UNIVERSITY OF CAMBRIDGE | CISL Cambridge Institute for Sustainability Leadership

Investing in Tomorrow:

A Guide to Building Climate-Resilient Investment Portfolios

January 2025

The University of Cambridge Institute for Sustainability Leadership

CISL is an impact-led institute within the University of Cambridge that activates leadership globally to transform economies for people, nature and climate. Through its global network and hubs in Cambridge, Cape Town and Brussels, CISL works with leaders and innovators across business, finance and government to accelerate action for a sustainable future. Trusted since 1988 for its rigour and pioneering commitment to learning and collaboration, the Institute creates safe spaces to challenge and support those with the power to act.

The Centre for Sustainable Finance: Our mission is for private financial institutions to accelerate the transition to a global economy that is sustainable and resilient. As part of CISL, we work with a range of stakeholders to achieve this, including academics, policy-makers, NGOs and private financial institutions. We bring together a unique combination of academic rigour and deep industry collaboration to produce research publications which help financial institutions to play a leading role in building a more sustainable economy. Our primary route to engagement with private financial institutions is through our three membership groups – the Banking Environment initiative for banks, ClimateWise for insurers and the Investment Leaders Group for investors.

The Investment Leaders Group (ILG) is a global network of pension funds, insurers and asset managers with over US$9 trillion under management and advice. The ILG's vision is an investment chain in which economic, social and environmental sustainability are delivered as an outcome of the investment process. The ILG is a voluntary initiative, driven by its members, convened by CISL and supported by academics in the University of Cambridge.

Authors

Lead authors:
Trisha Mani
Elizabeth Clark

CISL team:
Dr Nina Seega, Jessica Attard, Gwyn Rhodes, Eliot Whittington and Dr Bronwyn Claire (CISL Fellow and Climate Specialist at Ortec Finance)

Acknowledgements

ILG Steering Group:
John Chung (Aon), Jeremy Ng (Bridgewater Associates), Sudip Hazra (First Sentier MUFG Sustainable Investment Institute), Eric Nietsch (Manulife Investment Management), Erwin Houbrechts (PGB Pensioendiensten), Liam Turnbull, Oliver Jones, Max Richardson (Rathbones), Kushal Shah (SSGA), Mathieu Nègre, Nicolas Barben (UBP), Mette Gahr (Zurich)

External Advisory Group:
Sabrina Nagel (Atlantic Council, Adrienne Arsht-Rockefeller Foundation Resilience Center), Francisco Martes Porto Macedo (Climate Policy Initiative), Kristian Flyvholm (Sovereign Investors), Lea Lorkowski, Hiu Yan Cheng (UN Environment Programme Finance Initiative), Dr Nazia Habib (Centre for Resilience and Sustainable Development, University of Cambridge), Dr Jesse F. Abrams (University of Exeter), Dr Nicola Ranger and Dr Mark Bernhofen (Environmental Change Institute, University of Oxford)

Citing this report

University of Cambridge Institute for Sustainability Leadership (CISL). (2025). Investing in tomorrow: A guide to building climate-resilient investment portfolios. Cambridge, UK: Cambridge Institute for Sustainability Leadership.

Executive summary

Developed by the University of Cambridge Institute for Sustainability Leadership (CISL) and members of the Investment Leaders Group (ILG), this guide serves as a roadmap for investors to build climate resilience within their portfolios and invest in systemic resilience through engagement with the broader ecosystem.

The climate crisis is no longer a distant threat but a pressing reality that demands immediate attention. While efforts around climate change mitigation are gradually gaining momentum, the emphasis on building adaptation and resilience has been minimal.

The financial implications of extreme weather events are also becoming increasingly apparent for the private sector. However, while investors are aware of the need to integrate physical climate risks in financial decision-making, approaches to addressing it remain nascent, fragmented and unfamiliar.

The systemic nature of physical climate risk therefore requires systemic risk management and a two-fold approach from private capital: (1) making investment portfolios resilient to these risks, and (2) also actively investing in resilience measures to strengthen the broader ecosystem.

This guide focuses on listed equity and debt portfolios and is structured in two main sections:

1. **In focus: the investment process:** illustrates how decisions made early on can significantly impact subsequent stages and opportunities, emphasising the need to address physical climate risks from the outset.

2. **Changing the landscape: engaging with the enabling environment:** examines the different ways in which investors can proactively engage with critical stakeholders in the broader ecosystem, identifying opportunities for collaboration and advocacy within policy, the real economy, the broader financial sector and within their own organisations.

Key thematic takeaways

Building resilient investments

Tools and strategies for evaluating physical climate risks in listed equity and debt portfolios are increasingly available, enabling secondary market investors to understand the financial impact of such risks.

By integrating physical climate risks at the start of the investment process, investors can be better prepared to assess and address their exposures at subsequent stages.

Incorporating physical climate risks in asset allocation is critical to understand how they affect both short- and long-term economic and return forecasts.

Taking an active role in engaging with portfolio companies on adaptation and resilience can help investors enhance long-term value, mitigate climate risks and drive sustainable growth.

Enabling investment into resilience

Enhancement of corporate disclosure standards can help investors evaluate the financial materiality of climate hazards at the asset level and influence investment decision-making.

By engaging with the broader financial system - building on learnings from the insurance industry and blended finance structures, investors can leverage innovative financing models to invest into adaptation and resilience.

Collective action is required at the national and international levels to scale ambition for NDCs and NAPs, make them more investable and catalyzing the flow of private capital.

Education, awareness and capacity building within financial institutions around the language and tools to evaluate physical climate risks can help drive action across the system.

Contents

Introduction: the financial impacts of physical climate risks

2024 has served as a pivotal point in the climate crisis, with the physical impacts of climate change more evident now than ever before. Around the world, fierce wildfires, devastating floods and scorching heatwaves have become increasingly common, with each year surpassing the previous as the 'hottest year' on record. While emerging markets and developing economies (EMDEs) remain the most vulnerable to the impacts of climate change, the costs of inaction are becoming increasingly apparent for developed markets as well. Economic losses associated with extreme weather events in Europe amounted to €13.4 billion in 2023, with the region claiming the title of the fastest warming continent in the world.[1]

The climate crisis is no longer a distant threat but a pressing reality that demands immediate attention, with the financial implications of extreme weather events becoming increasingly apparent for the private sector. At a macro-economic level, a recent study by the US National Bureau of Economic Research found that previous estimations of the macroeconomic impacts of climate change are severely underestimated, demonstrating that a 1°C rise in global temperature could lower world gross domestic product (GDP) by 12 per cent at peak.[2] At a company level, a study by S&P Global revealed that two-thirds of major global companies will have at least one asset at high risk because of the physical impacts of climate change.[3] Additionally, in the absence of adaptation measures, the costs of these physical climate risks could amount to as much as 28 per cent per year of the value of real assets held by companies in the S&P Global 1200 by the 2050s.[4]

With an increasingly interconnected global economy, extreme weather events in one part of the world can impact businesses, economies and livelihoods of people in another. The financial impacts of physical climate risks are not restricted to specific sectors or geographies alone. Climate hazards that impact production hubs in vulnerable regions can result in significant global losses across supply chains around the world. It is estimated that a total of US$81 billion of global trade and at least US$122 billion of economic activity is at risk on average annually due to disruptions to the most critical ports globally from climate extremes.[5]

The increasing frequency and intensity of climate-related disasters are also pushing communities and ecosystems to their limits – leaving the most vulnerable populations at risk and underprepared. The nonlinear nature of the impacts of climate change often exacerbates existing inequalities, causing compounding effects on social systems, livelihoods and economies. For example, certain regions in India are approaching temperature thresholds that could make outdoor work extremely difficult when coupled with the already high humidity in the region. As of 2017, heat-exposed work accounted for about 50 per cent of the country's GDP, contributed to roughly 30 per cent of GDP growth, and employed nearly 75 per cent of the labour force, or about 380 million people.[6] However, as temperatures continue to rise, these ripple effects are not limited to outdoor work alone and will significantly disrupt economic activities across different sectors in India, leading to cascading effects across the global economic system.

Supply chain risks in action: ripple effects of the Panama Canal drought

In 2023, following one of the worst droughts on record, Panama Canal authorities for the first time cut the number of ships that can cross each day. This was in response to an incredibly dry October, coupled with the influence of El Niño, that led to a significant reduction in rainfall during what would usually be the peak of Panama's wet season, which runs from May to December.

According to a recent report, the Panama Canal Authority expects to post an estimated US$600 million to US$800 million decline in revenue due to continued drought, ship size restrictions and a falling quantity of daily passages. As a result, the shipping and logistics world is bracing for more frequent disruptions as climate change increasingly rocks global trade.

Challenges in mobilising private finance for adaptation and resilience

While regulators, central banks and other financial consortia are increasingly recognising the critical importance of physical climate risks, concrete guidance around adaptation and resilience is yet to be developed.

According to the latest Global Landscape of Climate Finance, mitigation-focused finance accounted for nearly 90 per cent of annual average financial flows in 2021–22. However, according to the latest UN Adaptation Gap Report, global adaptation finance needs are ten to eighteen times more than the current financial flows, amounting to between US$194 and US$366 billion per year for developing countries as of 2023.[7] This adaptation finance gap cannot be met with public finance alone. There is a crucial need for the mobilisation of private commercial capital towards investments in building resilience to the inevitable impacts of climate change.

For the private sector, the key challenge in climate risk analysis is the translation of climate models into actionable information for portfolio decision-making. Lack of asset-level data around the scenarios and climate models results in climate risks being severely underestimated in financial portfolios, while disparity in time horizons of climate forecasts and investment terms, and the lack of consensus around accounting for second-order climate-linked scenarios like mass migration make these risks difficult for practitioners to grapple with. As a result, to understand the economic impacts of different climate scenarios these models require substantial adjustment and refinement to translate their generalised trajectories into meaningful risk scenarios for specific sub-regions, companies, or assets.[8]

While investors are increasingly aware of the need to integrate physical climate risks in financial decision-making, approaches to addressing it remain nascent, fragmented and unfamiliar. There is a need for clear, practitioner-led guidance on integrating physical climate risks into investment decision-making, and outlining how investors can proactively engage with key stakeholders in the ecosystem to begin addressing these risks. **This report outlines the behaviour change needed from investors to begin assessing risks within their investment portfolio and addressing them through active engagement with the enabling ecosystem.**

How to use this guide

The purpose of this guide is to enable investor action on adaptation and resilience by outlining key levers for investor engagement both within the investment process and across the broader ecosystem.

Focus: listed equity and debt portfolios

This report focuses on listed equity and debt portfolios, recognising both a gap in the literature when it comes to these asset classes and potential scope for impact as they play a significant role in most institutional investment portfolios. Currently, financial assessments for physical climate risks are predominantly focused on real estate and infrastructure – sectors that are particularly vulnerable to extreme weather events.

Assessing physical climate risks in equity and debt instruments can be more challenging due to the nature of these markets and the way climate risks are priced in. However, not accounting for physical climate risks in these asset classes leaves a significant portion of the economy exposed to the compounding and cascading effects of climate change.

How is it structured?

This guide is designed to serve as a roadmap for investors and is structured in two main sections:

Part (1): The investment process
This section illustrates how decisions made early on can significantly impact subsequent stages and opportunities, emphasising the need to address physical climate risks from the outset.

Each stage within the investment process:

- introduces the challenges in accounting for physical climate risks within this stage
- outlines the behaviour change needed for investors to address these challenges
- explores key levers for change to support investors implementing these decisions. These levers often require strong collaboration with and support from the enabling environment.

Recognising that what works for one investor may not work for others, this guide seeks to provide a structure to help investors incorporate physical risks in a way that is best suited for different investment approaches.

Part (2): Engaging with the enabling environment
To ensure that investors are equipped to effectively address physical climate risks and support investments in adaptation and resilience, the broader ecosystem must evolve.

This section examines the different ways in which investors can proactively engage with critical stakeholders in the broader ecosystem, identifying opportunities for collaboration and advocacy within:

i. policy
ii. the real economy
iii. the broader financial sector
iv. their own organisations.

How to use this guide

The interactive visual is designed to represent the investment process and the broader enabling ecosystem surrounding it.

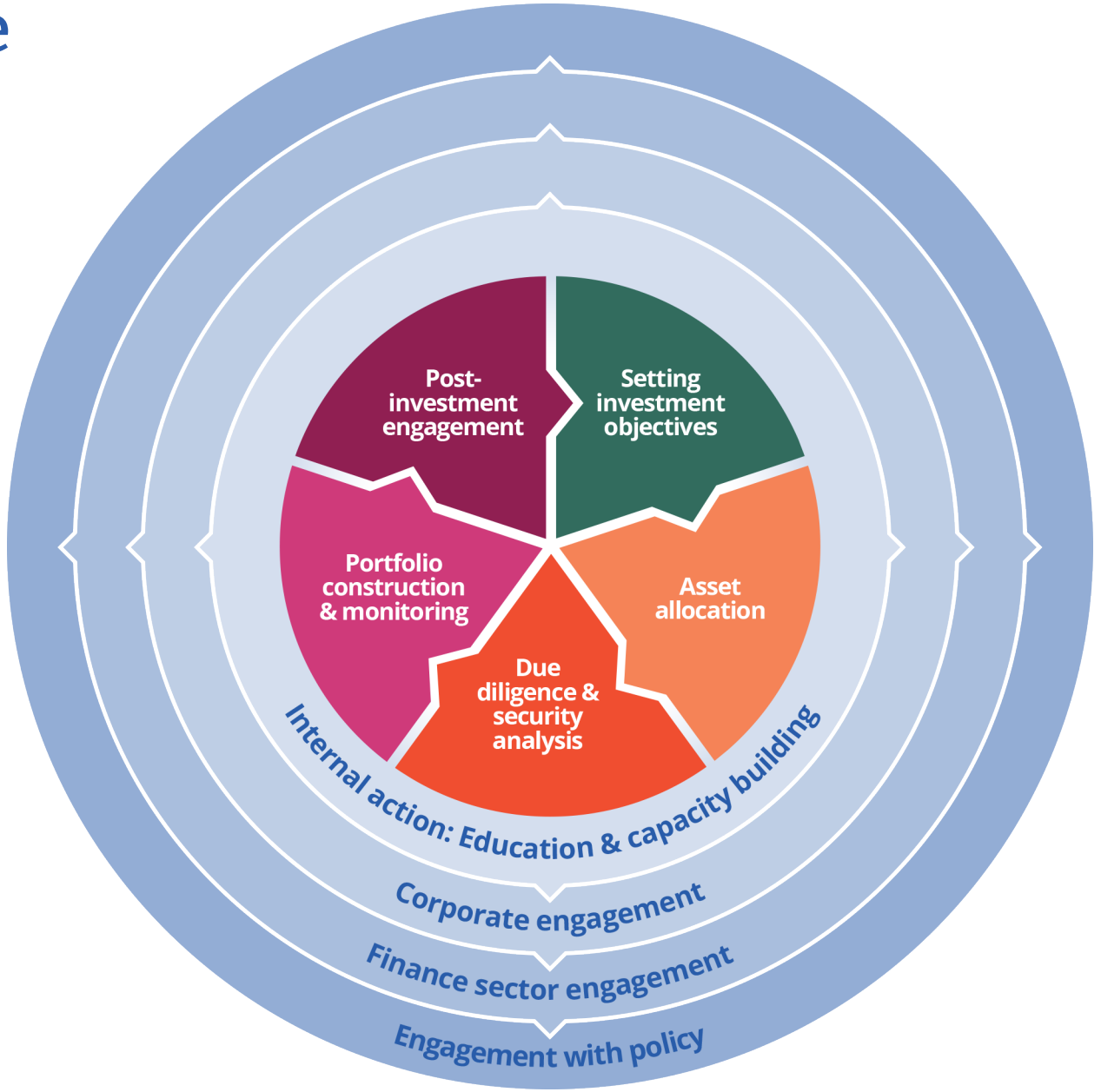
The investment process is represented by the wheel in the center and consists of five key stages:

- Stage #1: Setting investment objectives
- Stage #2: Asset allocation
- Stage #3: Due diligence & security analysis
- Stage #4: Portfolio construction and monitoring
- Stage #5: Post-investment engagement

The enabling ecosystem is illustrated using concentric circles, where each layer represents a critical group of stakeholders. These layers are arranged to reflect the different levels of agency and influence that investors have within the ecosystem, emphasizing the importance of engaging with each stakeholder group strategically.

Clicking through a particular phase or section will take you to the relevant page where further information on this topic can be found.

The icons at the top right will bring you back to the contents page or to this diagram.



Foundational Concepts: physical climate risks and investment opportunities

Understanding foundational concepts in physical climate risks is crucial for informed investor action. By grasping the underlying mechanisms of physical climate risks, investors can be better equipped to identify vulnerabilities, allocate capital effectively, and integrate resilience measures into their strategies.

What are physical climate risks?

Physical climate risks are those risks that arise from the physical impacts of climate change. Broadly speaking, there are two categories of physical climate risk:

Categories of physical climate risk	
Acute	Acute physical risks refer to those that are event driven, including increased severity of extreme weather events, such as cyclones, hurricanes, or floods.
Chronic	Chronic physical risks refer to longer-term shifts in climate patterns (eg, sustained higher temperatures) that may cause sea-level rise or chronic heatwaves.

Source: Reproduced from the TCFD Recommendations[9]

Foundational Concepts: physical climate risks and investment opportunities

How do they affect investors?

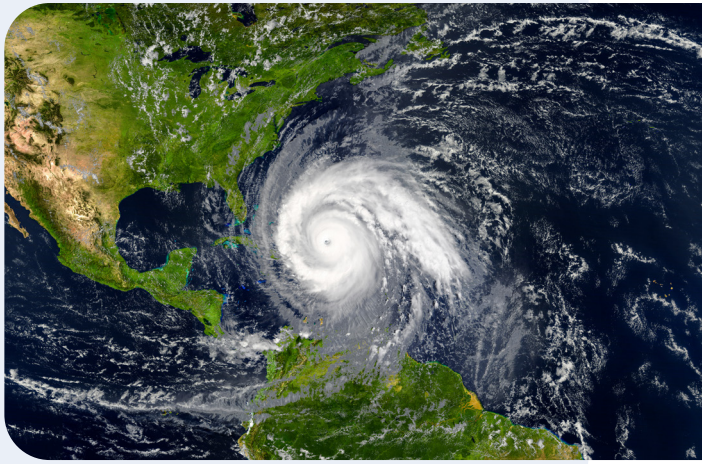
Physical climate risks have both direct and indirect financial implications for investors as they affect the risk and return profiles of investment portfolios. The Network for Greening the Financial System (NGFS) provides a useful summary of the different transmission channels through which climate risks affect the global and financial ecosystem.

Climate-related physical risks	Potential financial impacts on a company's/investee's value
Acute physical risks: • Increased frequency and severity of extreme weather events such as cyclones and floods **Chronic physical risks:** • Changes in precipitation patterns and extreme variability in weather patterns • Rising mean temperatures • Rising sea levels	• Reduced revenue from decreased production capacity (eg, transport difficulties, supply chain interruptions) • Reduced revenue and higher costs from negative impacts on workforce (eg, health, safety, absenteeism) • Write-offs and early retirement of existing assets (eg, damage to property and assets in 'high-risk' locations, relocation costs, etc) • Increased operating costs (eg, inadequate water supply for hydroelectric plants or to cool nuclear and fossil fuel plants) • Increased capital costs (eg, damage to facilities) • Reduced revenues from lower sales/output • Increased insurance premiums and potential for reduced availability of insurance on assets in 'high-risk' locations

Source: Reproduced from the TCFD Recommendations

Acute physical climate risks in action:

Hurricane Beryl, one that affected large areas of the Caribbean and North America in June 2024, became the earliest category five Atlantic hurricane in records going back around 100 years. The ripple effects created disruptions in shipping, air freight and temporary port shutdowns across the US, resulting in significant impacts to the supply chains across different sectors including apparel, chemicals and logistics.



Foundational Concepts: physical climate risks and investment opportunities

Adaptation and resilience investments

According to the Intergovernmental Panel on Climate Change (IPCC), the institution responsible for assessing the science related to climate change and guiding international climate policy:

Adaptation refers to "the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects."[10]

Resilience refers to "the capacity of interconnected social, economic and ecological systems to cope with a hazardous event, trend or disturbance, responding or reorganising in ways that maintain their essential function, identity. Resilience is a positive attribute when it maintains capacity for adaptation, learning and/or transformation."[11]

From an investor perspective, a climate adaptation and resilience investment is:

A climate A&R investment is...

An investment in a company offering a technology, product and/or service enabling others to:

- **Prepare & prevent**
- **Respond** to
- **Recover** from

The risk and impacts of climate change

A&R solutions include:

- **Climate risk analytics**
- **Cooling technologies**
- **Climate insurance**

- Enable others to **prepare for & prevent** the impacts of climate change
- Enable others to **respond** to the impact of climate change
- Enables others to **recover** from the impacts of climate change

Source: Climate Investment Playbook (BII & FMO, June 2024)[12]

Role of private capital: making investment portfolios resilient vs investing in resilience

The systemic nature of physical climate risk therefore requires systemic risk management and a two-fold approach from private capital: (1) making investment portfolios resilient to these risks, and (2) also actively investing in resilience measures to strengthen the broader ecosystem.

Making investment portfolios resilient:

Resilient investment portfolios are those that "can effectively mitigate short-term shocks and navigate long-term trends to optimize risk-adjusted returns across market cycles".[13] Resilient investment portfolios are therefore intended to be risk-aware, diversified, flexible and consistent.

The physical impacts of climate change directly impact portfolio resilience in different ways. By integrating such risks into the investment process, investors can begin to navigate the impacts of climate change on portfolio resilience and stability by better understanding their exposure to climate-related risks and how their investment activities may be contributing to these risks and impacts.

Investing in adaptation and resilience:

Investing in adaptation and resilience is fundamentally about ensuring that we are prepared for the likely impacts of climate change. By focusing on resilience and adaptation, private financial institutions can help minimise further damage by taking a more active role in engagement and leadership.

While avoiding losses is the primary motivation, focusing solely on this aspect underestimates the full range of benefits. The World Economic Forum (WEF) estimates a market opportunity of US$2 trillion in the field of adaptation and resilience investments.[14] Moreover, investing in resilience is said to yield a triple dividend – of avoiding losses, accruing economic benefits and contributing to social/environmental change.[15]

- **First dividend: avoided losses** – As 'universal owners', institutional investors have highly diversified and long-term portfolios that are largely representative of global capital markets.[16] Investing in resilience can collectively reduce the potential for future financial losses due to climate-related risks, protecting investment portfolios from adverse impacts due to climate change.
- **Second dividend: positive economic benefits** – This encompasses the broader economic gains achieved by meeting an increasingly unmet demand for solutions in adaptation and resilience. These benefits arise from the stimulation of innovation driven by the need for adaptation, improved efficiency and the creation of new opportunities resulting from adaptive measures.
- **Third dividend: social and environmental benefits** – This includes the social and environmental advantages that stem from resilience investments. These benefits contribute to overall societal well-being and environmental sustainability, providing value beyond immediate financial considerations.

For example, building climate-resilient infrastructure can help avoid future losses, offers a benefit-to-cost ratio of approximately 4:1 and accrues additional social and environmental benefits. With an estimated US$60 trillion in infrastructure investments expected between 2020 and 2030, the potential returns from early adaptation efforts are substantial, demonstrating a compelling value proposition for investors.[17]

In focus: the investment process

Stage #1: Setting investment objectives

Target outcome: setting climate-aware investment objectives with clients

Understanding a client's financial goals and risk tolerance is essential for building a climate-resilient portfolio that balances appropriate risk levels while addressing both short- and long-term climate-related challenges. By incorporating climate considerations into client discussions and demonstrating how climate risks impact financial outcomes, investors can support clients in enhancing portfolio resilience. Establishing clear climate objectives with clients from the start enables investment managers to integrate climate risks and opportunities more effectively throughout the portfolio and investment process.

While there is no 'one size fits all' approach for investors in setting investment objectives, they can approach integration of physical climate risks in two broad ways depending on their interactions with clients:

- **Integrating physical climate risks into existing financial objectives:** Incorporating climate risk assessments into traditional financial objectives (eg, inflation protection, preservation of capital, volatility of market value or income growth) seeks to ensure investors can manage downside risk under extreme climate scenarios and improve risk-adjusted returns.
- **Creating climate-resilience objectives:** Based on client appetites, developing specific climate-resilience objectives can help portfolio managers identify opportunities that contribute to building climate resilience in the broader economy. Such investment opportunities balance building resilience within the portfolio and investing in adaptation and resilience opportunities.

Key levers for change:

Changing the narrative: from climate mitigation to holistic climate risk and return

Traditionally, integrating climate considerations into client objectives has been framed predominantly through either an impact-driven narrative, focusing on the ethical and environmental consequences of climate risks, or a narrative about the direct financial implications of a low carbon transition. However, shifting this perspective to an approach that emphasises holistic climate risks, including both transition and physical, can influence client engagement. By adding a financial materiality lens to physical climate risks, investors can more effectively incorporate climate considerations into their financial strategies, aligning them with broader financial targets.

Recognising the diversity of client needs, investor approaches and risk appetites, the United Nations Environment Programme Finance Initiative (UNEP FI) Principles for Responsible Investment (PRI) has launched the Progression Pathways, a step-by-step journey for signatories to develop and progress their responsible investment practice. This approach allows investors to help educate clients depending on where they are in the journey towards integrating climate resilience within their portfolios.

In focus: the investment process

Stage #1: Setting investment objectives

Addressing the mismatch in time horizons: leveraging short-term climate scenarios

A critical challenge in setting climate-aware objectives with clients is the mismatch between the time horizons of investment portfolios and climate risk horizons used in strategic asset allocation processes. While traditional climate risk models often focus on long-term scenarios extending several decades into the future, investors operate with shorter time frames, typically ranging from three to five years. However, given that the effects of physical climate risk are being felt today, there needs to be a shift in the prevailing narrative that investments are outside the time frame.

To help contextualise this reality and bridge this gap in climate scenario analysis, UNEP FI has released a Short-term Climate Scenarios Tool. The guide and accompanying Microsoft Excel tool seek to help financial institutions understand the implications and drivers of a range of short-term shock scenarios spanning one to five years. By addressing the gaps in medium- to long-term scenario analysis they enable the translation of climate-related shocks into immediate financial impacts.[18]

Determining financial materiality: need for asset-level data

Understanding the financial materiality of physical climate risks involves assessing how climate-induced hazards may affect the value and performance of assets within a portfolio. The lack of granular asset-level data on physical climate risks makes this challenging. Currently, most investors rely on third-party commercial data providers to assess these risks, with methodologies often facing several limitations: they are proprietary, making them difficult and expensive to access; they lack full transparency; and they can lead to diverging/underestimated results. The resulting different levels of aggregation make it difficult to have certainty on overall damages, which often form the basis of valuation models and risk pricing.[19]

A recent study seeking to quantify the financial impact of the physical impacts of climate change translated climate shocks into economic and financial losses at the asset level. Taking the case of Mexico, a country highly exposed to physical climate risks, the study shows that using proxy data instead of asset-level data can lead to an underestimation of losses for investors of up to 70 per cent. Additionally, neglecting tail acute risks leads to a larger underestimation of portfolio losses, up to 82 per cent in the selected sample.[20] Thus the need for asset-level data is a key factor for investors to accurately determine the financial materiality of climate risks.

It is therefore critical that investors take an active role in engagement with key stakeholders in the ecosystem, for better access to relevant data. Working with corporates, engaging with policy on disclosure regulations and leveraging open data platforms are a few examples of potential avenues for engagement. A study by UNEP FI explores the critical role of open-source and neutral data platforms, arguing that such platforms could address some of the inefficiencies and financial challenges by improving data accessibility and reliability.[21] Bloomberg has also launched a series of science-based physical risk indicators, aimed at enabling companies and investors to assess exposure to climate-related risks such as floods, droughts and wildfires.

Scope for engagement: Investing in education and capacity building, working with corporates, leveraging international platforms and networks

In focus: the investment process

Stage #2: Asset allocation

Target outcome: integrating climate risks in economic and return forecasts

The asset allocation stage is a fundamental component of the investment process that involves the distribution of capital across various asset classes to diversify risk and achieve financial goals. Integrating physical climate risks within asset allocation is essential for the financial performance and long-term stability of investment portfolios, as extreme weather events and long-term shifts in climate patterns can directly impact the value and returns of assets.

There are typically three key components of asset allocation for an investor: Capital Market Assumptions (CMAs), Strategic Asset Allocation (SAA) and Tactical Asset Allocation (TAA). Decisions made at each of these components rely on economic forecasts and modelling. However, challenges around data availability and accuracy, complexity and comparability in diverse climate modelling techniques, and limitations of stress testing and scenario uncertainty have made it difficult to incorporate climate risks into long-term economic and return forecasts.

Key levers for change:

Exploring climate-aware capital market assumptions

Integrating climate risks into economic forecasts during the asset allocation stage can help investors better assess projected risks and returns, while also providing them with a more holistic understanding of the fiscal and economic stability of different countries. A recent study by the Bennett Institute found that climate change could induce sovereign downgrades as early as 2030.[22] Building on this research, a study by the University of Oxford demonstrates how acute climate risks and adaptation can be quantitatively incorporated into sovereign credit ratings. The findings reveal that potential impacts on sovereign credit ratings are far greater than originally perceived. However, with investments in adaptation, these impacts can be largely offset, thereby strengthening the importance of adaptation on financial stability.[23]

Climate-aware CMAs are an emerging approach in investment management that seek to integrate the potential impacts of climate change into traditional capital market assumptions. Climate-aware CMAs consider factors like physical climate risks, the transition to a low carbon economy, policy changes, technological developments and shifts in consumer preferences. The goal is to adjust expected returns and risks for various asset classes to reflect the anticipated effects of climate change over different time horizons.[24] This allows them to assess the potential impact of physical climate risks on investments over the short, medium and long term. These assumptions can help guide investors in making strategic asset allocation decisions by incorporating climate risks and opportunities into their investment frameworks.

Investors are increasingly exploring ways in which climate considerations can be incorporated into CMAs and thereby into asset allocation decisions. Invesco has developed a guide to help investors make climate-aware adjustments to CMAs in equities and fixed income asset classes. BlackRock has also developed a framework for climate-aware portfolio construction that seeks to incorporate the impacts of climate change on long-term asset returns through three channels: macro-economic variables (Macro), market valuation changes over the forecast period (Repricing) and corporate performance (Fundamentals).

In focus: the investment process

Stage #2: Asset allocation

Enhancing climate modelling techniques

Currently, asset managers use different climate modelling techniques to understand the financial implications of physical climate risks on revenue projections. However, limitations around risk and resilience modelling techniques make it difficult to incorporate such risks into economic forecasts, with challenges including:

- **Global scale vs local impact:** Climate models are typically designed to operate on a global or national scale, which limits their ability to predict localised impacts accurately. While industry efforts are developing to address this challenge, such as catastrophe modelling and the Inter-Sectoral Impact Model Intercomparison Project, they are yet to be translated into financial decision-making. This is because the lack of asset-level data for companies makes it challenging to map geolocation data to a company's assets.[25] Thus there is a need for enhancements in data disclosure from public companies to bridge this gap and help investors further integrate physical climate risk assessments into investment decision-making.

- **Tragedy of the horizon' and need for short-term climate modelling:** The temporal mismatch of the physical impacts of climate change and typical investment time horizons makes it difficult for investors to estimate physical climate risks in strategic asset allocation. In financial markets, asset pricing is determined by discounting future cash flows, and climate-related events have the potential to trigger a reassessment of these projected cash flows for companies exposed to long-term climate risks. The associated risk premium may increase due to factors such as the negative impact on credit ratings or heightened awareness of the materiality of climate risks.

- **Complexity and uncertainty:** Climate models must account for complex interactions between various climate system components, such as the atmosphere, oceans and biosphere. This complexity introduces significant uncertainty into projections, particularly regarding regional climate impacts and the potential for extreme weather events. The uncertainty is compounded by the difficulty in accurately modelling feedback loops and tipping points within the climate system, which can lead to substantial variability in predicted outcomes.[26]

- **Change in distribution of risks:** A landmark study by the Institute and Faculty of Actuaries and the University of Exeter emphasises the urgency of more realistic climate risk assessments, as research suggests that historic tail risks are now more likely to be expected.[27] The evolution of the distribution of climate risks calls for more realistic climate modelling techniques that account for the evolving nature of outcomes, including tipping points and realistic worst-case scenarios.

In focus: the investment process

Stage #2: Asset allocation

Recognising these challenges, the Climate Financial Risk Forum has developed a Scenario Analysis Guide for Asset Managers with the aim of helping asset managers understand how scenario analyses can inform different business processes. The guide provides an end-to-end view on model selection, outlining how asset managers can choose the relevant model and scenarios, understand their applicability across asset classes, and highlighting relevant case studies where applicable. It also outlines how climate adaptation is currently incorporated in scenario analysis, where the gaps are and how cost–benefit analyses could be used to help asset managers approach adaptation planning.[28]

However, when assessing climate risks, it is crucial to understand the methodological differences between traditional natural catastrophe models, their climate-conditioned versions, and novel climate modelling techniques, such as prescriptive analytics and machine learning. While each approach has its strengths and limitations, the choice of methodology should be tailored to the specific use-case requirements. This selection process should involve subject matter expertise to ensure that the models are fit for purpose and can effectively inform strategic market responses.

Given the rapidly changing landscape of climate risk tools and methodologies, the Climate Risk Dashboard from UNEP FI offers an in-depth overview of over 80 tools, detailing their features, metrics, methodologies, assumptions and typical use cases. It also provides comprehensive information on how these tools align with sustainability-related disclosure standards or regulations, as well as their policies regarding data quality, sourcing and other key aspects.

More broadly, a co-ordinated approach between modellers and decision-makers is essential for effectively assessing financial mechanisms for adaptation responses and making long-term strategic decisions. Engaging with relevant experts and counterparts within the insurance industry can also help facilitate a shared understanding of risks, ensuring that the models are appropriately applied and that the resulting insights are actionable.

> “We don’t need an army of actuaries to tell us that the catastrophic impacts of climate change will be felt beyond the traditional horizons of most actors – imposing a cost on future generations that the current generation has no direct incentive to fix.”
>
> Mark Carney as Governor of the Bank of England, 2015

Scope for engagement: Collaborating with the financial sector, working with corporates and leveraging international platforms and networks

In focus: the investment process

Stage #3: Due diligence and security analysis

Target outcome: quantifying physical climate risks at the sector and company level

The integration of physical climate risk assessments at the due diligence stage of the investment process enables investors to identify and manage a fuller spectrum of risks associated with climate change in their investment portfolio. As climate-related risks become increasingly material to financial performance and asset valuations, due diligence and security analysis must evolve to incorporate a comprehensive assessment of these risks.

The development of integrated due diligence assessments can help investors evaluate physical climate risks systematically – both at a sector level and at a company level:

- **A sector-level assessment** enables the identification of systemic risks that may affect an entire industry or region, providing a macro view of climate vulnerabilities.
- **Company-level assessments** offer a micro view by evaluating individual companies' exposure to climate risks, their adaptation strategies and resilience capabilities.

Key levers for change:

Developing a comprehensive risk classification system

To systematically address physical climate risks, a comprehensive risk classification system can help investors understand how different types of physical climate risk affect different aspects of business activity. Based on the type of physical climate risk (acute vs chronic), investors may further examine:

Primary risks: these include direct impacts to property, real assets and operations disruptions due to extreme weather events.

Supply chain and second-order risks: these are indirect risks but equally significant, potentially disrupting production or increasing costs due to disruptions with external partners both upstream and downstream in the value chain.

In focus: the investment process

Stage #3: Due diligence and security analysis

Leveraging taxonomies, tools and key resources for due diligence

Taxonomies database: adaptation taxonomy database covering 35+ jurisdictional and non-jurisdictional taxonomies that seek to identify adaptation investments. The objective of this inventory is to enable the financial sector to identify adaptation-aligned investment opportunities and craft comprehensive adaptation strategies.

Physical climate risk assessment tools: publicly available resources and tools to inform physical and transition climate change risk assessments.

2024 UNEP FI Climate Risk Landscape: delves into the available tools for financial institutions to assess physical climate risks and boost their institution's resilience to related impacts, providing best practices for tool utilisation, case studies, and recommendations to navigate the dynamic climate risk tools market. It also offers insights into the rapidly evolving regulatory developments around climate-related disclosure frameworks and recent market developments.

Organisation	Tools and Resources
British International Investment (BII)	List of open-source physical climate risk assessment tools
Asia Investor Group on Climate Change (AIGCC)	Compendium of risk assessment tools for Asian investors
UNEP FI	Climate Risk Dashboard features a wide range of providers and includes filtering options for physical climate risk solutions
World Bank	Open-source Climate and Disaster Risk Screening Tools - World Bank Climate and Disaster Risk Screening Tools
Resilient Planet Data Hub	Global climate-related risk analytics
Global Resilience Index	Infrastructure Risk Assessment
IIGCC	Physical Climate Risk Assessment Methodology (PCRAM)

Scope for engagement: Investing in education and capacity building, leveraging international platforms and networks

In focus: the investment process

Stage #4: Portfolio construction and monitoring

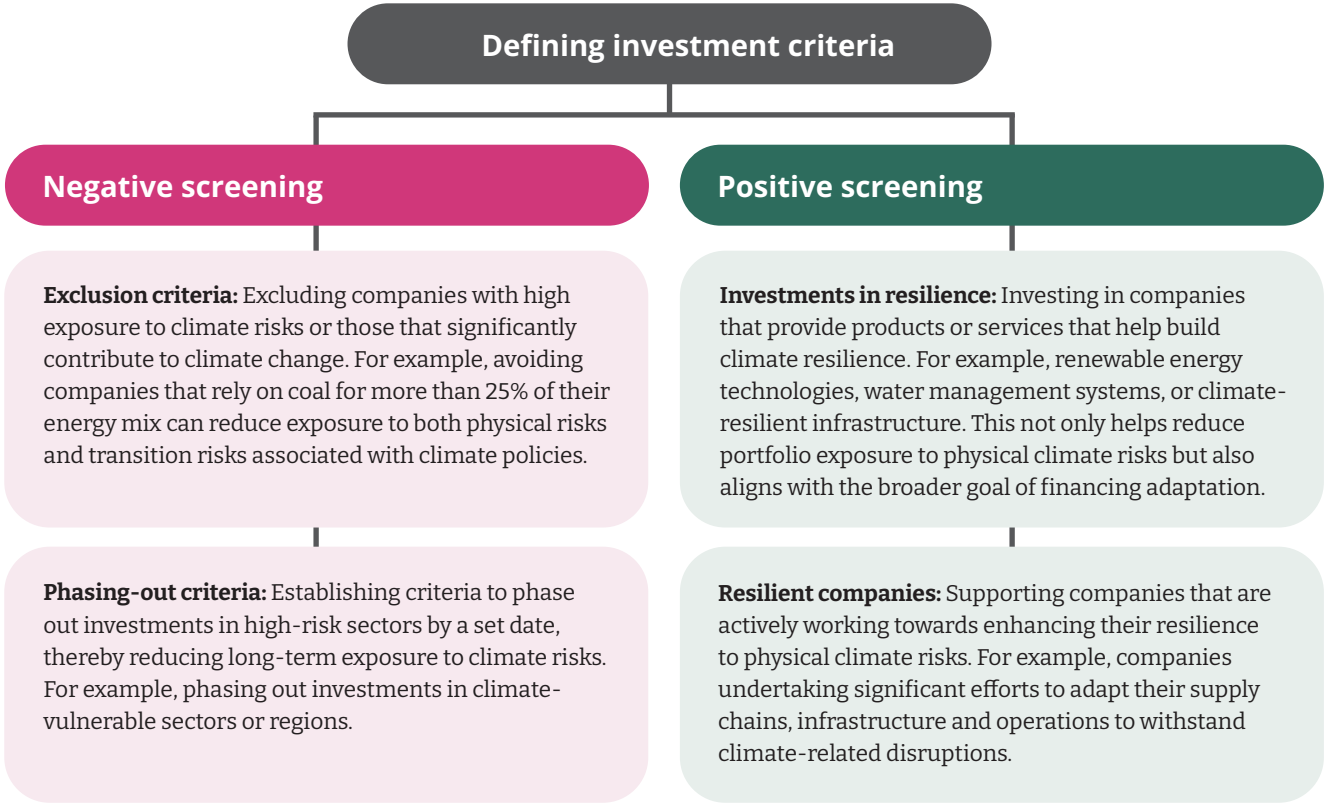
Target outcome: selecting adaptation and resilience-aligned investments

Integrating physical climate risks in portfolio construction and monitoring involves incorporating considerations of climate-related impacts, such as extreme weather events and gradual changes in climate patterns, into the investment criteria and security selection process.

Key levers for change:

Defining investment criteria: why a positive screen approach is essential

Defining investment criteria for portfolio construction usually follows a selection or combination of different approaches as described below, depending on the type of investor and the objectives of the portfolio:



Stage #4: Portfolio construction and monitoring

While both approaches play a critical role in facilitating climate action through investment decision making, integrating a positive screen approach is increasingly crucial in order to achieve the outcomes of adaptation and resilience. This approach involves selecting countries and/or companies that contribute to climate adaptation, resilience, and sustainability. Unlike traditional approaches to investment decision-making that might exclude certain high-risk sectors, a positive screen approach identifies and supports companies actively working towards mitigating potential climate risks.

However, to incentivize investors to adopt a positive screening approach in their decision-making, strong public policy support is essential. Policies that provide investment incentives, risk-sharing mechanisms, and robust regulatory frameworks can help create a more stable, conducive environment for investments in adaptation and resilience. Public-private partnerships can also facilitate the sharing of knowledge and resources – providing a financing layer which supports the private market in adaptation finance and injects further capital from private industries.

A coordinated approach between public and private finance is therefore essential to help address key challenges that arise from the increasing physical impacts of climate change, including:

- **Protecting financial performance of portfolios**
  Physical climate risks, such as floods, hurricanes, or heatwaves, have direct and often severe impacts on supply chains and business operations. Given the systemic nature of climate risks, events in one part of the world can have cascading effects on businesses elsewhere – eg, a flood in a manufacturing hub in Asia can disrupt the global supply chain, impacting companies around the world.

  A positive screen approach helps protect the financial performance of portfolios by prioritising investments in companies that are actively managing these risks through robust climate adaptation strategies. The COVID-19 pandemic was a wake-up call for many supply chain managers that historically prioritised efficiency over resilience. A study by BCG revealed that those companies that invested in building resilient supply chains were better equipped to deal with the immediate impacts of external shocks. By supporting investments in businesses that are better prepared to handle climate shocks, investors can reduce potential losses and enhance the resilience of their portfolios against such systemic risks.

- **Preventing capital flight from high-risk countries and sectors**
  As physical climate risks become more pronounced and increasingly quantified in projections and forecasts, there may be a risk of capital flight from countries and sectors which have high levels of exposure to physical climate risks.[29] A positive screen approach can help prevent capital flight by identifying and investing in countries and/or companies within these high-risk areas that are actively managing and mitigating climate risks. This strategy encourages investors to focus not just on avoiding risks but also on identifying opportunities where their capital can help build resilience. By doing so, it seeks to prevent investments from abruptly being withdrawn from sectors or regions that need it most.

Stage #4: Portfolio construction and monitoring

- **Preventing opportunistic market behaviours**
  By bringing physical risk assessments earlier on in the investment process, there is a risk of opportunistic behaviours from investors who may prioritise short-term gains over long-term sustainability. However, these behaviours can exacerbate market volatility and undermine efforts to build long-term resilience against climate risks. A positive screen approach can help address this by insulating investors against climate-related volatility, aligning investments with companies that have a long-term commitment to climate adaptation and sustainability. It promotes responsible investing that considers the broader impact of investment decisions on climate risk and resilience.

- **Redirecting finance to emerging markets for building resilience**
  Emerging markets are often more vulnerable to physical climate risks due to their geographic location, economic dependency on climate-sensitive sectors, and limited financial resources for adaptation. A positive screen approach can help redirect finance to these markets by identifying and investing in companies that are proactively working to build climate resilience. This not only supports local adaptation efforts but also creates opportunities for growth by financing innovative solutions to climate challenges. By channelling investments into these regions leveraging support from public financial institutions through blended finance structures, investors can play a significant role in enhancing global climate resilience.

How to identify adaptation and resilience-aligned investments?

A recent report released by the United Nations Office for Disaster Risk Reduction (UNDRR) in partnership with Standard Chartered and KPMG provides a useful decision tree to help investors identify investment opportunities that are aligned to climate resilience and adaptation goals. It includes an indicative list of adaptation and resilience activities alongside guidance on the process for assessment of these.

Identifying climate resilience and adaptation-aligned investments

A key challenge at the time of security selection for investors is the identification of climate-resilient or adaptation-aligned investment opportunities. The lack of clarity and limited information across the market on specific performance thresholds for climate resilience makes it difficult for investors to set thresholds for portfolio construction.

To address these challenges, the Climate Bonds Initiative has developed a Climate Resilience Classification Framework that provides clear definitions and criteria for investors to classify investment opportunities in a systematic, consistent and transparent manner. By providing a standardised approach to identifying climate-aligned investments, the aim of this framework is to catalyse financial resources towards projects that enhance resilience, mitigate risks and support communities and economies in adapting to the impacts of climate change.

The framework draws on existing guidance in the field and complements broader taxonomies (such as the EU Sustainable Finance Disclosure Regulation (SFDR), the United Kingdom Green Taxonomy, the United Nations Development Programme (UNDP) Sustainable Development Goals Finance Taxonomy, etc) by translating them into a classification system with associated criteria.[30]

In focus: the investment process

Stage #4: Portfolio construction and monitoring

Integrating climate considerations in risk management and monitoring

An integrated risk management and monitoring process can help investors understand how to work with their portfolio companies post investment to address and mitigate the risks identified. The dynamic and evolving nature of physical climate risks requires continuous review and revision, making it critical for investors to remain actively engaged, supporting portfolio companies in developing resilience to climate risks.

The strategies for risk management and monitoring vary depending on the type of investor and their level of engagement with portfolio companies. This variation also underscores the importance of setting clear expectations and objectives with clients earlier on in the investment process, ensuring that asset managers are empowered to undertake the appropriate risk management strategies. Approaches can include:

- **Active dialogue and engagement:** By regularly engaging with their portfolio companies and emphasising the importance of managing physical climate risks, investors can stay informed about their progress in addressing these risks. Setting clear expectations for risk mitigation and resilience-building can also encourage companies to adopt robust climate risk management practices.

- **Case-by-case risk evaluation:** Taking a case-by-case approach to risk evaluation can help investors determine the right actions for each portfolio company depending on their context, nature of exposure, etc. UNEP FI proposes a four-pronged approach to help drive action in terms of accepting, avoiding, adapting to and transferring risk.[31]

- **Creating a physical climate risk action plan:** Investors can work with portfolio companies to develop a comprehensive physical climate risk action plan that outlines specific actions and timelines for addressing identified risks. Guidance around setting ESG-related action plans for investors can be found in British International Investment's ESG Toolkit for Financial Institutions, including special considerations for physical climate risks.

- **Technical assistance programmes for climate risk management:** Investors can offer technical assistance programmes to help portfolio companies build internal capacity for climate risk management. This can be in the form of training programmes for company management and staff on climate risk assessment, adaptation and mitigation strategies, or access to high-quality climate data, models and tools that can enable companies to conduct detailed risk assessments and scenario analyses.

- **Knowledge sharing:** Investors can also play a key role in facilitating learning and knowledge sharing among portfolio companies, allowing them to benefit from each other's experiences and best practices. This can be through informal forums or networks where portfolio companies can share insights, challenges and solutions related to climate risk management, or through participation in industry-wide climate initiatives and coalitions. At an ecosystem level, collaboration between investors and with other stakeholders in the system such as insurance companies can also help push forward best practices in the market and facilitate a more unified approach to action.

Scope for engagement: Working with corporates, collaborating with the financial sector, leveraging international platforms and networks

In focus: the investment process

Stage #5: Post-investment engagement: portfolio companies

Target outcome: looking beyond risk management to impact measurement

While traditional risk management focuses on minimising potential financial losses from physical climate risks, post-investment engagement can support investors in addressing physical climate risks and measuring impact. By measuring how investments contribute to climate resilience and adaptation, investors can better understand the added value their capital brings to communities, ecosystems and economies. This impact-oriented approach allows investors to demonstrate accountability, enhance transparency and drive positive environmental and social outcomes. It also aligns with emerging regulatory requirements and stakeholder expectations for sustainable investment practices.

The guidance around investor engagement on building adaptation and resilience in portfolio companies is nascent yet growing. For example, the Adaptation and Resilience Investors Collaborative (ARIC), facilitated by UNEP FI, aims to establish standardised metrics for assessing adaptation and resilience impacts, develop strategies for mobilising capital, and enhance knowledge sharing among private sector investors and impact investors. The Global Adaptation and Resilience Investment Working Group (GARI) also seeks to advance the engagement of private investors on climate risks and opportunities, and has developed various tools and resources to provide a practical starting point for investors.

Key levers for change:

Exercising active ownership

Institutional investors are in a unique position to influence corporate actions on climate change. Through active ownership, they can engage with companies on issues like emissions, climate risk disclosures, building adaptation and resilience into their business models and the adoption of sustainable business practices. This includes both direct dialogue with company leadership and exercising shareholder rights, such as voting on climate-related resolutions at annual meetings.

The UN PRI's Active Ownership 2.0 framework emphasises the need for more proactive and transformative approaches. By emphasising the importance of real-world outcomes, reiterating common goals for systemic change and working collaboratively with different stakeholders in the field, investors can support their portfolio companies in aligning with long-term sustainability goals.

In focus: the investment process

Stage #5: Post-investment engagement: portfolio companies

Evaluating impact: the five dimensions of impact measurement

Recognising the need to help investors understand and quantify the impact of their portfolios on climate adaptation and resilience, the UN has released a blueprint to support investors in adaptation and resilience impact assessments: Adaptation & Resilience Impact: A measurement framework for investors.

Using the framework of the five dimensions of impact, the report provides a conceptual model for impact measurement at the enterprise level, including a proposed set of metrics, with examples to help investors approach impact measurement.[32] The five dimensions of impact considered are detailed alongside:

The report also outlines a high-level guide to identify and track adaptation and resilience metrics for different types of investment. It helps investors understand what metrics to use across different scenarios and directs them to useful resources to help measure and track indicators. This is an indicative and non-exhaustive list of metrics, intended to help investors understand how to approach impact measurement for adaptation and resilience-aligned investments.

What?	What outcome the enterprise is contributing to, whether it is positive or negative, and how important the outcome is to stakeholders.
Who?	Which stakeholders are experiencing the outcome and how underserved they are in relation to the outcome.
How much?	How many stakeholders experienced the outcome, what degree of change they experienced, and how long they experienced the outcome.
Contribution	Whether an enterprise's and/or investor's efforts resulted in outcomes that were likely better than what would have occurred otherwise.
Risk	The likelihood that impact will be different than expected.

Stage #5: Post-investment engagement: portfolio companies

Understanding principles for climate resilience metrics

The Inter-American Development Bank in collaboration with other Multilateral Development Banks (MDBs) released a discussion paper outlining "A Framework and Principles for Climate Resilience Metrics in Financing Operations". It sets out to provide a structured approach to measuring climate resilience in financing activities and is centred on creating a common language and principles for climate resilience metrics.[33]

The framework outlines four core principles to guide the development and application of climate resilience metrics:

1. **Context-specific approach:** Metrics should be tailored to the specific context of each project, reflecting the diverse range of climate vulnerabilities and responses.
2. **Compatibility with timescales:** Metrics must accommodate the varying timescales over which climate resilience results are achieved, from immediate to long-term outcomes.
3. **Managing uncertainties:** Metrics should be able to account for uncertainties in climate conditions, enabling flexible planning and adaptation.
4. **Defining project boundaries:** Metrics must consider the challenges in determining project boundaries, especially where impacts may extend beyond the immediate project area.

Scope for engagement: Investing in education and capacity building, Working with corporates, Leveraging international platforms and networks

Changing the landscape

Engaging with the enabling environment

The systemic nature of physical risk requires a systemic response. While this guide provides steps to help investors start assessing the complex challenge of physical climate risk, addressing it requires active engagement in changing today's economic reality. Unless more proactive policy and other measures shift incentives for investors around climate adaptation and resilience, the market will not deliver change at the pace required. The ongoing tension between profitability and sustainability can only be addressed by consistent, long-term government commitments and effective delivery plans, creating thriving markets for climate-neutral, nature-positive and circular products, and punishing those who fail to act.

This ambition will only materialise if a critical mass of leaders not only actively demand it, but also engage with key stakeholders to help shape it. For investors, this means engaging with critical parts of the enabling environment: (1) policy, (2) the real economy, (3) the broader financial sector and (4) within their own organisations.

Changing the landscape

Engaging with policy: international and national action required

As part of the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement, countries set national priorities and strategies to reduce vulnerability to the impacts of climate change and integrate resilience into broader development planning.

Nationally Determined Contributions (NDCs) embody efforts by each country to reduce national emissions (mitigation) and vulnerability of climate change impacts (adaptation), and are submitted every five years to the UNFCCC secretariat.[34]

National Adaptation Plans (NAPs) are a country-driven process where national governments identify medium- and long-term adaptation needs and develop strategies to address these.[35] While countries are responding to the need for climate action with increasingly comprehensive adaptation components in their NDCs, NAPs set out 'how' NDC adaptation goals can be implemented. Although the process was established in 2010, as of December 2023 only 52 countries had submitted a NAP, and assessments of these have been repeatedly delayed.[36]

For investors, NDCs signal the opportunities, risks and direction of travel of the policy environment in which companies operate, and are valuable in shaping investment decisions over the next decade. Companies are looking for clear indications in NDCs of how each government plans to transition away from fossil fuels, triple renewable energy and double energy efficiency globally by 2030.[37] NAPs are a critical process to complement and reinforce adaptation strategies within NDCs, ensuring these investments are resilient.

For NDCs to be investible, they must be backed up by clear and consistent policy frameworks. In their current state NDCs and NAPs vary significantly in their granularity and consistency across countries. To enable the top-down change required, investors must call for the highest government ambition, with groups like the We Mean Business Coalition, the IIGCC (Institutional Investors Group on Climate Change) and the AIGCC (Asia Investor Group on Climate Change) providing platforms and key asks to enable the mobilisation of private finance in adaptation and resilience.

Investor engagement with national and international policy is essential. This can be done at both an individual company level (see callout box for an example of Manulife's investor engagement in action) and via international platforms and networks, including groups like the Net Zero Asset Managers initiative, Climate Action 100+, Nature Action 100 and The Coalition for Climate Resilient Investment (CCRI).

Changing the landscape

Corporate engagement

Corporate disclosure frameworks are intended to enhance transparency by encouraging companies to disclose their climate risks and resilience strategies. Currently, in many jurisdictions disclosure is voluntary and many argue that these frameworks are currently not fit for purpose in their present form. The lack of specificity, consistency, and level of granularity in the existing guidelines often results in disclosures that fail to provide meaningful insights around climate risks and opportunities.

There is a need for clearer guidance within the regulatory frameworks on standardized metrics, sector-specific frameworks, and methodologies for scenario analysis that account for different climate pathways. However, it is vital to note that disclosure is not sufficient to drive action. While it can provide the insight needed to make more informed decisions and better understand risk, meaningful shifts in capital requires strong engagement with the real economy. Through mechanisms like active ownership, corporate engagement and market signalling, investors can take a more proactive role in supporting corporates to understand, manage, and mitigate the risks associated with climate events.

Bridging the gap: corporate engagement linked with sovereign engagement

Manulife Investment Management engaged with an Asian company exposed to flooding risk from rainfall and storm surge. Both groups discussed the shared concern of this vulnerability increasing due to sea level rise and typhoon severity, especially in higher temperature warming scenarios. As a result, the company invested in improving their seawall and drainage systems, and recognised the need for further capital expenditures to upgrade these systems.

While the discussion and analysis resulted in higher confidence in the resilience of the company's assets, critical public infrastructure supporting their operations (eg, the roads and rail transport connecting to their site) remained vulnerable to physical climate risk, highlighting the importance of establishing a high-quality and transparent National Adaptation Plan.

As a result, Manulife engaged with various parts of the government, which is also a sovereign issuer, on this process. Work with the AIGCC allowed them to recognise similar issues in other markets, prompting them to invite other asset managers to collaborate on similar sovereign engagements across Asia. While the effort is ongoing, these engagements benefit from the learnings across geographies and the interplay between corporate and sovereign discussion.

Changing the landscape

Collaborating with insurance

Financial losses from Hurricane Milton:

Moody's RMS estimates insured losses from Hurricane Milton, which struck Florida in October 2024, at US$22 billion to US$36 billion. Due to widespread wind, storm surge and flooding impacts, it became one of the costliest hurricanes in the US. Field assessments reveal that Milton's damage footprint includes extensive tornado outbreaks and structural impacts, especially in regions with older buildings not meeting recent hurricane standards.

The insurance sector, having grappled with the impacts of physical climate change for years, is well versed in managing this systemic risk. It plays a pivotal role in supporting investor resilience, protecting investments and promoting adaptation to climate risks. Cross-sector collaboration within the financial system is therefore crucial for achieving a smooth and effective transition to net-zero and nature-positive goals. Currently, such collaborations remain largely fragmented with the need for more cohesion and shared learnings across the industry.

To effectively manage climate risk – through governance, assessment and co-investment in adaptation and resilience – asset managers and private market investment funds can leverage partnerships with the insurance sector in the following ways:

1. Maximising data and analytics:
Insurers have developed advanced natural catastrophe models that incorporate historical data, climate projections due to the climate-conditioning process, and sophisticated algorithms to predict the impacts of climate change. These models can provide granular insights into potential losses and inform investment strategies for asset managers and private markets investment funds, while also recognising innovative and novel climate models, which are increasingly adopted.

2. Leveraging catastrophe insights, models and scenarios:
Collaborate with insurers: Engage with insurance companies to access their expertise in climate risk modelling and assessment. Insurers can provide detailed risk analytics and scenario analyses that can inform investment decisions. CISL published one of the first nature-related financial opportunities use cases showcasing a debt-for-nature swap where a large asset manager was supported by credit insurance for marine conservation in Ecuador.

Utilise catastrophe models and complementary climate models: Incorporate climate-conditioned natural catastrophe models developed by insurers into due diligence processes, as well as novel climate models. These models can help quantify potential losses from extreme weather events and identify high-risk areas. By integrating these models into investment analysis, asset managers can better understand the risk exposure of their portfolios.

Scenario planning: Work with insurers to develop and stress-test climate scenarios. This can help asset managers understand the potential financial impacts of different climate pathways and enhance portfolio resilience. Scenario planning can also identify potential tipping points and inform strategic decision-making.

3. Develop integrated risk management frameworks:
Holistic risk management: Adopt a comprehensive approach to risk management that includes both acute and chronic physical climate risks. Insurers can offer guidance on integrating these risks into broader risk management frameworks. This includes assessing the direct impacts of extreme weather events as well as the long-term effects of gradual climate changes on investment portfolios which also consider the re/insurance industries' perspective on such risks before considering long-term investment strategies, as well as the short-term climate scenarios being published.

Collaborating with insurance

Leverage innovation in climate models and climate tech solutions: Utilise advanced climate models and climate tech solutions, such as prescriptive analytics, to support the catalysation of adaptation efforts. These tools can provide actionable insights and recommendations for managing climate risks. Additionally, managing model uncertainty and decision uncertainty is crucial for making informed investment decisions.

4. Innovative insurance solutions:
Parametric insurance: Explore parametric insurance products that provide quick payouts based on predefined triggers, such as the occurrence of a specific weather event. This can offer immediate liquidity to address climate-related losses. Parametric insurance can be particularly useful for covering risks that are difficult to insure through traditional policies, providing a safety net for investment funds.

Climate resilience bonds: Partner with insurers to develop and invest in climate resilience bonds. These bonds can finance projects that enhance infrastructure resilience and reduce vulnerability to climate risks. By investing in resilience bonds, asset managers can support the development of adaptive infrastructure and contribute to long-term sustainability.

5. De-risking private markets investment:
Risk transfer mechanisms: Insurers offer various risk transfer mechanisms, such as traditional insurance policies, reinsurance, and innovative products like catastrophe bonds and insurance-linked securities. These mechanisms can help transfer the financial risk of climate-related events from investors to insurers, thereby de-risking investments.

Credit enhancement: Insurance products can provide credit enhancement for climate-resilient projects, making them more attractive to private investors. For example, insurers can offer guarantees or insurance wraps that improve the credit rating of bonds issued to finance adaptation projects.

Risk pooling: Insurers can facilitate risk pooling arrangements that spread the risk of climate-related losses across multiple stakeholders. This can reduce the financial burden on individual investors and make it easier to finance large-scale adaptation projects.

Advisory services: Insurers can provide advisory services to help investors identify, assess and manage climate risks. This includes conducting risk assessments, developing risk mitigation strategies, and advising on the design of insurance products that align with investment objectives.

6. Promote knowledge sharing around risk:
Knowledge of risk-sharing platforms: Foster knowledge-sharing platforms where investors and insurers can exchange insights and best practices related to climate risk. This can facilitate continuous learning and innovation in climate risk management. Knowledge-sharing platforms can also help build a community of practice focused on climate resilience.

Catalysing collaborative research: Engage in collaborative research initiatives with insurers to advance the understanding of climate risks. Joint research projects can explore new methodologies for risk assessment, develop innovative risk transfer solutions and identify emerging trends in climate resilience.

7. Engage with insurance to focus on quality and effectiveness:
Focusing on quality of insurance: Engage with insurers to ensure that the insurance products being utilised are of high quality and effectively address the specific climate risks faced by projects and clients. This includes evaluating the terms and conditions of insurance policies, the financial strength of insurers and the responsiveness of claims processes.

Maintaining the effectiveness of insurance: Assess the effectiveness of insurance in mitigating climate risks and providing financial protection. This involves monitoring the performance of insurance products, gathering feedback from insured parties, and making necessary adjustments to improve coverage and outcomes.

Thus, by leveraging the expertise, data and innovative solutions offered by insurers, investors can enhance their ability to manage climate risks, govern them effectively, and co-invest in adaptation and resilience.

Changing the landscape

Leveraging blended finance structures

An international financial architecture that enables the mobilisation of private capital towards adaptation and resilience. Currently, private finance investment into climate-vulnerable regions and sectors, particularly EMDEs, is not sufficient. Key barriers to investments include credit risks, currency risks, political and economic stability, etc. CISL's policy brief Everything, everywhere, all at once outlines the urgent need to restructure the international financing architecture to address the escalating demand for climate action, and proposes a set of recommendations to scale up private finance for climate and nature.

Public finance playing a stronger role in de-risking investments and catalysing private finance for adaptation and resilience, particularly through Multilateral Development Banks (MDBs). MDBs must use their ambition and balance sheets to derisk investments and encourage private finance to follow. While examples of adaptation investments exist, like Nature-based Solutions (NbS) (eg, restoring mangroves, green urban infrastructure), scaling these faces challenges related to funding gaps, limited technical capacity and high perceived risks by private investors. MDBs and philanthropic funds can provide concessional financing, guarantees, first-loss capital, or technical assistance to lower the risk profile of projects, making them more attractive to private investors.

Individual governments can create enabling conditions through regulations, tax incentives and subsidies that promote investments in adaptation and resilience. For instance, policies that promote insurance mechanisms for climate risks, mandate climate risk disclosures, or incentivise blended finance structures can help de-risk investments and make them more attractive to investors.

Project Gaia: a US$1.5 billion climate and blended finance platform launched by the Green Climate Fund (GCF)

In the past two decades, there has been an 83 per cent global increase in climate-related disasters, with low- and middle-income economies bearing the greatest burden and requiring a significant proportion of investments in adaptation and resilience. Project Gaia aims to provide long-term loans for climate adaptation and mitigation in 19 of the most climate-vulnerable countries through a blended finance platform. The project allocates 70 per cent of investments towards adaptation projects, with 25 per cent reserved for Least Developed Countries and Small Island Developing States, ensuring that funds reach the most vulnerable communities.

Internal action: education and capacity building

Building capacity and awareness around sustainability – including climate adaptation, resilience, and broader environmental and social concepts – is essential across all areas of an organisation, not just within Sustainability or Responsible Investment teams. This knowledge should extend from operational staff to executives and the Board of Directors. By training relationship managers and client-facing staff in understanding physical climate risks and their financial implications, investors can help guide clients in making climate-informed investment decisions.

Building awareness and capacity can take different forms:

- **Training programmes:** Delivering targeted training programmes tailored to different stakeholder groups, covering climate risk assessments, resilience-building strategies and financing mechanisms can help organisations be better prepared in the face of climate-related challenges.

The CFA Institute has developed different programmes and certifications on ESG, Climate and Impact Investing that can help investors build a strong foundation in these topics.

- **Knowledge-sharing platforms:** Creating open-source knowledge-sharing platforms can help foster a culture of continuous learning, ensuring that stakeholders understand the evolving nature of climate risks and the need for adaptive responses.

- **Role of academia and civil society organisations:** Academic and civil society organisations play a crucial role in bridging the education gap by building capacity and awareness across stakeholders, advocating policy change, engaging communities and ensuring inclusive participation in resilience-building efforts. CISL offers a wide range of programs that draw upon leading academics, practitioners and innovators to help inform business strategy and inspire action.

Conclusion

Addressing physical climate risks demands a comprehensive, collaborative and multifaceted approach. As climate impacts intensify, it is critical for all stakeholders to adopt a unified strategy for climate action, with an increasing emphasis on adaptation and resilience.

Investors play a key role in the financial ecosystem and have the power to facilitate change when their efforts are coordinated and targeted. By deconstructing the investment process, the guide provides practical insights for investors to assess and address physical climate risks.

However, the systemic nature of physical risk requires a systemic response. Unless more proactive policy and other measures shift incentives for investors around climate adaptation and resilience, the market will not deliver change at the pace required.

Summarized here are key thematic takeaways from the research, outlining the changes needed both within the investment community and across the enabling environment to facilitate a coordinated approach to building resilient investments and enabling investments into resilience.

Key thematic takeaways

Building resilient investments

Tools and strategies for evaluating physical climate risks in listed equity and debt portfolios are increasingly available, enabling secondary market investors to understand the financial impact of such risks.

By integrating physical climate risks at the start of the investment process, investors can be better prepared to assess and address their exposures at subsequent stages.

Incorporating physical climate risks in asset allocation is critical to understand how they affect both short- and long-term economic and return forecasts.

Taking an active role in engaging with portfolio companies on adaptation and resilience can help investors enhance long-term value, mitigate climate risks and drive sustainable growth.

Enabling investment into resilience

Enhancement of corporate disclosure standards can help investors evaluate the financial materiality of climate hazards at the asset level and influence investment decision-making.

By engaging with the broader financial system - building on learnings from the insurance industry and blended finance structures, investors can leverage innovative financing models to invest into adaptation and resilience.

Collective action is required at the national and international levels to scale ambition for NDCs and NAPs, make them more investable and catalyzing the flow of private capital.

Education, awareness and capacity building within financial institutions around the language and tools to evaluate physical climate risks can help drive action across the system.

Bibliography

Adaptation & Resilience Investors Collaborative. *Adaptation & Resilience Impact: A Measurement Framework for Investors.* United Nations Environment Program (UNEP) Finance Initiative, April 2024. https://www.unepfi.org/wordpress/wp-content/uploads/2024/04/Adaptation-and-Resilience-Impact_A-measurement-framework-for-investors.pdf.

African Development Bank, Asian Development Bank, Asian Infrastructure Investment Bank, European Bank for Reconstruction and Development, European Investment Bank, Inter-American Development Bank, International Development Finance Club, and Islamic Development Bank. *A Framework and Principles for Climate Resilience Metrics in Financing Operations*. Inter-American Development Bank, December 2019. https://doi.org/10.18235/0002040.

Amenc, Noël, Frédéric Blanc Brude, and Alice James. *Physical Climate Risk Survey: Those in the Infrastructure Investment Industry Are Concerned and Lack Data*. EDHEC Infrastructure & Private Assets Research Institute, January 2024. https://publishing.edhecinfra.com/papers/2024-01_physical%7C_climate_risk_survey.pdf.

Amin, Amal-Lee. "Adaptation and Resilience – a $2 Trillion Market Opportunity the Private Sector Cannot Ignore." British International Investment. Accessed August 12, 2024. https://www.bii.co.uk/en/news-insight/insight/articles/adaptation-and-resilience-a-2-trillion-market-opportunity-the-private-sector-cannot-ignore/.

Bernhofen, Mark V., Matt Burke, Akaraseth Puranasamriddhi, NicolaRanger, and Gireesh Shrimali. *Integrating Physical Climate Risks and Adaptation into Sovereign Credit Ratings: Implications for Financial Stability and Fiscal Policy at the Sovereign-Bank Nexus*. Smith School of Enterprise and the Environment, and Environmental Change Institute, University of Oxford, September 2024. https://www.eci.ox.ac.uk/sites/default/files/2024-09/Integrating%20Physical%20Climate%20Risks%20and%20Adaptation%20%282024%29.pdf.

Bilal, Adrien, and Diego R. Känzig. "The Macroeconomic Impact of Climate Change: Global vs. Local Temperature." National Bureau of Economic Research (NBER) Working Paper 32450, NBER, August 2024. https://www.nber.org/system/files/working_papers/w32450/w32450.pdf.

BlackRock. "The Case for Building Resilience into Portfolios." Accessed August 12, 2024. https://www.blackrock.com/ca/institutional/en/investment-themes/the-case-for-portfolio-resilience.

Bressan, Giacomo, Anja Đuranović, Irene Monasterolo, and Stefano Battiston. "Asset-Level Assessment of Climate Physical Risk Matters for Adaptation Finance." *Nature Communications* 15, no. 1 (July 1, 2024): 5371. https://doi.org/10.1038/s41467-024-48820-1.

British International Investment (BII) and FMO. *Climate Investment Playbook.* BII and FMO, June 2024. https://assets.bii.co.uk/wp-content/uploads/2024/06/28115333/Climate-Investment-Playbook-1.pdf.

Climate Financial Risk Forum. *Scenario Analysis Guide for Asset Managers*. Climate Financial Risk Forum, 2023. https://www.fca.org.uk/publication/corporate/cfrf-guide-2023-scenario-analysis-guide-asset-managers.pdf.

Copernicus. "Observer: ESOTC 2023 - Europe Experienced an Extraordinary Year of Extremes with Record-Breaking Heatwaves, Wildfires, Floods, and Drought." May 23, 2024. https://www.copernicus.eu/en/news/news/observer-esotc-2023-europe-experienced-extraordinary-year-extremes-record-breaking.

Cormack, Christopher, and Gireesh Shrimali. "The Challenge of Climate Risk Modelling in Financial Institutions - Overview, Critique and Guidance." December 11, 2023. https://doi.org/10.2139/ssrn.4669195.

Fiedler, Tanya, Andy J. Pitman, Kate Mackenzie, Nick Wood, Christian Jakob, and Sarah E. Perkins-Kirkpatrick. "Business Risk and the Emergence of Climate Analytics." Nature Climate Change 11, no. 2 (February 2021): 87–94. https://doi.org/10.1038/s41558-020-00984-6.

Global Commission on Adaptation. *Adapt Now: A Global Call for Leadership on Climate Resilience*. Global Commission on Adaptation, September 2019. https://gca.org/wp-content/uploads/2019/09/GlobalCommission_Report_FINAL.pdf.

Hong Kong Monetary Authority. "Are Investors Sensitive to Climate-Related Transition and Physical Risks? Evidence from Global Stock Markets." Hong Kong Monetary Authority, December 2021. https://www.hkma.gov.hk/media/eng/publication-and-research/research/research-memorandums/2021/RM08-2021.pdf.

Intergovernmental Panel on Climate Change. *Climate Change 2022: Impacts, Adaptation and Vulnerability.* IPCC, 2022. https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryVolume.pdf.

Klusakab, Patrycja, Matthew Agarwalabc, Matt Burkeab, Moritz Kraemerde, and Kamiar Mohaddesf. "Rising Temperatures, Falling Ratings: The Effect of Climate Change on Sovereign Creditworthiness." Bennett Institute Working Paper, University of Cambridge & Bennett Institute for Public Policy, March 18, 2021. https://www.bennettinstitute.cam.ac.uk/wp-content/uploads/2020/12/Rising_Climate_Falling_Ratings_Working_Paper.pdf.

Paul, Vivek, Chris Weber, Natalie Gill, and Christopher Polk. *Climate-Aware Return Assumptions: An Update.* BlackRock Investment Institute, December 2022. https://www.blackrock.com/institutions/en-us/literature/whitepaper/bii-portfolio-perspectives-december-2022.pdf.

S&P Global. "66% of Major Global Companies Have at Least One Asset at High Risk of Physical Risk under the High Impact Climate Change Scenario in 2050." Accessed August 12, 2024. https://www.spglobal.com/esg/education/essential-sustainability/climate/physical-risks?gclid=CjwKCAjwr56IBhAvEiwA1fuqGiu-w.

S&P Global. "Quantifying the Financial Costs of Climate Change Physical Risks for Companies." November 20, 2023. https://www.spglobal.com/esg/insights/featured/special-editorial/quantifying-the-financial-costs-of-climate-change-physical-risks.

Task Force on Climate-related Financial Disclosures (TCFD). *Recommendations of the Task Force on Climate-related Financial Disclosures*. TCFD, June 2017. FINAL-2017-TCFD-Report-11052018.pdf.

Bibliography

Trust, Sandy, Oliver Bettis, Lucy Saye, Georgina Bedenham, Timothy M. Lenton, Jesse F. Abrams, and Luke Kemp. *Climate Scorpion – the Sting Is in the Tail*. Institute and Faculty of Actuaries, and University of Exeter, March 2024. https://actuaries.org.uk/media/g1qevrfa/climate-scorpion.pdf.

United Nations Climate Change. "Record Number of National Adaptation Plans Submitted in 2023, But More Are Needed." *United Nations Climate Change News*, December 13, 2023. https://unfccc.int/news/record-number-of-national-adaptation-plans-submitted-in-2023-but-more-are-needed.

United Nations Environment Programme. *Adaptation Gap Report 2023*financing, and implementation. It also explores options for enhancing and advancing national and global adaptation efforts and provides an in-depth analysis of selected issues of interest. In addition to the update on adaptation planning and implementation, the 2023 edition provides a more in-depth finance assessment chapter and includes a thematic deep-dive chapter on loss and damage. The report also highlights key case studies.","ISBN":"978-92-807-4092-9","language":"en","note":"DOI: 10.59117/20.500.11822/43796","publisher":"United Nations Environment Programme","source":"DOI.org (Crossref: *Underfinanced. Underprepared. Inadequate investment and planning on climate adaptation leaves world exposed*. UNEP, 2023. https://doi.org/10.59117/20.500.11822/43796.

United Nations Environment Programme. "National Adaptation Plans." Accessed August 12, 2024. https://www.unep.org/topics/climate-action/adaptation/national-adaptation-plans.

United Nations Environment Programme (UNEP) Finance Initiative. *Managing Physical Climate-Related Risks in Loan Portfolios*. UNEP FI, May 2024. https://www.unepfi.org/themes/climate-change/managing-physical-climate-related-risks-in-loan-portfolios/.

United Nations Environment Programme (UNEP) Finance Initiative. *Scenarios for Assessing Climate-Related Risks: New Short-Term Scenario Narratives*. UNEP FI, July 2024. https://www.unepfi.org/themes/climate-change/scenarios-for-assessing-climate-related-risks-new-short-term-scenario-narratives-by-unep-fi-and-niesr/.

United Nations Environment Programme (UNEP) Finance Initiative. *The Climate Data Challenge: The Critical Role of Open-Source and Neutral Data Platforms*. UNEP FI, May 2024. https://www.unepfi.org/wordpress/wp-content/uploads/2024/05/Dataland-Final-Report-The-Climate-Data-Challenge-1.pdf.

United Nations Environment Programme (UNEP) Finance Initiative. *Universal Ownership – Why Environmental Externalities Matter to Institutional Investors*. UNEP FI, March 2011. https://www.unepfi.org/industries/investment/universal-ownership-why-environmental-externalities-matter-to-institutional-investors-2/.

United Nations Framework Convention on Climate Change. "Nationally Determined Contributions (NDCs)." Accessed August 12, 2024. https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs.

United Nations Office for Disaster Risk Reduction (UNDRR). *Designing a Climate Resilience Classification Framework*. Climate Bonds Initiative and UNDRR, 2023. https://www.climatebonds.net/files/reports/resilience_whitepaper_climatebondsinitiative_undrr.pdf.

Verschuur, Jasper, Elco E. Koks, and Jim W. Hall. "Systemic Risks from Climate-Related Disruptions at Ports." *Nature Climate Change* 13 (July 2023). https://doi.org/10.1038/s41558-023-01754-w.

We Mean Business Coalition. *Business Call to Action for Ambitious and Investible NDCs*. We Mean Business Coalition, September 2024. https://www.wemeanbusinesscoalition.org/time-to-deliver-business-calls-for-ambitious-investible-ndcs/.

Woetzel, Jonathan, Dickon Pinner, Hamid Samandari, Hauke Engel, Mekala Krishnan, Brodie Boland, and Carter Powis. *Climate Risk and Response: Physical Hazards and Socioeconomic Impacts*. McKinsey & Co, January 2020. https://www.mckinsey.com/capabilities/sustainability/our-insights/climate-risk-and-response-physical-hazards-and-socioeconomic-impacts.

Endnotes

1 “Observer: ESOTC 2023 - Europe Experienced an Extraordinary Year of Extremes with Record-Breaking Heatwaves, Wildfires, Floods, and Drought,” Copernicus, May 23, 2024, https://www.copernicus.eu/en/news/news/observer-esotc-2023-europe-experienced-extraordinary-year-extremes-record-breaking.

2 Adrien Bilal, and Diego R. Känzig, “The Macroeconomic Impact of Climate Change: Global vs. Local Temperature,” (National Bureau of Economic Research (NBER) Working Paper 32450, NBER, August 2024), https://www.nber.org/system/files/working_papers/w32450/w32450.pdf.

3 66% of Major Global Companies Have at Least One Asset at High Risk of Physical Risk under the High Impact Climate Change Scenario in 2050,” S&P Global, accessed August 12, 2024, https://www.spglobal.com/esg/education/essential-sustainability/climate/physical-risks?gclid=CjwKCAjwr56IBhAvEiwA1fuqGiu-w.

4 “Quantifying the Financial Costs of Climate Change Physical Risks for Companies,” S&P Global, November 20, 2023, https://www.spglobal.com/esg/insights/featured/special-editorial/quantifying-the-financial-costs-of-climate-change-physical-risks.

5 Jasper Verschuur et al., “Systemic Risks from Climate-Related Disruptions at Ports,” Nature Climate Change 13 (July 2023), https://doi.org/10.1038/s41558-023-01754-w.

6 Jonathan Woetzel et al., Climate Risk and Response: Physical Hazards and Socioeconomic Impacts (McKinsey & Co, January 2020), https://www.mckinsey.com/capabilities/sustainability/our-insights/climate-risk-and-response-physical-hazards-and-socioeconomic-impacts.

7 United Nations Environment Programme, Adaptation Gap Report 2023: Underfinanced. Underprepared. Inadequate investment and planning on climate adaptation leaves world exposed (UNEP, 2023), https://doi.org/10.59117/20.500.11822/43796.financing, and implementation. It also explores options for enhancing and advancing national and global adaptation efforts and provides an in-depth analysis of selected issues of interest. In addition to the update on adaptation planning and implementation, the 2023 edition provides a more in-depth finance assessment chapter and includes a thematic deep-dive chapter on loss and damage. The report also highlights key case studies.”,”ISBN”:”978-92-807-4092-9”,”language”:”en”,”note”:”DOI: 10.59117/20.500.11822/43796”,”publisher”:”United Nations Environment Programme”,”source”:”DOI.org (Crossref

8 Christopher Cormack, and Gireesh Shrimali, “The Challenge of Climate Risk Modelling in Financial Institutions - Overview, Critique and Guidance,” (December 11, 2023), https://doi.org/10.2139/ssrn.4669195.

9 Task Force on Climate-related Financial Disclosures (TCFD), Recommendations of the Task Force on Climate-related Financial Disclosures (TCFD, June 2017), FINAL-2017-TCFD-Report-11052018.pdf.

10 Intergovernmental Panel on Climate Change, Climate Change 2022: Impacts, Adaptation and Vulnerability (IPCC, 2022), https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryVolume.pdf.

11 Intergovernmental Panel on Climate Change, Climate Change 2022.

12 British International Investment (BII) and FMO, Climate Investment Playbook (BII and FMO, June 2024), https://assets.bii.co.uk/wp-content/uploads/2024/06/28115333/Climate-Investment-Playbook-1.pdf.

13 “The Case for Building Resilience into Portfolios,” BlackRock, accessed August 12, 2024, https://www.blackrock.com/ca/institutional/en/investment-themes/the-case-for-portfolio-resilience.

14 Amal-Lee Amin, “Adaptation and Resilience – a $2 Trillion Market Opportunity the Private Sector Cannot Ignore,” British International Investment, accessed August 12, 2024, https://www.bii.co.uk/en/news-insight/insight/articles/adaptation-and-resilience-a-2-trillion-market-opportunity-the-private-sector-cannot-ignore/

15 Global Commission on Adaptation, Adapt Now: A Global Call for Leadership on Climate Resilience (Global Commission on Adaptation, September 2019), https://gca.org/wp-content/uploads/2019/09/GlobalCommission_Report_FINAL.pdf.

16 United Nations Environment Programme (UNEP) Finance Initiative, Universal Ownership – Why Environmental Externalities Matter to Institutional Investors (UNEP FI, March 2011), https://www.unepfi.org/industries/investment/universal-ownership-why-environmental-externalities-matter-to-institutional-investors-2/.

17 Global Commission on Adaptation, Adapt Now.

18 United Nations Environment Programme (UNEP) Finance Initiative, Scenarios for Assessing Climate-Related Risks: New Short-Term Scenario Narratives (UNEP FI, July 2024), https://www.unepfi.org/themes/climate-change/scenarios-for-assessing-climate-related-risks-new-short-term-scenario-narratives-by-unep-fi-and-niesr/.

19 Giacomo Bressan et al., “Asset-Level Assessment of Climate Physical Risk Matters for Adaptation Finance,” Nature Communications 15, no. 1 (July 1, 2024): 5371, https://doi.org/10.1038/s41467-024-48820-1

20 Bressan et al., “Asset-Level Assessment.”

21 United Nations Environment Programme (UNEP) Finance Initiative, The Climate Data Challenge: The Critical Role of Open-Source and Neutral Data Platforms (UNEP FI, May 2024), https://www.unepfi.org/wordpress/wp-content/uploads/2024/05/Dataland-Final-Report-The-Climate-Data-Challenge-1.pdf.

22 Patrycja Klusakab et al., “Rising Temperatures, Falling Ratings: The Effect of Climate Change on Sovereign Creditworthiness,” (Bennett Institute Working Paper, University of Cambridge & Bennett Institute for Public Policy, March 18, 2021), https://www.bennettinstitute.cam.ac.uk/wp-content/uploads/2020/12/Rising_Climate_Falling_Ratings_Working_Paper.pdf.

23 Mark V. Bernhofen et al., Integrating Physical Climate Risks and Adaptation into Sovereign Credit Ratings: Implications for Financial Stability and Fiscal Policy at the Sovereign-Bank Nexus (Smith School of Enterprise and the Environment, and Environmental Change Institute, University of Oxford, September 2024), https://www.eci.ox.ac.uk/sites/default/files/2024-09/Integrating%20Physical%20Climate%20Risks%20and%20Adaptation%20%282024%29.pdf

24 Vivek Paul et al., Climate-Aware Return Assumptions: An Update (BlackRock Investment Institute, December 2022), https://www.blackrock.com/institutions/en-us/literature/whitepaper/bii-portfolio-perspectives-december-2022.pdf.

25 Tanya Fiedler et al., “Business Risk and the Emergence of Climate Analytics,” Nature Climate Change 11, no. 2 (February 2021): 87–94, https://doi.org/10.1038/s41558-020-00984-6.

Endnotes

26 Klusakab et al., “Rising Temperatures, Falling Ratings”; Fiedler et al., “Business Risk and the Emergence of Climate Analytics.”

27 Sandy Trust et al., Climate Scorpion – the Sting Is in the Tail (Institute and Faculty of Actuaries, and University of Exeter, March 2024), https://actuaries.org.uk/media/g1qevrfa/climate-scorpion.pdf.

28 Climate Financial Risk Forum, Scenario Analysis Guide for Asset Managers (Climate Financial Risk Forum, 2023), https://www.fca.org.uk/publication/corporate/cfrf-guide-2023-scenario-analysis-guide-asset-managers.pdf.

29 Hong Kong Monetary Authority, “Are Investors Sensitive to Climate-Related Transition and Physical Risks? Evidence from Global Stock Markets,” (Hong Kong Monetary Authority, December 2021), https://www.hkma.gov.hk/media/eng/publication-and-research/research/research-memorandums/2021/RM08-2021.pdf.

30 United Nations Office for Disaster Risk Reduction (UNDRR), Designing a Climate Resilience Classification Framework (Climate Bonds Initiative and UNDRR, 2023), https://www.climatebonds.net/files/reports/resilencewhitepaper_climatebondsinitiative_undrr.pdf.

31 United Nations Environment Programme (UNEP) Finance Initiative, Managing Physical Climate-Related Risks in Loan Portfolios (UNEP FI, May 2024), https://www.unepfi.org/themes/climate-change/managing-physical-climate-related-risks-in-loan-portfolios/.

32 Adaptation & Resilience Investors Collaborative, Adaptation & Resilience Impact: A Measurement Framework for Investors (United Nations Environment Program (UNEP) Finance Initiative, April 2024), https://www.unepfi.org/wordpress/wp-content/uploads/2024/04/Adaptation-and-Resilience-Impact_A-measurement-framework-for-investors.pdf.

33 African Development Bank et al., A Framework and Principles for Climate Resilience Metrics in Financing Operations (Inter-American Development Bank, December 2019), https://doi.org/10.18235/0002040.

34 “Nationally Determined Contributions (NDCs),” United Nations Framework Convention on Climate Change, accessed August 12, 2024, https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs.

35 “National Adaptation Plans,” United Nations Environment Programme, accessed August 12, 2024, https://www.unep.org/topics/climate-action/adaptation/national-adaptation-plans.

36 “Record Number of National Adaptation Plans Submitted in 2023, But More Are Needed,” United Nations Climate Change News, December 13, 2023, https://unfccc.int/news/record-number-of-national-adaptation-plans-submitted-in-2023-but-more-are-needed

37 We Mean Business Coalition, Business Call to Action for Ambitious and Investible NDCs (We Mean Business Coalition, September 2024), https://www.wemeanbusinesscoalition.org/time-to-deliver-business-calls-for-ambitious-investible-ndcs/.

UNIVERSITY OF CAMBRIDGE | CISL Cambridge Institute for Sustainability Leadership

Cambridge insight, policy influence, business impact

The University of Cambridge Institute for Sustainability Leadership (CISL) brings together business, government and academia to find solutions to critical sustainability challenges.

Capitalising on the world-class, multidisciplinary strengths of the University of Cambridge, we deepen leaders' insight and understanding through our executive programmes; build deep, strategic engagement with leadership companies; and create opportunities for collaborative enquiry and action through our leadership groups.

Over more than 30 years we have built up a leadership network of nearly 40,000 leaders and practitioners from business, government and civil society, who have an impact in every sector and on every continent. Their experience and insights shape our work, which is further underpinned by multidisciplinary academic research.

His Majesty King Charles III is CISL's Royal Founding Patron and has inspired and supported many of the Institute's initiatives, during his time as the Prince of Wales.

www.cisl.cam.ac.uk **@cisl_cambridge**

Head office
The Entopia Building
1 Regent Street
Cambridge CB2 1GG
UK

T: +44 (0)1223 768850
info@cisl.cam.ac.uk

Brussels
Sustainable Hub
Rue du Commerce
72, Brussels 1040
Belgium

T: +32 (0) 2 894 93 19
info.eu@cisl.cam.ac.uk

Cape Town
Workshop17 NCG 146
Campground Road
Newlands 7780
Cape Town, South Africa

T: +27 (0)21 300 5013
info.sa@cisl.cam.ac.uk