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7th Nov

Investor Group on Climate Change

Activating Private Investment in Adaptation

Turning capital flight risk into the next multibillion opportunity

Published November 2024

Embargoed 7th Nov

About the Investor Group on Climate Change.

We are the leading network for Australian and New Zealand investors to understand and respond to the risks and opportunities of climate change.

Our members include our countries' largest superannuation and retail funds, specialist investors and advisory groups.

They are custodians of the retirement funds and savings for more than 14.8 million Australians and millions more New Zealanders.

Our members manage more than $35 trillion in global assets, and almost $5 trillion locally.

Acknowledgements

Thank you to the IGCC members who contributed to the thinking, drafting, and reviewing of this paper. Thanks as well to reviewers from other parts of the finance and business sectors, and those from the public service.

This paper was written by IGCC's Kate Simmonds and Fergus Pitt, and ERM Energetics' Stephen Catchpole, Olivia Kember and Bronte Wild. It incorporates some passages from a paper on investing in resilient infrastructure by Timothy Grech, Sustainability Manager (Resilience) at QIC.

Some figures come from other sources and are duly acknowledged in the text. IGCC's Rebecca Mikula-Wright, Erwin Jackson, Dani Siew, Marwa Curran, and Michael Bones also reviewed later drafts.

Individual IGCC members may hold different views and information from what is in this paper. The Investor Group on Climate Change takes sole and final responsibility for the content of this paper. Please refer to the disclaimer on the final page for more important legal information.

Contents

01: Executive Summary

This paper shows what governments and investors can do to prevent capital flight from high physical risk areas and industries, instead enabling investment in adaptation and resilience from the asset level up to the whole-of-system level.

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The Goal:
Unlocking Private Capital for Adaptation and Resilience

To keep the economy as vibrant and productive as possible, Australia will need many billions of dollars invested in climate adaptation and resilience. Federal and state budgets cannot cover the entire cost without significantly cutting other critical public services, increasing borrowing or raising taxes.

Private investors, including Australia's $3.9 trillion superannuation sector and global capital markets, may be a source of funds under the right conditions.

However, there is a considerable risk of the opposite happening. If the free market is left to its own devices, climate change will make it financially rational for private capital to become less available for essential infrastructure and services in regions and industries with more exposure to climate damage and disruption. Banks have already indicated they may withdraw from exposed areas,[1] and insurers are already raising prices , above affordability in some cases.[2]

Current Barriers

To sufficiently scale up investment in adaptation and resilience, four core barriers need addressing:

- challenges in quantifying the financial implications of physical risks and adaptation
- lack of market recognition for resilience in valuations
- difficulties in cost-sharing when adaptation benefits are spread across stakeholders
- asset-level resilience is normally insufficient to protect value if whole-of-system resilience is lacking.

Addressing all four challenges is necessary to facilitate private investment in adaptation and resilience at the scale that will protect the economy (and the investment sector's collective beneficiaries).

Also, to allow for capital flow towards adaptation and resilience, individual investment decisions must satisfy investors' fundamental fiduciary duty requirements to their specific groups of beneficiaries.

Given the significant needs, resilience and adaptation activities and investment will also need to be coordinated so that the highest value activities are prioritised.

1 Australian Prudential Regulation Authority (APRA), *Climate Vulnerability Assessment Results*, November 2022.
2 Actuaries Institute, *Home Insurance Affordability and Home Loans At Risk*, August 2024.

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Summary of Recommendations

We propose the following high-priority recommendations for investors and policymakers.
Further detail can be found in Section 05: Recommendations on page 27

Group 1: Build a Shared Understanding of Physical Risk and Resilience

For adaptation to be financed, there must be a shared understanding of its value. This requires a common target for resilience, availability of credible information, capabilities to make sense of the information, and inclusion within relevant standards.

Shared Understanding - Resilience Objective and Plans

The National Adaptation Plan should be on-par, in impact and prominence, with the Net Zero Australia plan.

It should include a "Net Zero by 2050" equivalent objective for physical risk, whereby Governments identifies the goal but many other entities, including other level of governments and private entities, need to make key contributions to reach the objective.

Key steps for government

- Legislate the National Climate Risk Assessment and National Adaptation Plan.
- As quickly as possible, the National Adaptation plan should include sector-by-sector plans for adaptation, matching the Net Zero sectoral emissions reduction plans, which are currently in development.[3]

Sectoral resilience plans would require the Government to set a target level of resilience (i.e., a physical risk appetite) and a plan to reach this target for each sector. This would ensure a coordinated, cost-effective, and effective approach to whole of system resilience, and help avoid under-, over-, or maladaptation. This would also help ensure that a lack of whole of system resilience does not undermine asset-level resilience.

Key steps for Investors

- Engage with government on sector plans and targets for resilience, and
- align portfolio resilience targets with national adaptation plan.

3 Australian Government, Net Zero: Sectoral emissions reduction plans and how they relate to the Net Zero Plan, July 2024.

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Shared Understanding - Information

Credible and consistent physical risk information is central to a shared understanding of resilience. However, physical risk information is currently not fit for purpose, is inaccessible and is disaggregated. A nationally consistent evidence base should be developed through activities such as the National Climate Risk Assessment (NCRA) and the National Adaptation Plan (NAP). This, in turn, will support a shared understanding of physical risk and resilience across government, private investors and other stakeholders.

Key steps for government:

- invest in sovereign scientific capability and resources, including robust, high-resolution climate and hazard datasets and five-year scientific plans using the outputs of NCRA to fill key information gaps, which may include vulnerability information, compound and cascading hazards and financial impacts
- consolidate existing physical risk data into a nationally consistent database.

Key steps for investors

Enhance understanding of adaptation and resilience by:

- building their internal capacity
- collaborating with other stakeholders (e.g., companies, service providers and research institutions) to develop the physical risk-related information they need for adaptation investment cases. This may include funding research, developing information and tools or collaborating with other supply chain actors to quantify indirect impacts.

Shared Understanding - Standards

Valuation methodologies and standards should recognise the socioeconomic benefits of investments in adaptation. Governments and investors will need to work together and with other entities (e.g., valuers and rating agencies) to develop robust methodologies. For valuations, both the negative impacts of physical risk (i.e., costs) and the positive impacts of adaptation (i.e., benefits) should be considered.

Key steps for government:

- expand the Australian Sustainable Finance Taxonomy to incorporate resilience
- support and endorse the inclusion of physical risk and resilience in valuation standards
- include relevant standards in legislation and regulation where appropriate.

Key steps for investors:

- develop, refine and adopt standardised approaches to climate risk assessment, aiming for global compatibility and reflecting the latest climate science
- engage with asset managers and companies on their physical risk assessments so they can inform investor risk assessments. (IGCC's participating members are currently piloting a set of physical risk expectations, due for wider release in 2025.)

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Group 2 - Ensure Regulation and Planning Support Private Investment in Adaptation

Regulation and planning, including but not limited to land use and building codes, must consider resilience over the full expected life of the asset to avoid creating future risks and support private investment in adaptation.

Key steps for government:

- ensure regulators include clear expectations for resilience in making pricing determinations and shaping markets
- identify and adjust regulations that may unnecessarily slow or disincentivise investment in adaptation
- instruct the Australian Competition and Consumer Commission (ACCC) to provide clear guidance on private-sector collaboration for resilience, including by clarifying its stance around collaborative investment in resilience efforts between businesses.
- support inclusion of resilience and adaptation in town planning and land use.

Key steps for investors:

- engage with government and companies on regulatory and planning changes for resilience.

Group 3 - Facilitate Innovation in Resilience

New or changed risks (due to climate change) will necessitate new types of adaptation. As well, the scale of adaptation required to ensure a prosperous Australia cannot be funded by government alone. Therefore, these challenges require innovation for both the adaptation itself and funding mechanisms to allow private investment.

Key steps for government:

- Ensure the mandates of all specialist investment vehicles (SIVs) expressly include adaptation and resilience (current SIVs include National Reconstruction Fund Corporation, Northern Australia Infrastructure Facility, Regional Investment Corporation, Clean Energy Finance Corporation, and Australian Renewable Energy Agency). Mandates should reflect both financial performance and social benefit, and allow for a broad range of adaptation activities and financial structures
- create dedicated investment vehicles or funds that target adaptation and offer returns that reflect both financial performance and social impact
- secure long-term adaptation and resilience funding to provide certainty of cashflows for resilience PPPs or bonds and ensure resources are available for long-term planning and to support public–private investments
- co-fund and support publicly available adaptation case studies and pilots with private investors, ranging across asset types and including challenging adaptation cases.

Key steps for investors:

- launch adaptation pilots and case studies, developing the necessary mechanisms and showcasing best practice.

02: The Problem: Without Adaptation, Climate Change Will Lead to Capital Flight

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Australia's Rising Climate Costs and Deteriorating Risk Profile

The increasing frequency and intensity of extreme weather events have already led to loss of life, increased disaster recovery expenses, higher insurance premiums and asset repricing.[4] Coordinated investment in adaptation is needed to protect and minimise damage to the economy and community from climate change, as the costs of repair, recovery and lost productivity will continue to rise. In addition, increasing climate risks are projected to exacerbate existing vulnerabilities and social inequalities and inequities.[5]

The Financial Risks from Climate Damage and Disruption

The costs of climate change are already significant. Globally, climate, weather and natural disasters resulted in economic losses of over US$313 billion in 2022, affecting lives, livelihoods and economies.[6] Credible forward-looking estimates of damage from climate change range between US$1.7 trillion and $3.1 trillion per year by 2050. This includes costs of damage to infrastructure, property, agriculture and human health.[7]

In Australia, disasters cost around $38 billion annually, estimated to reach at least $73 billion by 2060.[8] Insured losses totalled nearly $20 billion from 2019 to 2024[9] and put upward pressure on premiums: 12% of Australian households already experience home insurance affordability stress. Among the affordability-stressed households, exposure to natural perils is the major factor in high insurance premiums.[10]

These significant financial losses are accompanied by non-monetary impacts, such as harm to community wellbeing and ecosystem health.[11]

Defining Physical Risk

"Physical risks resulting from climate change can be event driven (acute) or longer-term shifts (chronic) in climate patterns. Physical risks may have financial implications for organizations, such as direct damage to assets and indirect impacts from supply chain disruption. Organizations' financial performance may also be affected by changes in water availability, sourcing, and quality; food security; and extreme temperature changes affecting organizations' premises, operations, supply chain, transport needs, and employee safety.

Acute Risk

Acute physical risks refer to those that are event-driven, including increased severity of extreme weather events, such as cyclones, hurricanes, or floods.

Chronic Risk

Chronic physical risks refer to longer-term shifts in climate patterns (e.g., sustained higher temperatures) that may cause sea level rise or chronic heat waves."

- *Recommendations of the Task Force on Climate-Related Financial Disclosures,* 2017

4 Climate Council, *Uninsurable Nation: Australia's Most Climate-Vulnerable Place*, 2022.
5 IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, 2022.
6 AON, *Weather, Climate and Catastrophe Insight*, 2023.
7 World Economic Forum, *Climate Change Is Costing The World $16 Million Per Hour: Study*, 2023.
8 Ibid.
9 NEMA, *Challenges Changes Choices, ANU Disaster Solutions*, 2024.
10 Actuaries Institute, *Home Insurance Affordability Update*, 2023.
11 Deepki, *Adaptation: Building Climate-Resilient Real Estate*, 2024.

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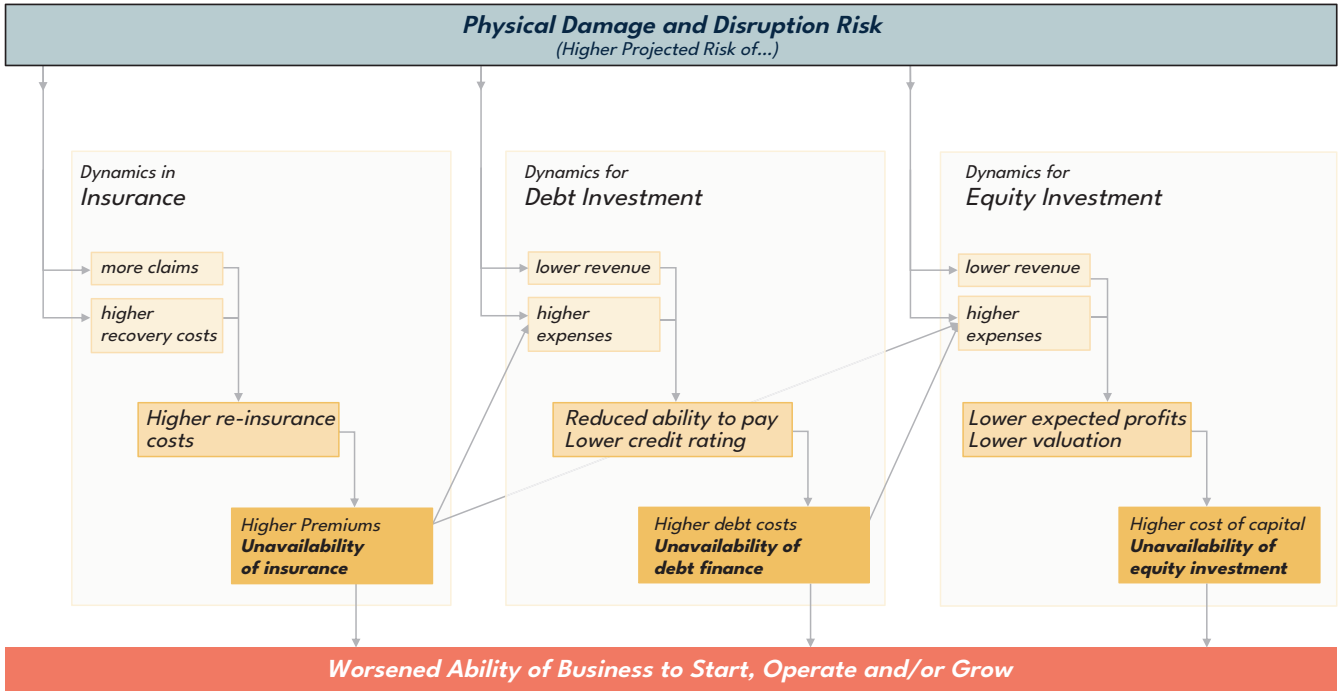
The Response by Insurers, Banks and Investors: Capital Flight

The costs of climate-related damage and disruption are risks that financial services firms need to manage. Repeated extreme events have increased reinsurance costs, prompting insurers to increase premiums – exemplified by properties in northern Australia due to cyclone risk, but common across the economy.[12] Higher insurance premiums lead some customers to reduce their cover or opt out of insurance altogether.[13] Similarly, banks are considering not offering loans to high physical climate risk regions, such as northern Australia.[14] Infrastructure investors could lose more than half their portfolio value to physical climate risks by 2050.[15]

These risks are necessarily present in many large investment portfolios. If material, investors will need to take them into account to meet their fiduciary duty.[16] Indeed, mainstream investors are starting to divest from stocks in exposed industries, and credit rating companies are factoring in climate-related risks, according to the Australian Government Department of Home Affairs.[17]

Figure 1. How climate risk can interact with the finance sector



12 Commonwealth of Australia, *Chapter 5: Insurance and Property Finance*, 2018.
13 Climate Council, *Weathering the Storm: Insurance in a Changing Climate*, 2023.
14 APRA, *Information Paper – Climate Vulnerability Assessment Results*, 2022.
15 EDHEC Infrastructure and Private assets Research institute, *It's Getting Physical*, 2023.
16 EY, *Climate Change: The Investment Perspective*, 2024.
17 Department of Home Affairs, *National Disaster Risk Reduction Framework*, 2018.

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Accelerating Capital Flight from Exposed Regions and Industries

These pressures towards capital flight will likely be strengthened by a confluence of factors: climate change itself (including extreme events), improvements in climate risk-related measurement and modelling tools, and increased transparency of climate-related financial risk to businesses.

Mandatory climate-related financial disclosures and increasingly common voluntary disclosures should enable more informed investment decisions and incentivise risk reduction at both investor and corporate levels.[18] However, the areas and activities – and even countries – perceived to be exposed to high climate change risk will thereby become exposed to capital flight and experience challenges accessing private capital. This may include:

- writing down and potentially decommissioning assets if no longer profitable
- financial services becoming unaffordable or inaccessible, including insurance, loans and investment.

Examples of rapid capital withdrawal are most visible in the insurance sector. Examples include customers being unable to afford insurance coverage,[19] especially in flood-prone areas like parts of Queensland and NSW, or high fire-risk areas, such as the withdrawal of coverage in California.[20] However, chronic underpricing of physical risk in investments could result in a climate-induced 'Minsky moment' or sudden recalibration of investor expectations of asset value.[21]

Figure 1 illustrates a simplified model of how physical risk impacts investment, loans, and insurance. The impact, from a business' financial perspective, could range from higher expenses up to unavailability of finance.

The cascading impacts of such capital withdrawal could be severe. They include damages to regional economies as key enterprises are closed and property values fall, as well as to national economies as key industries are weakened and pressure on households and support systems increases. Australia's NCRA considers this a 'plausible worst-case scenario'.[22]

There are many implications for governments: withdrawal of private capital from some regions would leave them as insurers, lenders and investors of last resort. Indeed, the government is currently a reinsurer of last resort in northern Australia.[23] If local economies shrink, all levels of government will have lower tax revenues, reducing their ability to provide services locally and across the country. In addition, governments will incur significant costs associated with higher unemployment in these regions.

Defining Capital Flight

Throughout this paper, we use 'capital flight' to include both active divestment actions and more passive mechanisms, such as decisions not to make new investments.

If these actions are repeated and trend consistently, either or both mechanisms would reduce overall exposure (from the investors' perspective) and capital availability (from the perspective of communities, businesses and governments). This assumes that other factors are held equal. The effect might also be described as 'downward pressure' on exposure/capital availability.

As discussed in this section credible models suggest the impact, or 'downward pressure', will vary but reach material levels in some regions and industries in the short term and impact more regions and industries in the medium-to-longer term.

18 Task Force on Climate-Related Financial Disclosures, *Climate-Related Risks, Opportunities, and Financial Impacts*, 2017.
19 Climate Council, *Weathering the Storm: Insurance in a Changing Climate*, 2023.
20 AP News, *California Insurance Market Rattled by Withdrawal of Major Companies*, 2023.
21 Financial Times, *Lex in Depth: How Investors Are Underpricing Climate Risks*, 2024.
22 Department of Climate Change, Energy, the Environment and Water (DCCEEW), *National Climate Risk Assessment, Appendix – Risk Descriptions*, 2024.
23 Australian Reinsurance Pool Corporation, *The Cyclone Pool*, 2022.

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The Impact on Australian Competitiveness

Echoing the potential domestic impacts, capital flight risks exist for Australia's economy in international markets. Australian sovereign bonds and Australian businesses may be given higher climate risk ratings unless the country can demonstrate its resilience.

This matters. Foreign direct investment in Australia is now at $4.7 trillion, equivalent to 181% of GDP.[24] If access to capital decreases, it compounds climate risk, with less funding available to reduce physical and transition climate risks (leaving aside the loss of the other benefits of foreign investment).

Australian-headquartered investors will not necessarily fill the gap. The competition to gain a share of Australia's superannuation savings is increasingly global; larger investors include offshore opportunities in their portfolios and prospecting.[25]

Australia has, however, competitive advantages when it comes to develop its resilience businesses and industries. Our disaster management sectors hold considerable experience, we have strong history of innovation in agriculture[26], and a relatively well educated workforce and research sector[27]. If supported, these advantages could be the basis for economic and jobs growth and new export products and services.

24 Australian Trade and Investment Commission, *Global Ties and Open Markets*, 2024.
25 FDI Intelligence, *AustralianSuper Boosts Overseas Investment*, 2024.
26 CSIRO *Good to Grow: trends in agricultural innovation* 2022
27 Australian Government *Australia's National Science Statement* 2024

03: The Need: Public and Private Investment in Adaptation and Resilience

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Investment in Adaptation and Resilience Is Essential to Avoid Capital Flight

To ensure Australia remains an attractive investment destination and avoids capital flight from high physical risk regions and sectors, investment in adaptation and resilience must increase. Adaptation measures should reduce residual risk to a level where it is attractive for private capital to remain in the region. This will enable the private sector to continue to offer affordable insurance and loans, operate business services and invest in critical infrastructure and other productive uses.

Australia's agriculture industry provides a key example of where adaptation and resilience investments can maintain global competitiveness, provide employment and attract investment.[28] For example, improvements to dryland farming practices, estimated to cost $250–500 per hectare, can boost cereal yields by 70–140%.[29]

There is a financial benefit to investing earlier rather than later. The costs of achieving the same resilience will increase the longer the risks remain unaddressed.[30]

Private Finance Has a Role to Play in Funding Adaptation

The scale of finance and investment required to transition the Australian economy to be resilient to the physical impacts of climate change is well beyond what governments alone can achieve, especially under tight fiscal conditions.

However, almost all adaptation finance globally, identified as such, has come from public sector sources including development finance institutions. According to the Climate Bonds Initiative, only 19% of capital from the sustainable bond market flows to climate resilience activities. Governments or other government-backed entities issue most of these bonds, with only 20% issued by financial and non-financial corporates. This has led to a gap of US$194 billion and $US 266 billion *annually* between current investment in adaptation and resilience and what is required globally.[31]

Governments and institutional investors have strong incentives to work together to invest in adaptation and resilience. Very large institutional investors, such as Australian superannuation funds, are 'universal owners', necessarily exposed to whole economies. As such, their returns to beneficiaries correlate highly to the economies' growth or contraction.

The availability of private capital to invest in sustainability and climate change-aligned projects is increasing. The California Public Employees' Retirement System (CalPERS) recently expanded its commitment to invest at least $100 billion in climate solutions by 2030 as driven by its Climate Action Plan and one of its three investment categories is climate change adaptation.[32]

"Adaptation" Versus "Resilience" – What's the Difference?

According to the Intergovernmental Panel on Climate Change (IPCC), adaptation is the process of adjustment in response to actual or expected climate change and its effects to moderate harm or exploit potential benefits.

Resilience is the capacity of an entity to resist, absorb, accommodate, adapt to, transform and recover from the current and projected impacts of climate change, both direct and indirect, maintaining its basic structure and form.

Simply put, adaptation is the action, and resilience is the outcome or goal.

28 NSW Government, *NSW Climate Change Adaptation Strategy*, 2022.
29 Ibid.
30 United Nations Framework Convention on Climate Change (UNFCC), *Investment and Financial Flows to Address Climate Change*, 2007.
31 United Nations Environment Program, *Adaptation Gap Report 2023*, 2023.
32 CalPERS, $100 Billion Climate Action Plan, 2024.

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The Investment Options for Resilience and Adaptation

Adaptation is not an asset class itself. Instead, investors invest in adaptation in a range of different ways, including via real assets, listed and private companies and bonds. These investments then contribute to the broader resilience of the Australian economy. Alongside solely private investments, blended finance (i.e., public and private investments) is likely to be important in adaptation financing due to the wide benefits of adaptation.

Real Assets

Investors may fund resilience in physical assets such as infrastructure (i.e., energy and communications) and real estate, supporting economic growth and productivity.[33] Asset-level investment in resilience may occur when any asset is built, upgraded or throughout its lifetime (i.e., retrofitting). Examples may include raising an asset (e.g., a building or bridge) to protect from flood risk or building an asset (e.g., real estate) further from vegetation to reduce bushfire risk. In addition, there are assets where the primarily function is to increase resilience (e.g., a flood levee). The UK-based Institutional Investor Group on Climate Change (IIGCC) recently released a range of international case studies that show how adapting infrastructure assets can increase rates of return.[34] This may occur through cheaper insurance, lower lifecycle costs, higher productivity or higher bankability.

Listed and Private Companies

Companies from all sectors may need capital to protect or raise their performance using adaptation technologies, products or services.[38] According to BCG and the Global Resilience Partnership, 'every dollar a company invests in implementing adaptation and resilience measures can yield $2–15 in financial benefits'.[39]

Investors holding listed equities tend to have less control over companies than private market investors. However, large public market investors (e.g., superannuation funds) can set strong expectations around the quality of disclosures as they relate to physical risk management, adaptation and resilience. They can also signal they support the timely implementation of appropriate adaptation and resilience measures and the requisite corporate capex. IGCC and its members are currently piloting a set of expectations on companies' physical risk and resilience.[40]

Alongside companies making themselves more resilient to physical climate risk, there are also opportunities for private and public companies to build innovative resilience technologies. "Adaptation and resilience solution providers earned a median valuation multiple of 9 times revenue ... and some companies generated valuations as high as 77 times", according to BCG.[41]

Global Adaptation and Resilience Investment (GARI)'s research into the resilience solutions of listed companies found a potentially investible universe of over 800 companies. Still, it noted that pure-play resilience companies were limited, so investment strategies that weight portfolios towards dual-use resilience providers would likely be the best approach to accessing resilience solutions growth in the near term.[42]

33 DCCEEW, *National Climate Resilience and Adaptation Strategy 2021–2025*, 2021.
34 IIGCC, *PCRAM in Practice Outputs from the Physical Climate Risk Assessment Methodology (PCRAM) 1.0 Case Studies*, 2024.
35 Climate-KIC Australia, *The Resilience Investment Vehicle*, 2023.
36 Global Centre on Adaptation, *Climate-Resilient Infrastructure Officer Handbook*, 2021.
37 C. B. Casady, A. Cepparulo & L. Giuriato, *Public-Private Partnerships for low-Carbon, Climate-Resilient Infrastructure: Insights from the Literature*, 2024.
38 Tailwind, *Tailwind Taxonomy for Adaptation and Resilience Investments*, 2024.
39 DCCEEW, *National Climate Resilience and Adaptation Strategy 2021–2025*, 2021.
40
41 Global Resilience Partnership, *From Risk to Reward*, 2023.
42 GARI Working Group, *The Unavoidable Opportunity: Investing in the Growing Market for Climate Resilience Solutions*, 2024.

Bonds

Bonds have historically been used to fund disaster recovery and adaptation. Examples include the world's oldest bond that is still paying out, which was used to fund the replacement of a dike in Utrecht in 1624.[43]

Today, bonds focused on adaptation and resilience (known as 'resilience bonds') are increasing but remain rare. Examples of these bonds have been issued by the European Bank for Reconstruction and Development and the Asian Infrastructure Investment Bank.

Another approach is to integrate climate resilience criteria into green bonds issuance. However, this market remains relatively underutilised despite its potential. In 2023, of the 48,000 green bonds issued, just 1,200 had adaptation and resilience elements.[44]

Blended Finance and Public–Private Partnerships

For some adaptation investments, blended finance may be more appropriate. This is often the case if the benefits of adaptation are spread across a range of actors. To explore the potential of this, NAB and IAG worked with Climate-KIC to develop the Resilience Investment Vehicle. This involved bringing together cross-sectoral stakeholders to investigate how to direct public and private capital towards new and existing infrastructure that builds resilience, minimises disaster risk and produces financial returns for investors.[33]

One type of blended finance is public–private partnerships (PPPs) for infrastructure. These are increasingly recognised as a promising tool for adaptation and resilience investment,[34] with the potential to complement the traditional infrastructure investment portfolio. To date, there is little visibility on their use for resilience investment, nor is there clear evidence for a single best practice, institutional framework or standardised model. However, some academic research indicates that PPPs for resilience investment have been able to use the standardisation developed through traditional PPP contracts while developing innovative variations. This includes bringing in other stakeholders, such as community partners.[35]

43 Financial Times, *The World's Oldest Living Bond*, 2023.
44 Climate Bonds, *Sustainable Debt Global State of The Market*, 2023.

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The Breadth of Adaptation and Resilience Activities

The range of solutions is far broader than hardening infrastructure. It includes drought-resistant crops, fire-resistant building materials, digital communications, ecosystem repair, adapted work practices and much more.

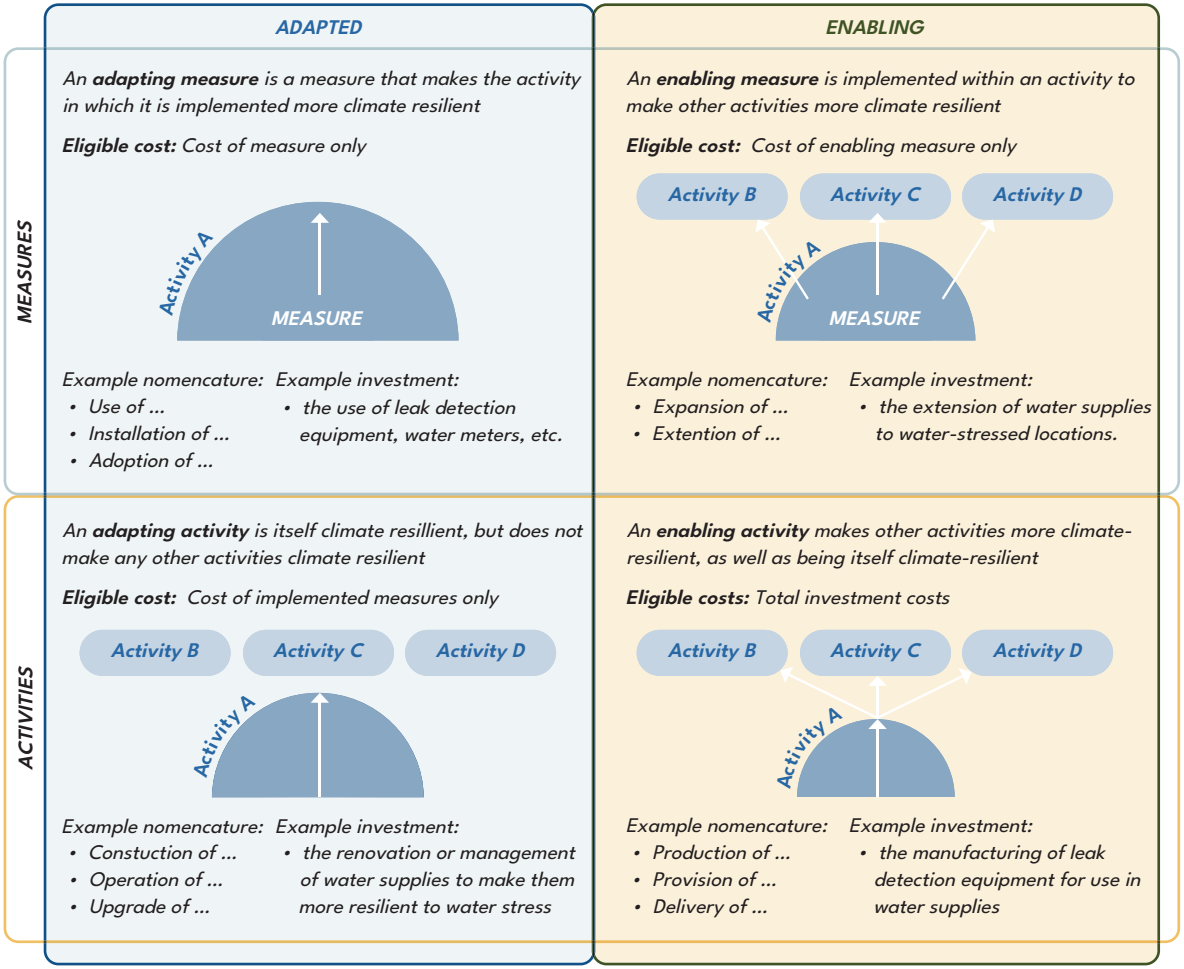
Sorting Adaptation and Resilience

Sorting adaptation and resilience activities will depend on the use case. The Climate Bonds Initiative recently released its Resilience Taxonomy Methodology, which builds on the European Union's Taxonomy. This methodology was designed to support debt issuance (bonds and loans) and guide investors and underwriters in assessing the credentials of resilience debt issuances. They define four types of activities and measures to potentially invest in:

- An **adapted measure**: a measure that makes the activity in which it is implemented more climate resilient.
- An **enabling measure**: implemented within an activity to make other activities more climate resilient.
- An **adapting activity**: itself climate resilient but does not make any other activities climate resilient.
- An **enabling activity**: makes other activities more climate resilient and is itself climate resilient.

Specific adaptation activities were identified within seven resilience themes: infrastructure, food systems, cities, social systems, health systems, natural systems and industry and commerce. Within these, 27 sectors were identified, with 66 subsectors and 1,445 unique adaptation investments.

Figure 2. Adapted and enabling measures and activities



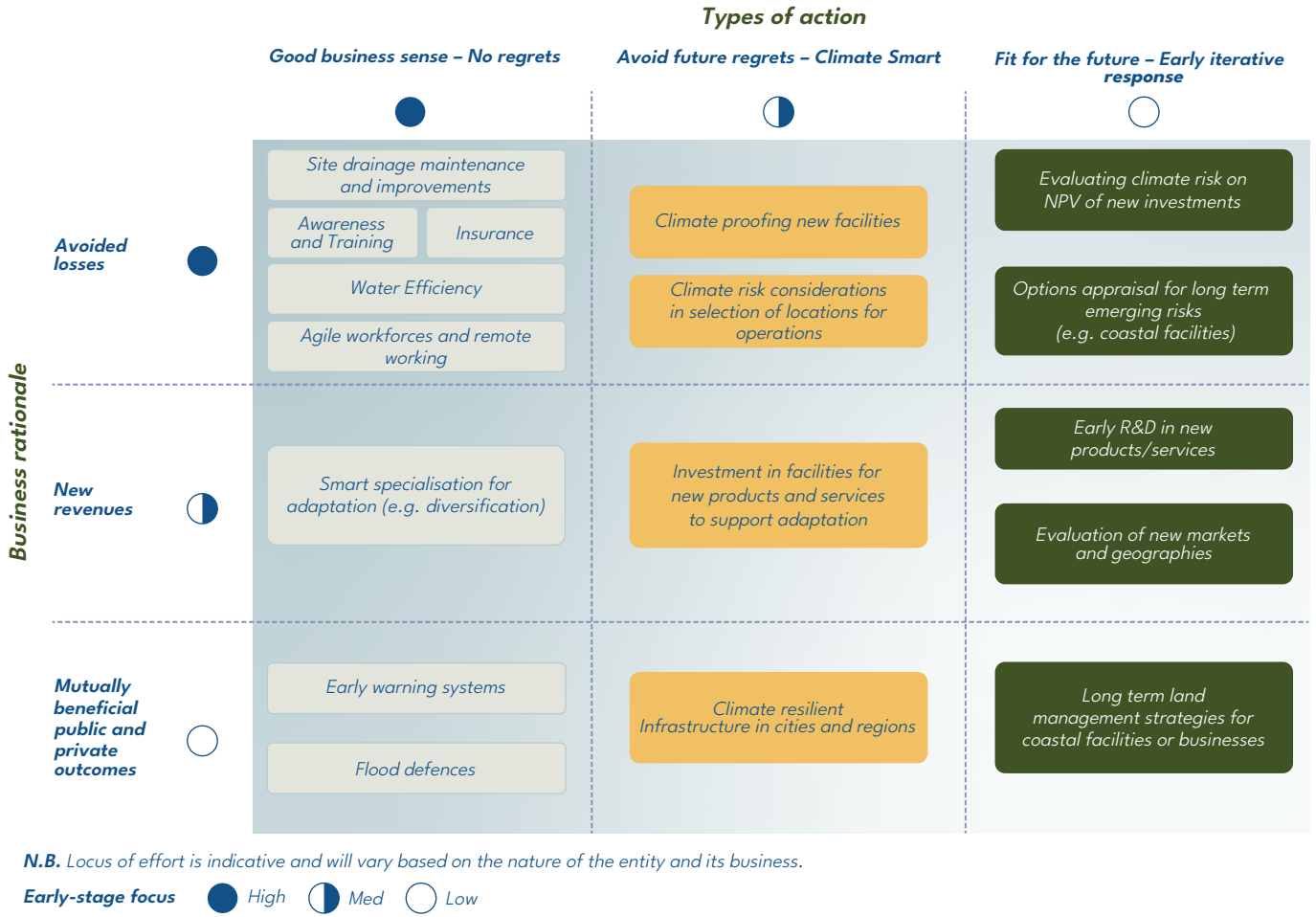
Source: Adapted from Climate Bonds Initiative

The Transition Plan Taskforce's Adaptation Working Group (AWG) has developed another approach, producing a matrix for defining adaptation activities based on the timing of risks and the time horizon of the adaptation decision.[45] This matrix was intended for use by entities preparing their climate adaptation and resilience-focused disclosure within transition plans. AWG defined three kinds of activity:

- **No/low regret actions:** Immediate actions that address current climate risks and offer immediate benefits.
- **Climate-smart design:** These actions involve near-term decisions with exposure to future climate risks, where there is a unique chance to adapt now. This approach helps avoid future regrets, such as altering the design of new infrastructure to enhance resilience against future climate impacts and avoid the costs of major retrofits later.
- **Early iterative response:** Some future actions to address significant climate change will require time to develop and could benefit from better information and learning. In such cases, planning should start now, especially if lead times are long or there is a high potential for learning, including developing new market offerings aligned with projected climate risks.

These frameworks highlight the breadth of adaptation activities across different types of investment, time horizons, and sectors.

Figure 3. Types of resilience action and their rationale from a business' perspective



Source: Adapted from the Transition Taskforce.[44]

45 Transition Taskforce, *Building Climate-ready Transition Plans*, 2024.
46 Transition Taskforce, *Building Climate-Ready Transition Plans*, 2024.

Case Studies of Adaptation and Resilience Activities

Investment in dual-use resilience solutions companies (USA)

According to the GARI Working Group, resilience solutions companies provide opportunities for investment in resilience at scale. GARI highlights two major listed companies where product lines that align with resilience solutions are responsible for about one-fifth of revenue.

One is a US$122 billion multinational technology company that provides products and services in building, industrial automation, energy solutions and aerospace technologies. Its adaptation solutions include air purification systems, air quality monitoring devices, refrigerants, power grid resiliency and Internet of Things urban communication networks, collectively responsible for an estimated 18% of 2022 revenue.

The second company is a US$76.6 billion pharmaceutical and biotechnology firm. GARI estimates about 20% of its 2022 revenue derives from products designed to alleviate or combat climate-induced diseases and conditions.[47]

A home resilience self-assessment tool that lowers insurance costs (Aus)

In collaboration with the Australian Government, IAG, NAB and BlueScope Steel, Australia's Resilient Building Council developed a Bushfire Resilience Rating Home Self-Assessment app that allows homeowners to evaluate their property's bushfire resilience.[48] It provides a customised action plan to improve the rating and as users complete recommended tasks, their home's Resilience Rating is updated.

Two insurance providers now provide discounts to households who use the tool to make their homes more resilient to bushfires. Other insurers and banks have indicated they will do the same. The approach is being funded to expand to multiple climate hazards. By making each property's vulnerability and resilience improvements visible to key stakeholders and convertible to financial benefits, the initiative both incentivises adaptation and reduces its costs.

To date, 19,000 households have accessed the app, and 6,600 households have taken at least four recommended actions, investing an estimated $44 million in resilient home improvements.

Telecommunication Disaster Resilience Innovation Program (Australia)

This program funds the creation of new technologies aimed at enhancing telecommunications disaster resilience, especially in regional, remote, and First Nations communities. This initiative is part of the Australian Government's Better Connectivity Plan for Regional and Rural Australia.

Funded projects include ZetiMesh – a power-efficient, long-range, public Wi-Fi for at-risk and disaster impacted communities, Rapid deployable "plug & play" hybrid off grid power solutions, and power back up for multiple nbn fixed wireless sites.[49]

A place-based approach to creating resilience investment (Australia)

'Enabling Resilience Investment' is an approach developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Value Advisory Partners to generate place-based investment cases for projects (e.g., development of public and private assets) in an integrated manner and across a range of public and private stakeholders.[50]

The Port Adelaide Enfield pilot identified over 80 adaptation opportunities that would produce 66 types of benefits for 22 beneficiary groups, which, when assessed for value creation and access to funding mechanisms, prioritised resilience infrastructure in the inner and outer harbour.[51]

47 GARI Working Group, *The Unavoidable Opportunity: Investing in the Growing Market for Climate Resilience Solutions*, 2024.
48 NEMA, *Protecting Australian Homes with Free Bushfire Resilience Rating App*, 2023.
49 Australian Government. Telecommunications Disaster Resilience Innovation Program, 2024.
50 CSIRO, *The Enabling Resilience Investment Approach*, n.d.
51 CSIRO, *Developing Resilience Investment Cases in Port Adelaide Enfield Building National Capability for Enabling Resilience Investment*, 2022

Designing resilience into new energy assets

Two energy projects – a 50 megawatt (MW) wind farm and a 40 MW run-of-river hydropower project – show how project investors determined the investment case for implementing resilience measures.

Analysis of the hydropower generator's vulnerability to future drought found that implementing resilience measures could improve project internal rate on return (IRR).[52] Although the impacts of projected droughts across the asset's 20-year equity holding period were minimal, climate risk beyond that period increased significantly. This has implications for the asset's valuation at the time of the proposed sale. The wind farm was exposed to rising sea levels and storm surges. But the analysis found that the critical elevation would not be breached until after the useful life of the asset and that a key decision was citing the primary substation as a critical single point of failure.

Funding to relocate the substation was compared against scenarios in which the substation was flooded and needed to be rebuilt. The IRR of the relocation option was shown to be materially better.[53] These projects were among the first two analysed against the PCRAM methodology for evaluating physical climate risks to an infrastructure asset. Developed by the Coalition for Climate Resilient Investment and now overseen by the IIGCC, PCRAM's goal is to help asset owners incorporate resilience in decision-making over the asset's life cycle. PCRAM 2.0 is under development.[54]

A new reservoir to enhance water security and biodiversity (UK)

The Havant Thicket Reservoir involves constructing a new reservoir in the water-stressed southeast. Equity commitment of £150 million from Portsmouth Water's existing shareholder and £165 million in debt finance was supported by £50 million senior debt from the UK Infrastructure Bank (UKIB). This was UKIB's first adaptation finance project. The financing package includes £205 million of innovative ESG performance-linked financing.

The project directly benefits 160,000 customers in the catchment area and reduces emissions by about 100,000 tCO_2e. Public consultation and environmental impact assessments have influenced the design, which includes new wetlands areas and replanting/improving 110 hectares of woodland.[55]

52 IIGCC, *Case Study 1: Run of River Hydropower Facility*, 2024.
53 IIGCC, *Case Study 2: Coastal Wind Farm*, 2024.
54 IIGCC, *PCRAM in Practice: Outputs and Insights from Climate Resilience in Action*, 2024.
55 Singapore Green Finance Centre, *Financing Adaptation and Resilience in London and the UK: Moving from Aspiration to Reality*, 2024.

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Transformations and Managed Retreat

Investing in adaptation should neither undermine market signals of unacceptable risk, involve subsidising activities that climate change renders uneconomic, nor lock in settlement of places where there is an unacceptable risk to life or wellbeing. For instance, adaptation of a residential area on a high-risk flood plain may need to include the planned relocation of some or all residents based on clearly defined and widely accepted risk thresholds. In these areas, transformational adaptation may be required.

Transformational Adaptation[56]

Given the deep, long-term challenges posed by climate impacts, addressing climate change, both in adaptation and mitigation, may require fundamental shifts in systems, values and strategies. Unlike incremental adaptations, which make smaller adjustments to existing practices, transformational adaptation contemplates reconfiguring entire systems to make them more resilient and sustainable. This process would often include significant changes in governance, infrastructure and social systems, and potentially the underlying values and worldviews.

The increasing interest in transformational adaptation comes with the recognition that incremental changes may be insufficient in the face of extreme climate scenarios. In some cases, incremental adaptation can accrue to result in transformational adaptation. However, as climate change accelerates, some ecosystems and human systems may reach tipping points where traditional adaptation approaches no longer suffice. For instance, communities living in flood-prone coastal areas might need to relocate instead of merely strengthening sea defences. Similarly, agricultural systems facing prolonged droughts may require not just improved irrigation but a complete shift in farming practices or crop types all the way to regenerative farming.

A crucial aspect of transformational adaptation is its emphasis on equity and inclusivity. With this approach, vulnerable and marginalised groups, often disproportionately affected by climate impacts, must be included in decision-making processes. This would ensure that adaptation strategies are not only effective but also help to reduce social inequalities exacerbated by climate change.

Transformational adaptation would require bold, innovative actions and rethinking conventional approaches but may be necessary for long-term resilience in the face of rapidly changing climate conditions.

That said, mainstream organisations, including within the Victorian Government[57] and the CSIRO,[58] recognise the concept's credibility.

56 IPCC Working Group II, *Impacts, Adaptation And Vulnerability. Concepts, Approaches and Examples of Transformational Adaptation*, 2022.
57 State of Victoria Department of Environment, Land, Water and Planning, Government, *Natural Environment Climate Change Adaptation Action Plan 2022–2026*, 2022
58 . CSIRO, *Transformative Adaptation Research Alliance*, n.d.

04: Current Barriers

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Four Barrier Groups and Fiduciary Duties

Private investors currently face significant barriers to investing in adaptation and resilience. These include:

- quantifying the financial implications of physical risks and adaptation
- the lack of market recognition for resilience in valuations
- the difficulties in cost-sharing when adaptation benefits are spread across stakeholders
- an insufficient asset-level resilience to protect value if whole-of-system resilience is lacking.

Addressing all four challenges is necessary to facilitate private investment in adaptation and resilience at the scale that will protect the economy (and, therefore, investors' collective beneficiaries).

Also, to allow for capital flow into adaptation and resilience, individual investment decisions must satisfy investors' fundamental fiduciary duty requirements to their specific groups of beneficiaries.

Given finite resources and the significant need for resilience and adaptation, activities and investments must also be coordinated and prioritised.

Barrier Group 1 - Quantifying the Financial Implications of Physical Risks and Adaptation

To build an investment case for adaptation, investors must quantify the financial implications of physical risks to their assets and operations, including indirect impacts via value chain exposures. This information can then determine the financial benefit of investing in adaptation and resilience measures.

However, this process currently involves significant challenges, including being confident of the:

- frequency and severity of hazards (acute and chronic) under various climate change scenarios
- vulnerability of assets, operations and supply chains to changing hazards
- changing vulnerabilities when hazards are complex and/or compounded
- effectiveness and associated financial benefit of resilience measures.

These challenges have led to a lack of market confidence in current approaches, particularly where they produce inconsistent results. A recent comparison of proprietary models for predicting properties' vulnerability to flood risk showed little agreement among models regarding high-risk areas.[59]

Much of the existing information on the vulnerability of assets has been developed within the insurance industry. This has led to a focus on insurable hazards (typically acute) and direct damage. In addition, while several studies exist on the financial impacts of physical risk on residential housing and real estate,[60,61] limited analysis remains for other asset types, operations and supply chains.

Methods for understanding the impacts of assets to multiple hazards and compound events are still nascent despite these events likely producing the highest costs. IGCC has produced several policy briefings that outline the information needs of investors to build investment cases for adaptation in more detail.[62]

59 Bloomberg, *Clashing Risk Predictions Cast Doubt on Black Box Climate Models*, 2024.
60 Bloomberg, *Clashing Risk Predictions Cast Doubt on Black Box Climate Models*, 2024.
61 Actuaries Institute, *Home Insurance Affordability and Home Loans at Risk*, 2024.
62 IGCC, *Submission: National Adaptation Plan to Manage Physical Risks for Economy*, 2024; IGCC, *Investor Expectations: National Climate Risk Assessment*, 2023.

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Barrier Group 2 - Lack of Market Recognition for Resilience

Even if investors can make the investment case for adaptation, they will only realise the full financial benefits if valuation standards mature to recognise the higher risk-adjusted returns from climate-resilient assets and businesses.

This will unlikely change until evidence-based resilience outcomes are developed. This may partly be due to many market participants assuming that insurance will be available to cover climate impacts and that government funding will materialise to save critical systems (including the insurance system).[63] This, in turn, disincentivises private investment in adaptation and resilience.

The Limitations of Financial Metrics

Further, many adaptation benefits, particularly those for communities (e.g., reduced risk to life), are difficult to quantify as a financial benefit. The financial value of avoided costs of climate impacts is an incomplete picture of the benefits of resilience. In some cases, even accurately and comprehensively recognising the financial value of resilience may be insufficient to build an investment case for resilience measures beyond limited asset hardening.

The World Resources Institute defines the 'triple dividend of resilience', of which avoided losses are only the first dividend. Including broader economic benefits (the second dividend) and social and environmental benefits (the third dividend) can show higher benefit–cost ratios. However, the challenge remains that as investors do not (financially) benefit from these additional dividends, they cannot include them in investment cases without contradicting their fiduciary duties.

Barrier Group 3 - Cost-Sharing when Adaptation Benefits Are Spread Across Stakeholders

Financing adaptation measures where the benefits are spread across multiple parties is challenging because stakeholders potentially include different levels of government, local communities and private entities. An adaptation business case may not stack up for any one party, and the financier may inadequately receive the benefits of adaptation. For example, in developing a flood levee:

- community residents and local businesses will be the direct beneficiaries of the infrastructure through avoided damages and losses from future floods
- insurers also benefit as insurable property numbers will increase, and claim costs will decrease
- more residents and businesses can access affordable insurance
- government faces less pressure to become the insurer of last resort or subsidise insurance and/or reinsurance costs
- government does not have to bear costs associated with flood recovery.

A private investor could fund and manage the delivery of a flood levee, but as there are no inherent cash flows to the investor, there is no clear return on investment. A more easily financially justifiable approach would be to share the costs and associated risks between the benefiting parties. This involves identifying and collaborating with relevant stakeholders (in the location and/or value chain), quantifying the benefits that accrue to them, and establishing mechanisms by which those benefits are paid for. Each step in this process adds complexity and friction to the investment case and to constructing an equitable financing model.

Mechanisms to facilitate this process, like CSIRO's Enabling Resilience Investment approach,[64] are in early experimental stages. The resources, time and uncertainty associated with this process are collectively a significant deterrent to investors – especially given many individual resilience actions represent relatively small investments (even if the aggregated pool of investments is large).[65]

63 United Nations Environment Programme Finance Initiative, *Driving Finance Today for the Climate Resilient Society of Tomorrow*, 2019.
64 CSIRO, *The Enabling Resilience Investment Approach*, n.d.
65 Climate-KIC Australia, *The Resilience Investment Vehicle*, 2023.

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Barrier Group 4 - Whole-of-System Resilience

Almost every asset and business is, at least some degree, reliant on a complex system of supply chains, shared infrastructure, workforces integrated with communities, and natural ecosystems that 'supply' clean water, air, soil and other supports. This means that even if the asset itself is resilient, this resilience may be undermined by the resilience of the broader system. This has implications for the productivity of the asset and weakens the initial business case for adaptation investment.

For example, after the NSW floods in 2022, Port Kembla was unaffected, but the infrastructure allowing its customers to deliver and retrieve freight was damaged.[66] While customers were initially able to reroute grain and steel delivery through the train network, this continuity plan was undermined by a landslide, which cut off access. This example also highlights the significant impact that compounded events can have.

Another example, provided by Telstra, is the risk of the main electricity supply failing to telecommunication network sites due to climate events. This is the company's primary financial climate exposure.[67] To mitigate this risk, they require their electricity suppliers to have business continuity plans, including having backup suppliers in different locations and holding critical stock on hand.

Interactions of These Barriers With Investors' Fiduciary Duty

Investors' fiduciary duty to invest in the long-term best interests of their beneficiaries is widely interpreted as a duty to maximise portfolio returns, which rules out investments with uncompetitive risk-return profiles.

Investors are wary of investing in climate resilience as they may not be able to demonstrate the financial benefits, capture them through increased valuation, or access them through the benefit of shared resilience.

Interventions to address the barriers above need to be designed and sized to enable the risk-return profile of investments in systemic resilience to compete with other potential investment opportunities.

66 IFM Investors, *Investing in Adaptation to Protect Value and Provide Essential Services*, 2024.
67 Telstra, *Annual Report*, 2024.

05: Recommendations

To overcome the barriers identified in Section 4, governments and investors will need to take decisive action. These actions have been categorised into three groups:

- build a shared understanding of physical risk and resilience
- establish regulations and incentives to support private investment in adaptation
- facilitate innovation in resilience.

Some of these actions are already occurring within some sectors, levels of government and parts of the investment community. However, even initial actions are included to provide a holistic roadmap to activate and accelerate private investment into adaptation.

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Recommendation Group 1 - Build a Shared Understanding of Physical Risk and Resilience

For adaptation to be financed, there must be a shared understanding of its value. This requires a common target for resilience, the availability of credible information, the capabilities to make sense of the information, and inclusion within relevant standards (e.g., Australian Sustainable Finance Taxonomy).

Shared Understanding: Resilience Objective and Plans

The National Adaptation Plan should be on-par, in impact and prominence, with the Net Zero Australia plan.

It should include a "Net Zero by 2050" equivalent objective for physical risk, whereby Governments identifies the goal but many other entities, including other level of governments and private entities, need to make key contributions to reach the objective.

As quickly as possible, the National Adaptation plan should include sector-by-sector plans for adaptation, matching the Net Zero sectoral emissions reduction plans, which are currently in development.[68]

Sectoral resilience plans would require the Government to set resilience goal (i.e., a physical risk appetite) and a plan to reach this goal for each sector. This would ensure a coordinated, cost-effective, and effective approach to whole of system resilience, and help avoid under-, over-, or maladaptation. This would also help ensure that a lack of whole of system resilience does not undermine asset-level resilience.

For government:

Develop sector plans and targets for resilience, as part of the National Adaptation Plan.

- Develop resilience targets (or physical risk appetites) with relevant stakeholders for key sectors.
  - Governments may have varying risk appetites with respect to different types of assets and sectors.
  - For example, critical infrastructure and its essential services would likely have a low-risk appetite due to the significant adverse consequences if their services are interrupted due to the physical impacts of climate change. This then requires a higher level of resilience, which may justify a higher investment cost. Conversely, assets with a higher risk appetite may be sufficient with a moderate or lower level of resilience and will not require large amounts of investment.
- Develop sector plans to reach resilience targets with relevant stakeholders in a coordinated, cost-efficient and effective way.
  - The sector resilience plans should be compatible with the Net Zero sector plans and vice-versa.
  - The Net Zero sector plan for the built environment has already identified resilience as a key component and may, therefore, be a good starting sector.
- Update the plans every five years, as part of the National Climate Risk Assessment and the National Adaptation Plan.
- Communicate resilience and targets with relevant stakeholders and support their implementation.
  - This may be through training, regulation, targeted funding and other incentives.
- Use these plans to create a clear list of priority resilience projects (e.g., the Infrastructure Priority List).
  - This would provide private investors confidence that their investment lay in areas of higher importance for governments and enable planning for a longer-term program of investments.

Ensure adaptation efforts are fully integrated across all government climate change activities.

- Collaborate across Government departments to ensure climate change activities are aligned.
  - This should be enacted to avoid silos and promote a unified approach to building resilience.
  - This alignment should be reflected in policy, planning and funding priorities across all levels of government.

68 Australian Government, Net Zero: Sectoral emissions reduction plans and how they relate to the Net Zero Plan, July 2024.

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Shared Understanding: Resilience Objective and Plans (continued)

For investors:

Engage with government on sector plans and targets for resilience

- For relevant sectors, engage with government on the development of resilience targets and sector plans.
  - This may occur through submissions, roundtables and other forms of engagement.

Align Portfolio Resilience Targets with National Adaptation Plan

- Within the constraints of their fiduciary duty, investors should set portfolio resilience targets, and progress towards those targets.

Shared Understanding: Information

Credible and consistent physical risk information is central to a shared understanding of resilience. However, physical risk information is currently not fit for purpose, inaccessible and disaggregated. Through activities such as the NCRA and the NAP, a nationally consistent evidence base should be developed. This, in turn, will support a shared understanding of physical risk and resilience across government, private investors and other stakeholders.

For government:

Legislate the National Climate Risk Assessment (NCRA) and National Adaptation Plan (NAP)

- Legislate that NCRA and NAP update at least every five years, per the Climate Change Authority's recommendation.
  - Legislating these activities positions adaptation as a key priority for the government and builds investor confidence that it will continue to be so.[69]
  - Legislation should also cover ongoing monitoring and evaluation.
- Include a systemic literature and information review in each NCRA, which, in turn, can inform scientific priorities for the next five years.

Invest in soverein scientific capability and resources

- Assign accountability and funding for developing and maintaining robust, high-resolution climate and hazard datasets, including tools and training where appropriate.
  - More information on investor information needs is available in IGCC's Investor Expectations on NCRA.[70]
- Develop and fund five-year scientific plans using NCRA outputs to fill key information gaps.
  - This may include vulnerability information, compound and cascading hazards and financial impacts.

Consolidate existing physical risk data into a nationally consistent database

- Collaborate with other government levels (i.e., federal, state and local) to create a national database of consistent, aggregated climate and hazard data.
  - This database should be commercially available, easy-to-access and in usable formats.
  - New information developed at local and state levels should adhere to nationally consistent methodologies.

69 IGCC, *Submission: National Adaptation Plan Issues Paper*, 2024.
70 IGCC, *Investor Expectations: National Climate Risk Assessment*, 2023.

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Shared Understanding: Information (continued)

For investors:

Enhance understanding of adaptation and resilience

- Build capacity, potentially including targeted training and hiring, in asset managers and owners, focusing on resilience and adaptation strategies.
    - Programs should cover both asset-level and systemic resilience, equipping financial professionals with skills to incorporate physical climate risk into investment decision-making processes, including through valuations.
- Collaborate with other stakeholders (e.g., companies, service providers and research institutions) to develop physical risk-related information needed for adaptation investment cases.
    - This may include funding research, developing information and tools or collaborating with other supply chains actors to quantify indirect impacts.

Shared Understanding: Standards

Valuation methodologies and standards should recognise the socioeconomic benefits of investments in adaptation, be internationally consistent and build on, complement, or otherwise refer to existing relevant methodologies, frameworks, standards and approaches. Governments and investors must work together and with other entities (e.g., valuers and rating agencies) to develop robust methodologies.

For valuations, both the negative impacts of physical risk and the positive impacts of adaptation should be considered. This may be done similarly to how the International Valuations Standards Council is exploring embedding environmental, social and governance metrics into real estate valuation.[71]

For government:

Expand the Australian Sustainable Finance Taxonomy to incorporate resilience

- broaden the scope of the Australian Sustainable Finance Institute to include detailed criteria for eligible investments in systemic adaptation and resilience.

Support and endorse the inclusion of physical risk and resilience in valuation standards

- support valuers and rating agencies in developing and promoting standardised methodologies that allow for the integration of physical risk and resilience factors into asset and company valuations
- include standards in legislation and regulation where appropriate.

For investors:

Develop, refine and adopt standardised approaches to climate risk assessment

- adopt climate risk assessment frameworks that are globally applicable and continually updated to reflect the latest climate science
- engage with industry initiatives to develop and pilot best practice approaches where they do not currently exist, including providing case studies
- engage with asset managers and companies on their physical risk assessments to ensure they are fit for purpose. Investors can then use these to inform their risk assessments. (IGCC's participating members are currently piloting a set of physical risk expectations, due for wider release in 2025.)

Support and require the inclusion of physical risk and resilience in valuation standards

- work with valuers and rating agencies to develop and promote standardised methodologies that allow for the integration of physical risk and resilience factors into asset and company valuations.

71 IVSC IVSC Perspectives Paper – ESG and Real Asset Valuation, 2024.

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Recommendation Group 2 - Ensure Regulation And Planning Support Private Investment in Adaptation

Regulation and planning must consider resilience to avoid creating future risks and support private investment in adaptation. This is already starting to occur, for example, with the inclusion of climate change in the National Building Code. In addition, consideration of flooding has led to stricter planning controls in NSW.[72] These controls have already been tested in the Georges and Hawkesbury-Nepean floodplains, where planned rezoning has been denied due to the potential risk to life.[73]

However, in other instances, while regulations include resilience to natural hazards, climate change is not considered. For example, although the Security of Critical Infrastructure Act 2018 commits to protect essential services by uplifting the resilience of infrastructure to threats, including natural hazards, currently, no material obligations directly address the implications of the changing intensity and frequency of natural hazards due to climate change. There are likely to be many other examples where regulation does not consider climate change,[74] which may either disincentivise or slow down investment in adaptation.

For government:

Ensure regulators include clear expectations for resilience in making pricing determinations and designing markets

- determine whether current market regulations for infrastructure services adequately recognise the value of investments in improving the resilience of these services, and if not, update regulatory frameworks to incentivise resilience investments appropriately.
  - DCCEEW's paper on the role of regulation in facilitating or constraining adaptation to climate change for Australian infrastructure will be informative. Still, it may need updating since its 2012 release.[75]
- explore the role of regulation in facilitating investment in adaptation for other asset types and markets
- identify and adjust regulations that may unnecessarily slow or disincentivise investment in adaptation
- communicate early with companies likely to be affected by regulation changes, with a clear roadmap for when changes will occur
- instruct the ACCC to provide clear guidance on private-sector collaboration for resilience
  - The ACCC should clarify its stance on collaborative investment in resilience efforts between businesses (similar to the recent guidance note on joint sustainability initiatives) to provide a clear framework for joint climate initiatives that would avoid legal risks.

Ensure resilience is considered in planning to avoid creating future risks

- ensure planning guidance considers the physical impacts of climate change
  - the Insurance Council of Australia has done considerable work and advocacy on this topic[76]
  - alongside insurable impacts, non-insurable (e.g., heat and sea level rise) must also be considered
- include resilience as a key criterion when setting development targets (e.g., housing targets)
  - all new developments should meet a standard level of resilience for the lifetime of the asset, including the likely impacts of climate change.

For investors:

Engage with government and companies on regulatory and planning changes for resilience

- engage with government on regulation and planning changes, where appropriate, including through submissions and roundtables
- engage with companies on proposed regulation and planning changes, particularly where companies lobby against regulation changes that will increase the whole-of-system resilience.

72 NSW Government, *Update on Addressing Flood Risk in Planning Decisions*, 2024.
73 The Sydney Morning Herald, *Strict New Rules Threaten Construction Of Thousands Of Homes In South-West Sydney*, 2023.
74 ABC Online, *Backlash after Queensland Government Approves New Homes on Gold Coast Flood Plain*, 2024.
75 Australian Government, *The Role of Regulation In Facilitating or Constraining Adaptation to Climate Change for Australian Infrastructure*, 2012.
76 Insurance Council of Australia, *No Time to Slow Down Land Use Planning Reforms for Extreme Weather*, 2024.

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Recommendation Group 3 - Facilitate Resilience Innovation

The scale of adaptation required to ensure a prosperous Australia cannot be funded by government alone, and new or changed risks (due to climate change) will necessitate new types of adaptation. Therefore, these challenges need innovation for the adaptation itself and funding mechanisms to allow private investment.

For government:

Ensure the mandates of all specialist investment vehicles (SIVs) expressly include adaptation and resilience

- Australian SIVs currently comprise:
  - National Reconstruction Fund Corporation
  - Northern Australia Infrastructure Facility
  - Regional Investment Corporation
  - Housing Australia
  - Clean Energy Finance Corporation
  - Australian Renewable Energy Agency
  - Australian Infrastructure Financing Facility for the Pacific[77]
- Require (and fund) appropriate resilience measures in all funded projects,
- Allow for funding of new assets and activities where the primary goal is resilience. Across the vehicles, this should cover projects and financial structures with the widest possible range of technology maturities, risk/return profiles, and other characteristics reflecting the diversity of need and opportunity for resilience and adaptation.
- Mandated targets should reflect both financial performance and social benefit.
- If gaps remain, or efficiency demands, an additional SIV could be established, however it would be preferable to ensure the existing vehicles meet the NAP goals.

Allocate long-term adaptation and resilience funding to provide certainty of cashflows for resilience PPPs or bonds

- Establish a 10-year rolling funding mechanism dedicated to sustained investments in building systemic resilience
  - funding should be flexible, allowing for adjustments based on new climate data and emerging risks
  - it should ensure resources are available for long-term planning and to support public–private investments.

Co-fund and support adaptation case studies and pilots with private investors

- Establish a suite of case studies that facilitate private investment in adaptation
  - these should explore a range of asset types (e.g., infrastructure and bonds) and address challenging adaptation cases (e.g., where benefits of adaptation are spread across a range of stakeholders)
  - case studies learnings should be made publicly available where possible.
- Case studies should:
  - demonstrate the financial and social benefits of resilience investments, modelling best practice
  - include projects selected for potential to scale or demonstrate what is necessary to scale
  - include projects that build best practice for cooperation and collaboration between multiple, diverse stakeholders.

For investors:

Launch adaptation case studies and pilots

- Develop and co-fund case studies and pilot projects that showcase best practices in private and public–private financing of adaptation and resilience
  - these case studies may be co-funded (by government) where necessary, but privately funded case studies should also be considered where the investment case is already financially viable
  - where possible, share projects learnings to facilitate further investment opportunities
  - existing initiatives producing case studies include PCRAM and the UNDRR Disaster Resilience Scorecard.

77 Australian Government, Specialist Funding Vehicles, 2024.

06: Conclusion

As this paper shows, there is a clear reward for accelerating investment in adaptation and resilience. The country's leading investors have already set targets to deploy tens of billions of dollars into resilience assets and upgrades. They see the opportunity for significant financial returns to their beneficiaries.

Australia's policymakers have likewise put physical risk assessment and climate adaptation onto the already full public agenda. They understand that their ability to protect the country's communities and productive capacity is also highly reliant on public and private investment in resilience and adaptation.

However, considerable valuable action still needs to be taken. This paper steps into that gap, connecting the economic need with government goals and with investors' considerable capabilities. It clarified the barriers and identified how to overcome them.

This is complex work, and there's a lot of it. It will take time, but the first steps are clear. The faster we plan and move, the more benefits we will see.

07: Appendix: Proposed Government Actions By Timeframe

	Within the next 12-18 mo	Within the next three years	Through the next six years and beyond
Group 1 Shared Understanding			
Government			
NCRA & NAP	• Set & highlight an adaptation objective • Legislate the NCRA and NAP		
	Start developing sector plans	Release first sector plans	Updates to sector plans
	Identify priority resilience projects		
Information	Allocate additional funding for relevant science & training	• Release first five year science plans • Release physical risk database	Update science plans & database
Standards	Add resilience to the sustainable finance taxonomy		
	Support including resilience in valuation standards	Support including resilience in valuation standards	
Investors			
NCRA & NAP	Engage with government on NCRA, NAP, sector plans, and priority projects		
		Align portfolio resilience targets with NAP	Make progress on portfolio resilience targets
Information	Build internal capacity in physical risk, resilience and adaptation	Maintain and update internal skills and knowledge on adaptation.	Maintain and update internal skills and knowledge on adaptation.
	Build relationships with other stakeholders to support collaboration on adaptation business cases	Continue to commission research, information tools, necessary for adaptation business cases	Continue to commission research, information tools, necessary for adaptation business cases
Standards	Start to develop standardised approaches to climate risk assessment	Refine, broaden and update standards for climate risk assessment.	Refine and update standards for climate risk assessment.
	Engage valuers and ratings agencies on resilience in valuation standards	Require resilience in valuation standards.	Require resilience in valuation standards.

	Within the next 12-18 mo	Within the next three years	Through the next six years and beyond
Group 2 Regulation and Planning to Support Private Investment			
Government			
Regulation	Update the 2012 DCCEEW 'Role of Regulation in Adaptation' paper		
	• Engage regulators on resilience's relevance for pricing and market design. • Engage with potentiallyimpacted companies	Update regulations that are headwinds to investment in adaptation	
	Instruct the ACCC to provide clear guidance on private sector collaboration on resilience		
Town and Land Use Planning	Delivery of a national standard including adaptation in decision making.		
		Include resilience as a criterion when setting development targets.	
Investors			
	Engage with relevant levels of government on regulation, town planning and land use.		
Group 3 Facilitate Innovation in Resilience			
Government			
	• Engage with all SIVs • All mandates for new deployments to include adaptation and resilience.	All funded projects to meet minimum resilience standards	All funded projects to meet minimum resilience standards
	Establish 10 year rolling funding mechanism for systemic resilience	Deploy Funds	Deploy Funds
	Co-fund pilots & case studies		
Investors			
	Develop case studies of resilience projects currently in-flight		
	Start additional pilot projects showcasing best practice	Deliver case studies of pilot projects. Incorporate lessons from case studies into ongoing portfolio management.	Incorporate lessons from case studies into ongoing portfolio management.

Investor Group on Climate Change

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