# Physical Climate Risk Assessments of Infrastructure Assets

Synthesis Report: Real Assets Sub-Working Group, Phase 2 (May–December 2024)

## Executive summary

This report synthesises the Phase 2 results of the Real Assets Sub-Working Group, comprised of investors in real assets and convened by the Investor Group on Climate Change. In 2024, the group focused on the challenges related to assessing the physical climate-related risks to and resilience of infrastructure holdings.

### Findings

Institutional investors struggle to reliably and comprehensively assess the climate-related physical risks to their infrastructure holdings. There are four main reasons for this:

- Climate and hazard data tend to be fragmented instead of being in accessible, aggregated formats, and their underlying assumptions and models are not transparent.
- Asset-level vulnerability assessments are lacking or unavailable to investors. Important factors that are typically unavailable to investors include the age, construction materials and floor height of individual assets.
- Assets are exposed to interdependent or indirect system-level risks that are difficult to identify or quantify. These may exist in upstream value chains or other connected systems or on the demand side. Fully mitigating these risks may be beyond the capacity of owners.
- Even if direct risks, system-level risks and asset vulnerabilities are adequately understood, investors still need to combine and translate these into financial impact metrics.

### Recommendations

To address these challenges, the working subgroup has made the following recommendations for investors, researchers and service providers:

1. Develop a defensible method to assess the physical climate-related risks to infrastructure assets.
2. Develop consistent physical climate risk metrics.
3. Improve the visibility of asset-level vulnerability.
4. Develop methods to quantify the economic benefits of adaptation beyond avoided losses.
5. Improve knowledge of and resilience to whole-of-system risks.

The Real Assets Sub-Working Group plans to address Item 1—develop a defensible method to assess the physical climate-related risks to infrastructure assets—through the remainder of 2025 by collaborating with key investors, service providers and other stakeholders.

## Opportunities for others to create value

The public sector, academic researchers, other industry bodies, commercial service providers and investment companies may have the expertise and incentives to address Items 2–5.

Given the hundreds of billions of dollars in capital value of Australian infrastructure and the contribution of these assets to value creation across the economy, the Investor Group on Climate Change hopes that the investment ecosystem will recognise the importance of fully understanding the sector's exposure to climate-related hazards and forms a business case to protect the value of these assets.

# Background

## About the Investor Group on Climate Change

The Investor Group on Climate Change (IGCC) is a leading network of institutional investors in Australia and New Zealand, collectively representing more than A$4 trillion of AUM in Australia and New Zealand and approximately A$40 trillion globally. IGCC is a not-for-profit organisation that advocates on behalf of its members and collaborates to address the multifaceted risks and opportunities generated by climate change.

## Agenda of the Real Assets Sub-Working Group

Since 2023, the IGCC's Investor Practice Working Group has administered a dedicated member-led sub-working group known as the Real Assets Sub-Working Group (Working Group). The Working Group comprises 35 participants, consisting of 66% investors (asset owners and managers) and 34% service providers and industry associations.

To date, the group has completed the first two phases of its overall program. In Phase 1, the group evaluated climate mitigation and emissions reduction approaches. In Phase 2, the group focused on the physical climate-related risks to and resilience of infrastructure by:

- identifying the challenges with conducting credible physical climate-related risk assessments for infrastructure assets
- discussing potential solutions to the challenges identified
- sharing information about the challenges and potential solutions with relevant stakeholders.

To achieve these aims, the IGCC organised a series of six workshops.

# This report

This synthesis report provides an overview of the discussions held during Phase 2. These discussions took place from May to December 2024 and covered the implementation, approaches and challenges related to physical climate-related risk and resilience assessments experienced by Working Group members. While the focus was on infrastructure assets, many of the challenges and opportunities identified may be relevant to other types of real assets.

The report also identifies work that would improve investor practices related to the assessment of physical climate risks. It is written for investors, service and data providers, research institutes and other stakeholders that are either undertaking physical climate risk assessments or supporting others to do so.

The Working Group contributes to Objective 2 of the IGCC's *Road to Resilience: An Investor Action Plan for an Adaptive and Resilient Economy: Physical Risk Strategy 2023–25*[1]. Objective 2 refers to investors, companies, governments and communities developing a shared understanding of physical climate-related risks.

[1] https://igcc.org.au/wp-content/uploads/2023/07/IGCC-Physical-Risk-Strategy-2023.pdf

## Physical climate risk assessment by investors: Current practice landscape

The management of physical climate risks in the infrastructure sector is a growing area of practice among investors. Phase 2 of the Working Group involved exploring investors' understanding of and progress in physical climate-related risk assessments at both the *portfolio* and the *asset* levels.

### Approaches and tools

Organisations are taking a diverse range of approaches to assessing physical climate-related risks. These approaches also vary according to the type of organisation (e.g. consultant, data provider or investor). They include the use of hazard models, climate projections, geospatial tools and building assessments. These tools are advancing the understanding, assessment and management of physical climate-related risks by informing deep analyses (often at the asset level), governance frameworks, engagement with asset managers, key performance indicators and climate thresholds. They trigger adaptation responses and, in some cases, decisions about whether or not to hold an asset.

### Remaining challenges

All participants acknowledged the significant challenges in undertaking physical climate risk assessments of infrastructure assets and using these assessments to inform their investment decisions.

### Limitations of rating schemes and methodologies

In general, the existing approaches to understanding physical climate-related risks to real assets, including infrastructure, rely on applying established risk management rating systems (e.g. the Infrastructure Sustainability Council's IS Rating Scheme[2] or the Green Building Council Australia's Green Star[3] rating system for real estate). While some progress has been made in the development of climate-related risk management standards, namely AS 5334-2013[4] and ISO 14090:2019[5], these standards are too general and high level for decision-useful risk assessments. The investment industry is currently developing supplementary methodologies to identify and manage physical climate-related risks, including the Physical Climate Risk Assessment Methodology (PCRAM)[6] and the United Nations Environment Programme Finance Initiative's Climate Resilient Scorecard for Cities[7]. However, these are still in their infancy.

### Ambiguity and inconsistency

The key gaps in climate-related risk management standards and supplementary methodologies introduce technical ambiguity. Therefore, investors rely on asset development managers and operators to establish the rigour and defensibility of assessments.

While there are some instances of operators and owners properly managing physical climate-related risks to infrastructure, many owners and managers have not meaningfully started their journeys. Where assessments do exist, investors may not be confident in their robustness. This is a major challenge for asset owners and operators, the majority of whom have invested significant capital, thus are financially vulnerable to climate-related damage to infrastructure. Further, failing to thoroughly assess risk limits the business case for investing in adaptation and resilience measures to protect the value of assets.

[2] https://www.iscouncil.org/is-ratings/
[3] https://new.gbca.org.au/green-star/rating-system/
[4] https://store.standards.org.au/product/as-5334-2013
[5] https://www.iso.org/standard/68507.html
[6] https://www.mottmac.com/en/insights/topics/pcram-the-industry-methodology-for-climate-resilient-infrastructure-investment/
[7] https://mcr2030.undrr.org/media/99243/download?startDownload=20250618

## Key assessment challenges faced by investors

When conducting physical climate risk assessments on real assets, investors are faced with four key challenges related to data and standardisation, vulnerability assessments, interdependent risks and financial assessments. These are discussed in turn below.

### 1. Data and standardisation

Credible risk assessments rely on a range of information, including climate change data (e.g. climate change projections and hazard data), exposure data (i.e. where an asset is located) and asset-level vulnerability data (e.g. how an asset is constructed). However, many of these data are not currently accessible, aggregated formats, meaning that obtaining reliable data involves considerable costs and effort. For example, in Australia, flood maps are usually held at the council level, while bushfire maps are held at the state level. For investors with national and international portfolios, sourcing and aggregating can be time consuming and inefficient.

Instead, investors often use data and models from service providers. These may lack consistency and transparency and misalign with climate change modelling approaches adopted by state governments. Service providers also base their outputs on certain assumptions as they translate physical climate risk data into financial outcomes for specific asset types. It is critical that investors have confidence in their application of available information.

This challenge has been a key focus of the IGCC's advocacy with the Australian Government. More information can be found in IGCC's policy briefs, including *Investor Expectations on the National Climate Risk Assessment*[8] and *Activating Private Investment in Adaptation*.[9] While we hope to see progress in the public sector's data and model provision, the private sector, including investors, also play an important role.

### 2. Vulnerability assessments

Detailed and accurate vulnerability information (i.e. the physical characteristics of an asset) is essential to determine how an asset will be physically affected by climate-related risks. However, this information is often lacking or unavailable to investors. For example, a building's construction materials and floor height are important determinants of its bushfire and/or flood risk. While investors may be able to access this on an asset-by-asset basis, this is inefficient for portfolio-level assessments.

This is particularly challenging for complex assets that have unique vulnerabilities or are spread across different areas, thus are exposed to a range of physical risks. For example, a transport company may have railway lines exposed to flooding in one area and extreme heat in another.

### 3. Interdependent risks

Assets are subject to not only direct physical climate risks but also indirect risks, including macroeconomic shocks, supply chain disruptions or inaccessibility to public services such as roads or transport infrastructure. These risks can broadly grouped as *interdependent risks*, which arise as a result of the interconnectedness of various systems. If one part of the system is affected, a chain of effects across other parts can be triggered.

Quantifying these interdependent risks can be challenging because investors may not have the necessary information or relationships with supply chain operators. In addition, once they understand

[8] https://igcc.org.au/wp-content/uploads/2023/07/Briefing-Investor-Expectations-National-Climate-Risk-Assessment.pdf
[9] https://igcc.org.au/wp-content/uploads/2024/10/Activating-Private-Investment-in-Adaptation.pdf

these risks, they may have limited options to reduce their exposure if the managers of those assets are unwilling or unable to adapt.

4. **Financial assessment**

The relationships between physical risks and investor returns under different climate scenarios are complex. The potential outcomes of risks, financial or otherwise, and opportunities for adaptation will vary across scenarios.

Once investors understand the physical hazards and their interdependencies, to assess their financial vulnerability, they will also need to consider whether any risk mitigation has been undertaken, including whether insurance covers climate-related damage or business interruptions. Alternatively, the business may have included the risks in their resilience planning or undertaken operating or capital expenditures to reduce potential effects on revenue, capital value or profits.

These complexities, along with the inherent uncertainty of climate change, makes the transmission of physical climate risks to financial impact difficult to predict. While historic examples (e.g. costs to investors of past climate events) may be useful, they cannot cover the full scope of events that may occur in the future.

## Opportunities for future work

The Working Group identified five possible solutions or further work to address the abovementioned challenges. These are detailed below.

1. **Establish a defensible method for assessing risk**

While some exsiting Australian and international standards have established a basis for the assessment of physical climate-related risks (e.g. AS 5334-2013 and ISO 14090:2019), they leave numerous material gaps throughout the risk assessment process. This undermines the quality and defensibility of assessments undertaken by organisations and hinders effective decision-making by investors, including decisions related to investments in adaptation. Therefore, investors have the opportunity to support the establishment of enhanced methods of assessing physical climate-related risks to infrastructure. This may involve establishing clear responsibilities for all stakeholders, including asset developers, operators, investment managers and investors.

Potential focus areas:

- Define a clear process for the defensible assessment of physical climate-related risks to real assets.
- Explore the current constraints on investors and investment managers in terms of accessing relevant data and assessing physical climate-related risks. Identify opportunities to mitigate these constraints (e.g. through the provision of data and assessments by asset operators).
- Establish clear responsibilities for investors, investment managers and asset operators.
- Establish investor expectations for asset developers and operators and investment managers to change current practices.

### 2. Consistent and decision-useful financial physical climate risk metrics

Metrics are a key component of both risk assessments and disclosure. While physical climate risk–related financial metrics are becoming more common in the insurance (e.g. average annual loss) and banking (e.g. loan-to-value ratio) sectors, consistent metrics for investors are less common. This is because of the diversity of assets held in investment portfolios and the variety of ways in which physical climate-related risks can have financial impacts.

A consequence of this is that physical climate risk–related financial metrics at the asset or sub-asset level are often challenging to aggregate at the portfolio level or use in comparisons, prioritisations, target-setting or valuation standards.

Potential focus areas:

- Collate case studies of physical climate risk–related financial metrics used by investors and compare their usefulness in investment decision-making.
- Develop a worked example of how metrics from different assets can be aggregated to create a consistent physical climate risk–related financial metric.
- Map different elements of financial effects for investors (i.e. what should be included in a physical climate risk–related financial metric), including direct and indirect damage and business disruptions.
- Develop guidance on target-setting for physical climate risk and resilience.
- Develop guidance on categories of non-damage-related financial effects (e.g. low productivity because of high temperatures, supply chain disruptions or governance).

### 3. Accessible asset-level vulnerability information

The Working Group identified a lack of asset-level information available to investors when undertaking physical climate risk assessments. This information determines how assets respond (i.e., their vulnerability) to different types of acute and chronic climate hazards. Without this information, it is challenging to translate climate and hazard metrics (e.g. wind speed or flood depth) to financial metrics (i.e. costs to investors).

Potential focus areas:

- Survey physical climate risk and resilience service providers on how they account for vulnerability in their assessments and provide guidance on key challenges (including information gaps) and what represents current best practice in this area.
- Develop a worked example of how vulnerability can be considered for non-building assets (e.g. railroads) or hazards that are typically overlooked in physical climate risk assessments (e.g. extreme heat).
- Collate examples of how asset vulnerability may change under compound events (i.e. multiple hazards) and provide guidance on how investors can account for this in their physical climate-related risk assessments.

### 4. Economic quantification of adaptation benefits beyond avoided losses

The World Resources Institute refers to the 'triple dividend of resilience'. The first dividend relates to avoided losses. Including the broader economic benefits (the second dividend) and social and environmental benefits (the third dividend) will enable a true cost–benefit analysis. Currently, it is challenging to include these additional dividends because of the limited methodologies, and it is still unclear how investors should integrate these additional dividends in accordance with their fiduciary duties.

Potential focus areas:

- Provide guidance on how investors can include the second and third resilience dividends in their investment cost–benefit analyses.
- Provide thought leadership on how cost–benefit analyses that consider all three resilience dividends will be financially relevant for investors, including investigating opportunities for innovative financial mechanisms.
- Develop a worked example identifying resilience dividends for an infrastructure asset in Australia, including the benefits for investors.

### 5. Whole-of-system resilience

Large institutional investors are uniquely exposed to interdependent risks because they are generally invested across broad sections of the economy. However, this presents an opportunity for them to engage with and mitigate interdependent risks (e.g. in asset supply chains or local regions) to build whole-of-system resilience. This may be done within their own portfolios, and by engaging with other stakeholders or through policy and advocacy.

Potential focus areas:

- Develop methods for portfolio-wide resilience targets that drive whole-of-system resilience.
- Develop guidance on:
    - the inclusion of interdependent risks in physical climate risk assessments
    - engaging and collaborating with relevant stakeholders
    - investing in adaptation that promotes whole-of-system resilience
- Produce a case study (or worked example) of any of the above.

### What's next?

In the next phase, the Working Group will focus on establishing a defensible method for assessing physical climate risks to infrastructure assets. Any IGCC members who are interested in becoming involved are invited to contact us. Additionally, the IGCC is interested in hearing from other groups exploring these topics to collaborate and share insights.

## Contact details


Kate Simmonds
Senior Manager, Climate Resilience
kate.simmonds@igcc.org.au

Marwa Curran
Manager, Investor Engagement
marwa.curran@igcc.org.au


## IGCC Real Assets Sub-Working Group members

Arcadis
Australian Super
Aware Super
Dexus
ERM Energetics
GHD
IFM Investors
Investa
Macquarie Asset Management
MaxCap Group
Owl Advisory
Queensland Investment Corporation
Rest Superannuation Trust
Stockland
TCorp
The Climate Risk Group
University of Melbourne