can be added to the analysis string. This capability provides companies and their stakeholders with actionable insights into the return on investment for adaptation and the residual risks that remain. It also supports the recalculation of risk at the portfolio level as adaptation plans are developed and implemented.

The Scale of the Challenge

So many companies

The first major challenge in adaptation reporting is creating a system that can work for the sheer number and diversity of companies worldwide. While many climate risk disclosures already track emissions or operational data, adaptation reporting requires companies to evaluate and communicate highly asset-specific, location-based measures—actions that are directly tied to protecting physical infrastructure from hazards. There are around 45,000 listed companies globally, plus many more large private firms, each with assets spread across different geographies, climates, and regulatory environments. Adaptation measures are, by their nature, place-based and context-dependent. Therefore, the challenge is to design a reporting framework that can accommodate this diversity while remaining consistent, comparable, and useful to stakeholders. It must capture meaningful information about resilience without creating undue complexity or burden.

How to measure 'intention'

Another key challenge lies in how to measure and report on intention to adapt, not just what has already been achieved. Adaptation is often a multi-year or multi-decade process, with measures phased in as part of asset maintenance, upgrades, or redevelopment cycles. Companies that are genuinely committed to building resilience should be recognised for credible, well-defined plans, even if they have not yet delivered the final outcome. However, reporting on intention is inherently difficult. The company itself is best placed to know its plans, but it must communicate them clearly. Vague statements about "improving resilience" or "considering adaptation" offer little value to investors, insurers, or regulators trying to assess future risk. What is needed is quantifiable specificity: Which assets? Which hazards? What timeline? And to what level of protection?

Capturing intention requires a balance. We must ensure that reporting frameworks incentivise genuine, actionable planning rather than hollow commitments,



How to measure resilience - A Parallel to Net Zero Transitions

Few companies will be resilient from the outset. A credible framework must provide a way to offset planned actions against current risk so that stakeholders can distinguish between companies that are on the right path and those that are not.

Adaptation pathways can be thought of as an equivalent to company commitments to Net Zero – the commitment to the journey is important.

A resilient company might be one where its assets are already at low risk today and where plans are in place to keep them that way. Alternatively, a company may have significant vulnerabilities now but demonstrate a robust, time-bound plan to achieve resilience in the future. In both cases, transparency about intention is critical to give stakeholders confidence in the company's trajectory. It will also provide a quantifiable understanding of the levels of risk the company is running along that time-line.

Counterparty analysis

The presumption of this approach is third party entities are able to undertake risk analysis of assets independently of the company that owns them. This is needed if there is to be truly independent, trusted and comparable analysis of risks between companies and across sectors. But how, given the almost infinite range of possible asset-specific adaptation interventions that are possible?

Machine readable

Another key challenge in designing an adaptation reporting framework is ensuring that it is machine-readable. With thousands of companies needing to report across diverse sectors and jurisdictions, the system must allow adaptation information to be provided in a structured format that does not rely on human interpretation. Narrative descriptions or complex technical reports make it difficult to compare companies or to recalculate risk in a consistent way. A machine-readable framework ensures that data can be ingested, analysed, and benchmarked efficiently, supporting like-for-like comparisons across organisations and enabling stakeholders to evaluate resilience at scale. This is essential for transparency, accountability, and for the reporting system to support robust decision-making by investors, insurers, regulators, and other stakeholders.

P-Five : A Performance Based Framework for Adaptation Reporting

Taxonomies have their limits

Designing a practical and comparable system for reporting adaptation is inherently complex. Unlike emissions or energy use, adaptation actions are highly local, context-dependent, and often bespoke to specific assets and hazards. A single hazard, such as flood risk, might be addressed in many ways: raising a building, constructing flood walls, using water-resistant materials, or implementing emergency response measures like sandbags. This diversity reflects the strength of asset-specific solutions, but it also makes standardised reporting challenging. A taxonomy that simply lists adaptation actions is of limited value, as it cannot capture the nuance needed for consistent and repeatable risk recalculation.

Furthermore, the mere presence of an adaptation measure tells us little about its effectiveness. Listing individual actions without specifying what level of protection they are designed to achieve fails to provide stakeholders with the information they need to quantify the extreme weather risks the company is running across its assets. The variety and complexity of potential solutions, while appropriate for managing physical risk, are not well suited to machine-readable reporting or to the production of comparable, verifiable risk assessments. What is needed is a shift in focus: away from cataloguing actions and toward describing the outcomes those actions are intended to deliver in terms of resilience performance.

The What - not the How

To address this challenge, we need a reporting framework that captures the what—the performance objective—rather than the how. When a company reports that it aims to protect its assets against a 1-in-100-year flood event or design to withstand a specific wind speed, analysts can meaningfully recalculate risk and assess the company's resilience. The specific means of achieving that outcome, whether through materials, design choices, or engineering solutions, is less relevant for external assessment. What matters is the level of protection and the timeframe over which it applies. This focus on intended performance enables adaptation reporting that is consistent, comparable, and actionable.

The P-FIVE Approach

To support this shift from action cataloguing to performance-based reporting, we have developed the **P-FIVE** framework. This approach is designed to help companies communicate adaptation plans in a way that is easy, clear, credible, and suitable for risk recalculation.

P-FIVE provides five key components—Policy, Portfolio, Perils, Performance, and Period—that together describe the scope, objective, and timeframe of adaptation strategies. By standardising these elements, P-FIVE enables machine-readable, repeatable reporting that allows external stakeholders to assess risk reduction while accommodating the wide range of possible technical solutions companies may choose to achieve their adaptation goals.

The P-Five approach: An overview



Policy

P1: Policy – Is this official company policy?

Reports must clarify whether adaptation plans are formal policies endorsed at a senior level, backed by board approval or budget allocation. This ensures that intentions are credible and actionable. A plan which is not endorsed cannot be used to infer future resilience building.



Portfolio

P2: Portfolio – Which assets are covered?

Companies should specify which assets or asset classes are covered by adaptation plans, using clear identifiers (e.g. location, type, exposure, ownership) to enable external identification and risk recalculation.



Perils

P3: Perils – Which hazards are addressed?

Reports should list the climate hazards addressed by adaptation measures, aligned with standard hazard categories such as flood, wind, heat, or fire, supporting consistent risk modelling.



Performance

P4: Performance – What is the intended outcome?

Rather than detailing specific engineering solutions, reports should state the performance objective (e.g. protection against 1-in-100-year floods) so that risk analysts can recalculate the vulnerability to of the asset.



Period

P5: Period – When does it start and how long will it last?

Adaptation plans should indicate the timeframe for implementation and the duration over which protection is expected to be effective, enabling alignment with climate projections.

The P-Five approach: In detail



P1: Policy – Is this official company policy?

At the outset, it is essential to establish the status of an adaptation strategy and the level of internal endorsement it has received. Is it a vague idea that may never be implemented, or is it a formal plan that has been approved by the board and allocated a budget? This is fundamentally a binary question that provides assurance to adaptation analysts that the plan represents genuine company policy. To demonstrate this, companies should provide clear evidence—ideally with supporting documentation—that the adaptation plan is official policy. This might include:

- A formal budget allocation that explicitly references the adaptation plan
- Board minutes or a resolution endorsing the plan
- A statement to shareholders outlining the plan
- An equivalent form of formal commitment

There may be multiple policies in place—for example, separate policies for different asset types, countries, or hazards. Where this is the case, it is important to clearly indicate how these policies connect and form part of the overall adaptation strategy.



P2: Portfolio – Which assets are covered?

Physical climate risk analysis is highly location-specific, with hazard data often modelled at resolutions as fine as 5m x 5m. Risk also varies depending on asset type and its inherent vulnerability to different hazards. To conduct meaningful risk analysis, it is therefore essential to clearly define which assets are covered by each adaptation policy. Assets can be identified individually or grouped using specific criteria, such as:

- Exact location (e.g. address or centroid latitude/longitude)
- Asset type (e.g. factory, office, data centre)
- Resilience characteristics (e.g. age, design thresholds, construction materials)

Alternatively, companies may define the scope of assets in broader terms. For example, an adaptation policy might apply to:

- All assets within a particular country
- All assets of a specific type
- All assets exposed to a particular hazard
- Or other clear identifiers that allow a third party to determine which assets are covered

It is also important to distinguish between assets that are owned versus those that are leased, as companies may have different levels of control over the resilience measures applied to leased properties.

P3: Perils – Which hazards are addressed?

Effective analysis requires a clear indication of which hazard or hazards are being addressed by an adaptation plan. A list of the major extreme weather hazards which drive damage and disruption are shown in the table below.

Other hazards that may be of interest to productivity which do not cause direct asset damage but could cause indirect disruption include Water Stress (lack of water to support the activities of the business) and Human Heat Stress which affects the ability of workers (or other critical people to the business) to use the asset safely.



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.



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).



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

P4: Performance – What is the intended outcome?

Rather than specifying the exact adaptation actions a company will take, this framework focuses on specifying the intended performance outcome. The key question is: what level of protection will the adaptation deliver? For example, a company might plan to strengthen the roofs of its factories in Florida and the Caribbean using stronger materials and fastenings. However, unless the company states the level of protection these upgrades are designed to achieve, no analysis can translate this into a measurable reduction in risk.

If instead the company reports, "All of our factories in Florida and the Caribbean will be upgraded to withstand a 1-in-200-year wind speed event", this provides a clear performance threshold. Risk analysis systems can then model the risks by assuming that damage will only occur at wind speeds exceeding that specification.

There are several ways in which performance can be defined, varying by hazard. Four main types of adaptation performance specifications are relevant at scale:

Asset Severity Thresholds

Specifies that the asset is designed to survive a hazard event up to a defined severity. Examples include:

- Flood survival threshold by flood water height above ground or datum (fluvial, pluvial, or coastal inundation)
- Survival wind speed for synoptic, convective, or cyclone winds
- Design operating temperature for extreme heat

Asset Probability Thresholds

Specifies that the asset is designed to cope with an event of a given probability (e.g. an event with a 1% annual probability) or return period (e.g. a 1 in 100 year event). Examples include:

- Flood protection specified by design flood return probability
- Wind protection specified by wind speed return probability

- Extreme heat protection specified by temperature return probability
- Subsidence resilience specified by drought return probability
- Landslide resilience specified by extreme precipitation probability

Probability Reductions

For hazards like forest fire—where event intensity, duration, and proximity are unpredictable—it is often more practical to specify a reduction in risk rather than a survival threshold. For example:

- *"This building is designed to be 50% less likely to be ignited in a forest fire than a conventional building built to the current fire code."*

Sub-Asset Component Specifications

Specifies resilience measures for critical components within an asset. This can be useful for certain systems but may be less meaningful for others. Examples of useful component-level specifications include:

- Electrical systems designed to be flood proof
- Foundations resilient to landslide or subsidence



P5: Period – When does it start and how long will it last?

Adaptation plans should indicate the timeframe for implementation and the duration over which protection is expected to be effective, enabling alignment with climate projections.

An adaptation plan may have staged actions that fit into an asset management plan, so this dictates when new levels of resilience can expect to be in place, and therefore how long existing vulnerabilities will persist.

Also, the duration of an action before any further upgrade and expected asset retirement is useful. And this helps to specify the level of resilience if attached to climate change projections. For example a company might say, "This year, all of our properties will be upgraded to cope with worsening tropical cyclone wind speeds over their entire design lifetime of 50 years." This means that the analysis can look up tropical cyclone wind speeds projected for 2075, and apply those to the assets from today onwards.

Practical examples of P-Five Reporting

Here are some examples of how the P-Five reporting could appear in practice:

Example 1

The company has set aside a budget to adapt all of its data centres in Europe and the USA to be able to cope with flooding and coastal inundation events up to 1 metre, and to cope with any Cat5 hurricane. This will be completed within 5 years and be expected to be in place for the 20 year design life of these facilities before being reviewed.

Example 2

In this AGM we can report that the board has endorsed an adaptation strategy such that no manufacturing assets will be allowed to become high-risk going forward. This means that all factories will be made fully resilient to extreme weather events including forest fire, river, surface and coastal flooding, extreme wind and heat events up to a 1 in 100 year return frequency, with climate change factored in on an ongoing basis. A 10 year time window has been allowed for the implementation, and it applies to all assets that we own or lease, in all countries. It will apply on an ongoing basis.

Example 3

The company is focussed on managing forest fire risks in California. Within the next 5 years, the company will ensure that all properties it uses in California are outside of fire risk zones. This is company policy will remain in place on an ongoing basis.

Demonstrating adaptation at scale - an example

These two pages are an extract from the 2025 XDI Global Data Centre Physical Climate Risk and Adaptation Report - a new report scheduled for release in July 2025. It is included here to demonstrate the benefits of readily available adaptation measures across more than 8000 data centres around the world. Scan the QR code to receive the full report when ready.

Investing in resilience

Adapting the design of infrastructure to account for climate change hazards is a critical step in enhancing its long-term resilience and functionality. Traditional design standards, often based on historical climate data, no longer provide sufficient protection in an era of increasing extremes. By incorporating forward-looking climate risk analysis into the planning, design and upgrade process, infrastructure can be better equipped to withstand hazards such as flooding, storms, extreme heat, or sea-level rise.

The 2025 Global Data Centre Physical Climate Risk and Adaptation Report calculates how adaptations to the design of a data centre can reduce damage risks from climate change hazards, minimise operational disruption and reduce insurance premiums.

The cost benefit of adaptation for data centres

For this analysis, XDI applied plausible adaptation by modifying structural elements of the base archetype using readily available changes in materials and/or design specifications to increase its resilience. The 2050 lower-resilience outcomes were then compared to 2050 higher-resilience results.

The adaptation measures applied reduced the Maximum-to-Date Value At Risk (MVAR) across data centres globally by 74% , which - for a global fleet of data centres worth US $ 4 trillion - would be equivalent to avoiding US $11 billion in average annual damage costs. Without adaptation, XDI estimates that the costs of extreme weather insurance will be about 3 to 4 times more than what companies are paying today.

The results

Adaptation measures applied to the base analysis slashed the number of **High Risk** data centres by more than 2/3 in 2050 - from 632 to 175, a 72% reduction.

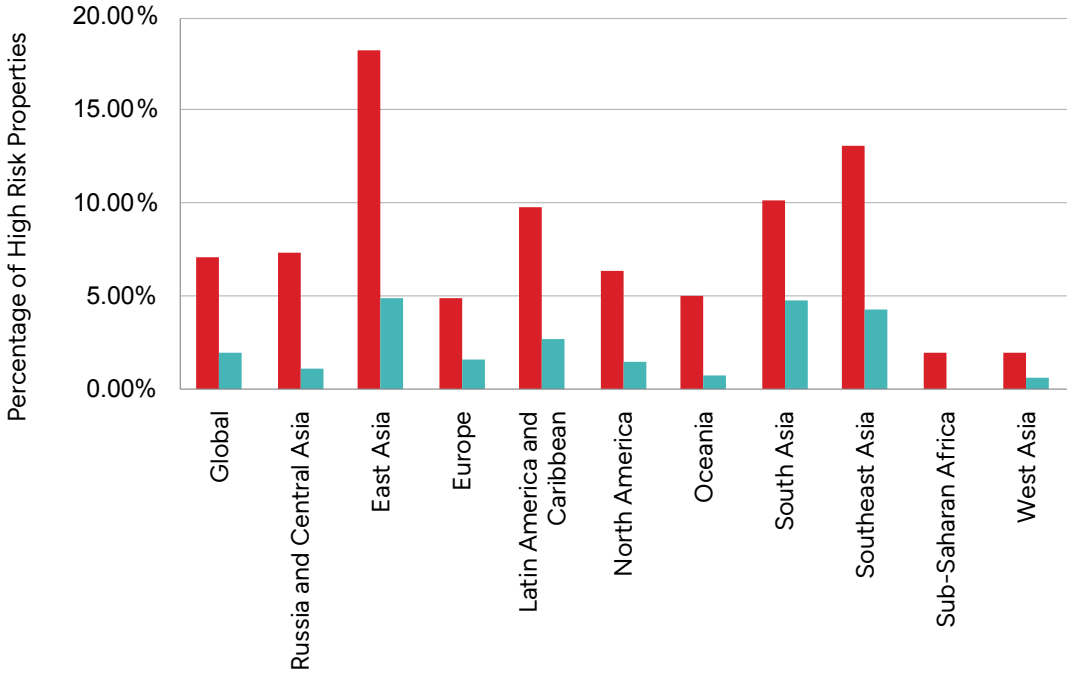
The number of **Moderate Risk** data centres around the world in 2050 was also dramatically reduced - from 1,738 (19.60%) to 511 (5.76%) - a 71% decrease, further strengthening resilience across the global fleet.

The overall **risk of damage to data infrastructure** from climate change hazards was also reduced by almost 3/4, with a 74% reduction.

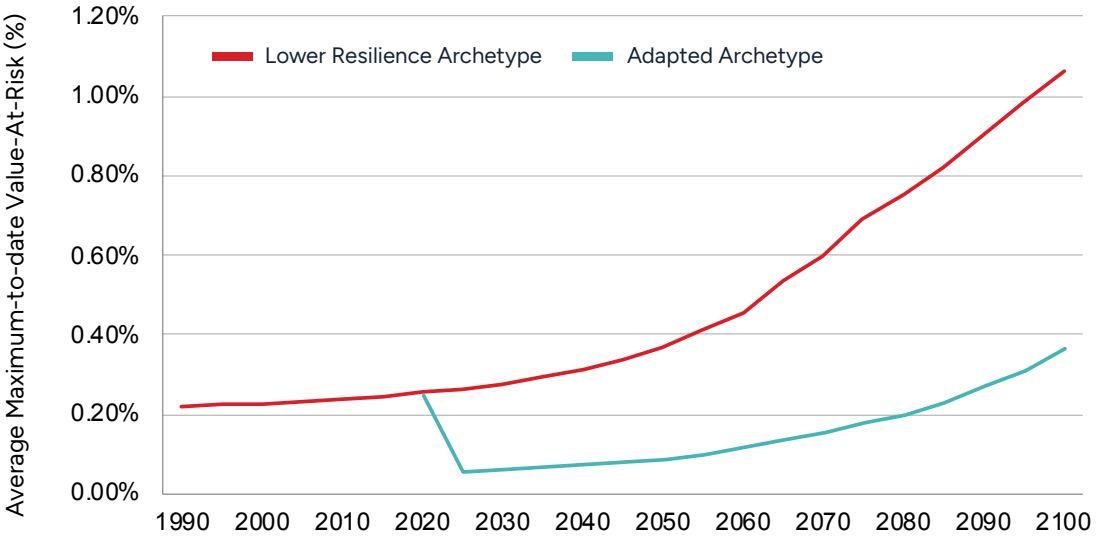
This highlights how readily achievable measures can significantly reduce risk over time, even under worsening climate conditions.

2050 %HRP per region - Lower Resilience vs Adapted Archetype

The red column indicates the level of risk to data centre infrastructure in our first analysis, expressed as average MVAR. The green column shows how this risk is reduced when data centre infrastructure is adapted to increase resilience.



Global Average MVAR% Over Time



Conclusions

This white-paper seeks to draw attention to both the importance of corporate adaptation to achieve asset-level resilience and difficulties in conveying and analysing such commitments.

A switch of approach is proposed from Taxonomy based adaptation reporting to Performance based disclosure.

A very simple framework is proposed which asks companies to specify asset-level adaptation plans in terms of Policy, Portfolio, Perils, Performance, and Period.

The proposed P-FIVE framework is intended to enable independent and properly quantified risk analysis to assess company resilience supporting credible, comparable evaluations across sectors – that can also be applied at scale.

Feedback on the approach is encouraged - please email media@xdi.systems.





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