Reframing Net Zero: Investing in a >2°C World

MAY 2025

The global climate trajectory has fundamentally shifted. With warming very likely to exceed 2°C, investors face a radically altered investment landscape marked by intensifying physical risks, rising litigation and liability, evolving regulation and uneven progress in transition readiness. This paper outlines how we are recalibrating our research agenda and investment process in response to these profound structural changes.

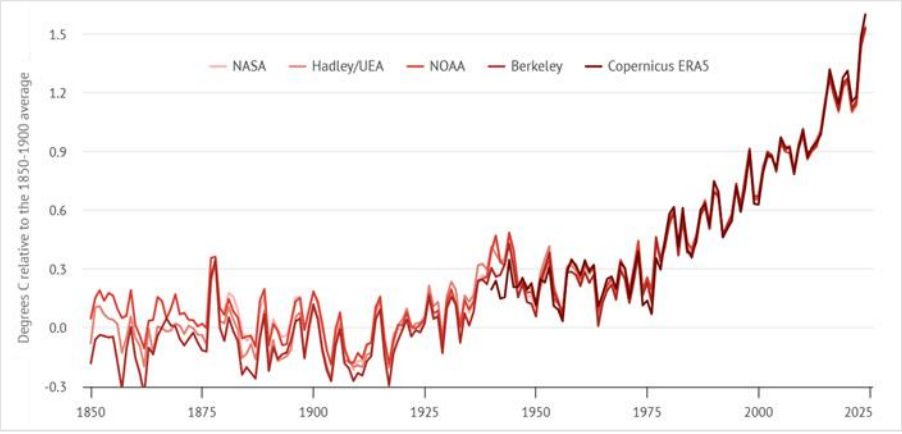
Our base case outcome driving our research approach now focuses on an adaptation and mitigation response rather than achieving a net zero outcome. To be clear, we believe we must continue to pursue net zero objectives. However, as fiduciaries, we must take a pragmatic approach to managing climate risks and opportunities.

Dr Erin Kuo-Sutherland
Chief Sustainability Officer

The New Climate Reality

The world has already surpassed 1.5°C of warming[1] (refer Figure 1), and current policy pathways suggest temperatures will surpass 2.4°C this century. Many physical climate events—heatwaves, wildfires, droughts and floods—are accelerating in frequency and severity[2]. The investible universe in Australia and globally is materially exposed to both direct and indirect consequences of this warming trajectory.

Figure 1. Global surface temperatures over time relative to pre-industrial baseline



Source: Carbon Brief, Jan 2025.

[1] Source: https://wmo.int/news/media-centre/wmo-confirms-2024-warmest-year-record-about-155degc-above-pre-industrial-level.

[2] Source: https://soe.dcceew.gov.au/overview/pressures/climate-change-and-extreme-events; We note that some physical events may have uneven impacts across regions, including some regions, such as Queensland, projected to experience potentially decreasing frequency and increasing severity of cyclones; whereas other risks, in particular, chronic risks are projected to increase in both frequency and severity.

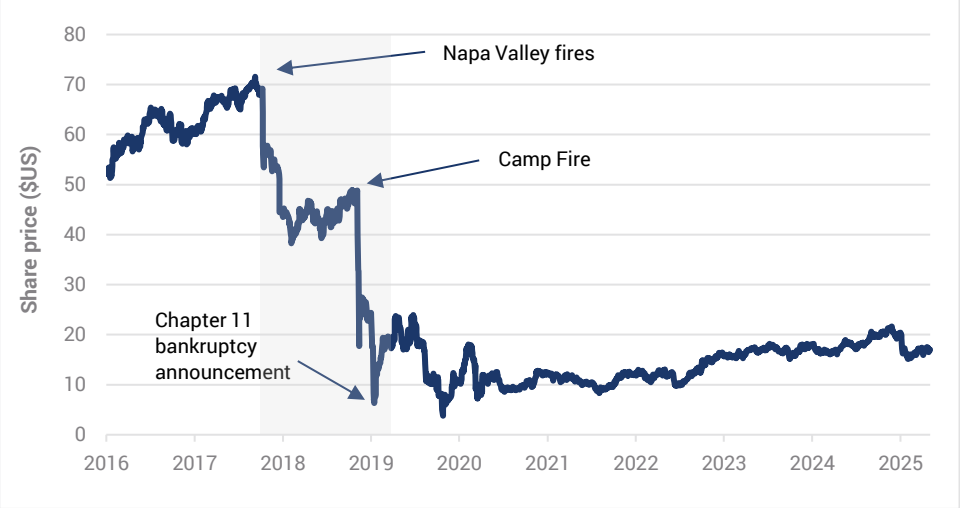
YARRA CAPITAL MANAGEMENT

The Intergovernmental Panel on Climate Change (IPCC) 2023 AR6[3] report projects that our current policies and technological trend is pointing to well over 3°C warming by the end of the century, noting that we have already exceeded two-thirds of the global carbon budget to stay below 2°C. Indeed, the current Nationally Determined Contributions (NDCs) under the Paris Agreement[4] are insufficient to limit the world's warming to below 2°C and are now projected to lead to warming above 2.4°C. And in Australia, the growing recognition of this climate reality has led to the appointment of a new position, Special Envoy for Climate Change Adaption and Resilience following the May 2025 federal election,[5] and the recent release of the Australian Adaptation Database[6].

Investment Risks are on the Rise

Physical risks are already driving financial losses. For example, Californian utility company Pacific Gas and Electric (PG&E) was forced to file for Chapter 11 bankruptcy in 2019, flagging over US$30 billion in liabilities after being held responsible for equipment failures and downed power lines that started the 2017/18 Californian wildfires, including one blaze which caused 84 fatalities. PG&E's share price is yet to recover and trades today some 3-4 times below its pre-wildfire levels (refer Figure 2).

Figure 2. PG&E's share price fell 91% between Sept 2017 and Jan 2019



Source: YCM, Bloomberg, May 2025.

Beyond being impacted by physical events, companies are also increasingly likely to be held liable for their contributions to physical events. Climate litigation is expanding. A recent model[7] attributes over **US$8.5 trillion in damages globally to top fossil fuel producers**. This research extended to Australia's five largest fossil fuel producers over this same period, with an estimated **US$682 billion in economic damages** directly attributable to these companies.

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[3] Source: https://www.ipcc.ch/assessment-report/ar6/.

[4] Source: https://unfccc.int/. The Paris Agreement is a legally binding international treaty that aims to limit global warming to well below 2°C with efforts to limit it to 1.5°C through national commitments to reduce greenhouse gas emissions, enhance climate resilience and provide support for developing countries. In 2015, 195 countries signed this agreement; and as of March 2025, there are currently 196 countries and the European Union who are signatories, representing an estimated 85-90% of global greenhouse gas emissions (following the withdrawal of the United States – which accounts for an estimated 15% of global emissions – by executive order in January 2025). In 2018, the Intergovernmental Panel on Climate Change (IPCC) published a special report noting that limiting the global temperature increase to 1.5°C above pre-industrial levels would significantly reduce the risks and impacts associated with climate change compared to an average increase of 2°C. This included lower levels of biodiversity loss, sea-level rise and extreme weather events such as heatwaves and more frequent and severe storms.

[5] Source: https://www.pm.gov.au/media/press-conference-canberra-12may25.

[6] Source: https://australianadaptationdatabase.unimelb.edu.au/.

[7] Source: https://www.nature.com/articles/s41586-025-08751-3.

Shareholders, clearly, will be impacted by rising corporate accountability for climate change. Attribution of cost implications of physical events to specific companies will be important to watch. In Table 1 (refer Appendix), we summarise the impacts on companies from physical disruptions as well as the potential liabilities associated with causing physical events. A detailed list of sector-specific considerations is also included in Table 2 (refer Appendix). We are actively analysing these risks to every company that we research, and it now forms a key pillar in our engagement agenda.

Portfolio Implications for a Warming World

As investors, understanding (i) the portfolio implications of a likely delayed transition; and (ii) the higher physical impacts resulting from climate change are critical.

Our process is also evolving. Whereas like many investors we have historically worked to understand the path to targets and the associated risks, our focus has shifted to focus acutely on mitigation and adaptation.

We are moving beyond 'net zero pathways' to model how climate outcomes – not just targets – affect value and risk. Our analysis now focuses on physical exposure mapping, litigation trends and adaptive capacity across sectors.

Key opportunities include companies enabling **climate adaptation, resilient infrastructure, diversified and adaptive supply chains, and carbon removal technologies**. We expect to observe:

1. **Climate Adaptation**
    - **Higher end market pricing:** companies will adapt and manage input cost pressures and use pricing power in response to climate disruptions.
    - **Rising building, construction and consumer staples demand:** some companies will benefit from a world where increased property damage and emergency stockpiling is more common.
    - **More product diversification:** there is ample evidence globally of investment in product diversification as a climate-risk management strategy. one of the world's largest meat producers – the US-based Tyson Foods – is investing in insect and plant-based protein production, in part driven by their identification of climate-related risks. Australian companies can be expected to adopt similar strategies.

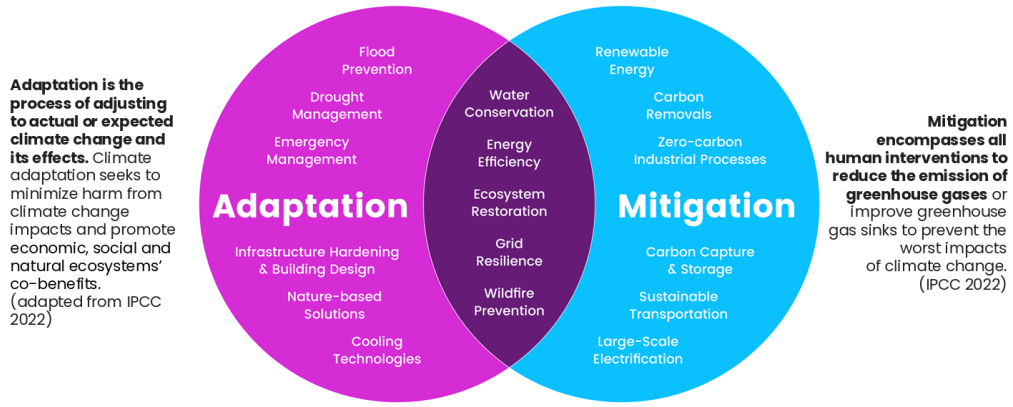
2. **More Resilient Infrastructure**
    - **Increased infrastructure investment:** we expect an increase in companies investing in resilient infrastructure, benefitting suppliers of these materials. We expect tailwinds for engineering firms and REITs and suppliers focused on flood prevention, drainage, water efficiency, infrastructure hardening and wildfire prevention.

3. **Increasingly Diversified and Adaptive Supply Chains**
    - **Greater supply chain investment:** understanding critical materials supply chain bottlenecks and contingencies for supply chain disruptions will present opportunities for diversification and innovation, notably in logistics as well as product innovation.

4. **Greater Investment in Carbon Removal Technologies**
    - **Heightened investment in carbon sinks:** we expect rising land use approaches as well as greater investment in carbon technology, capture and storage.

Mitigation and adaptation strategies also include specific initiatives to slow down or reverse the effects of global warming (refer Figure 3).

Figure 3. Adaptation and mitigation opportunities



Source: Tailwind Climate Adaptation Finance Primer.

What We're Doing Differently

With the world on a trajectory beyond 2°C, understanding and navigating the risks associated with this emerging reality is crucial. In particular, we are:

1. **Reassessing Portfolio Risks and Implications:** Our mapping of adaptation and mitigation risks and opportunities and understanding of preliminary implications has informed our stewardship agenda for the period ahead. In some cases we are seeking clarification of specific risks. e.g. safeguarding or insuring assets in locations with higher risk of damage or disruption.
2. **Refining our Stewardship and Engagement Priorities:** We are constructively engaging with companies around opportunities to improve their adaptation and mitigation strategy, including managing climate-related impacts.
3. **Positioning for Opportunities:** We are integrating these insights to position our portfolios in response to these material risks and opportunities. This includes assessment of both headwinds (e.g. rising cost inflation) and tailwinds (e.g. rising demand for niche products or services).

The climate investment narrative has shifted from 'if' to 'how much' and 'how fast'. Portfolio resilience now requires a forward-looking understanding of both climate impacts and adaptation dynamics. We are sharpening our research to reflect this new reality and to ensure we continue to deliver value in an era of accelerating environmental change.

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Appendix 1

Table 1. Short and long-term summary implications from physical events

Sector	Short-term impact	Longer-term impact	Case study examples	Summary
Insurance	Immediate losses due to surging claim liabilities.	Varied depending on the severity or degree of catastrophe and the ability of insurers to recover higher losses through increased premiums.	Allstate Corp: Hurricane Ian (2022) led to over US$700m in net losses but share price rebounded shortly after. Suncorp: Suncorp exceeded its catastrophe expense allowance in 7 of the 9 financial years ending FY23.	Research of insurance companies vs the broader market shows only slight underperformance in the 30-day period following a severe storm suggesting more short term than long term impacts. In general, insurers have been able to pass through the cost of higher losses over time to the buyers of insurance policies. This has preserved industry profitability but raises long term affordability issues.
Utilities	Losses from infrastructure damage and regulatory backlash.	Outcomes dependent on the degree of damage and quantum of regulatory/legal liabilities.	Hawaiian Electric: Maui wildfires (2023) saw share price fall over 70% and remain low since.	Liabilities associated with causing physical events can have significant long-term impacts.
Food and Agribusiness	Crop and livestock losses, price spikes creating winners and losers, and infrastructure and supply chain damage.	Higher risk exposure including to drought, floods and heatwaves leading to long-term risks such as pollinator-bloom mismatch, crop losses and supply chain disruptions.	Kangaroo Island Plantation Timbers (KPT): following the 'Black Summer' 2019-20 bushfires, KPT lost 90-95% of its standing timber. This led to an overnight share price drop from $1.15 to $0.15 and an eventual takeover by an SPV to distribute insurance proceeds and remaining assets.	Higher risks associated with physical events need to be thoughtfully mitigated with adaptive farming, product innovation, supply chain management and insurance.
Energy	Increased facility and refinery interruptions or shutdowns, spills and pollution-related events, higher volatility in commodity (oil) pricing.	Outcomes are varied and are largely dependent upon the impact to commodity prices.	Exxon Mobil: Hurricane Harvey (2017) saw short-term operational impacts due to damaged infrastructure reducing refining capacity as well as cleanup costs, though financial impacts were short-lived.	Energy markets have historically suffered shorter-term impacts and are relatively responsive to disasters. However, assessing and understanding direct liabilities resulting from physical events is paramount.
Retail and Consumer	Store interruptions, including facility damage and closures, supply chain and customer interruptions. Home repairs and consumer staples experience short-term sales spikes following storms, but these are typically temporary.	The largest impacts likely to be on supply chain disruptions over the long-term.	Nvidia: Hurricane Helene (2024) impacted a region responsible for producing 70% of the world's High Purity Quartz, creating short term share price volatility, though partly mitigated by existing inventories and supply chain diversification.	For many retail and consumer products it is essential to understand critical materials, their supply chains / supply chain resilience and available mitigation strategies.
Property	Damage resulting from extreme weather event can render properties unoccupiable.	Requirement to retrofit or demolish and rebuild.	Mirvac: The Toombul shopping mall in Brisbane – a key decades-long retail hub – suffered catastrophic damage in the 2022 Eastern Australia floods which remains one of Australia's worst recorded flood disasters. The mall was written off ($216m impact) and demolished in 2023.	Property location (more/less vulnerable to extreme weather), level of building flood-resiliency and insurance protections are important long-term risk considerations for property investors.

Table 2. Examples: exposure to physical risk and opportunities

Sector	Sub-sector	Direct and Indirect implications: physical effects of climate change	Summary View	Mitigants and Adaptation Opportunities
Food and Agribusiness	**Quick service restaurants**	• Reduced revenues: power outages or storm damage; impact on deliveries due to conditions; staff availability. • Increased capex: damaged stores, equipment, vehicles. • Increased opex: increased energy costs due to heat, increased fuel costs, increased cost of supplies, increased insurance premiums. • Increased liabilities: staff injuries or accidents occurring during extreme weather events. • Supply chain disruptions: shortages, delays, reduced quality, requirement to diversify or shift supply chains. • Customer preference shifts: changes resulting from increased pricing, reduced convenience or variable quality.	Low near-term risk. Medium risk over medium-long term due to price sensitive product offerings and potential impacts in operating costs, supply chain disruptions and customer preferences.	**For companies:** • Explore critical suppliers and supply chain agility and resilience, including innovative farming practices. • Adequate insurance coverage. **For investors:** • Engagement to better understand materiality of risks, customer price sensitivities, supply chain strategies, and advocating for adaptation.
	Dairy production	• Reduced revenues: driven by events that disrupt product production or quality. • Supply chain disruptions: reduced milk supply & quality due to heat stress on cows, poor pasture/feed availability, drought/flood, water scarcity. • Increased capex: damage to farms, processing plants, transport infrastructure. • Increased opex: increased costs for water, energy, feed, cooling for animals.	Low-medium near-term risk characterised by acute events that may impact key production sites. Medium-high longer-term risk that can be partially mitigated through adaptative practices.	**For companies and suppliers:** • Improved supply chain diversification. • Adaptive practices: heat stress mitigation (shade, cooling), drought/heat tolerant fodder, regenerative agriculture, fire/flood preparedness, site hardening including for soil health, water efficiency, crop management, improvements to infrastructure resilience. • Adequate insurance and embedding security clauses through procurement contracts. **For investors** • Engagement to better understand supply chain strategies and advocating for adaptation.

Sector	Sub-sector	Direct and Indirect implications: physical effects of climate change	Summary View	Mitigants and Adaptation Opportunities
Insurance	**General Insurers**	• Premium mismatch: combined ratios >100%, meaning claims and expenses are exceeding premiums due to severe physical events (e.g. recent California wildfires). • Pricing & underwriting challenge: difficulty pricing risk accurately as historical data becomes less reliable, higher potential for under-reserving. • Reduced insurability: risk of some assets or geographies becoming uninsurable or unaffordable, impacting premium pool and potentially leading to social license issues or regulatory intervention. • Reinsurance issues: higher costs for a company's own insurance protection.	Low to medium near and long term risk. The global insurance industry has been grappling with the financial consequences of climate change for at least two decades, so is well progressed in addressing the issue. Insurance and reinsurance pricing has moved to capture the higher probability of more frequent and severe weather-related events, such as hailstorms and rain events. Buyers of insurance have also become accustomed to premium increases related to weather activity; however affordability constraints suggest under insurance could emerge as an issue. We have also seen primary insurers implement more innovative reinsurance structures to lower earnings volatility.	**For companies:** • New insurance lines for insurance industries. e.g. transition industries. • Product innovation, such as introducing policies to reduce premiums and/or deductibles for policyholders that reduce climate-related risks through specific infrastructure or land management practices. e.g. more resilient infrastructure. • Pricing strategies that factor in climate-related risks. • Investment in efficient and resilient claims handling processes to manage surges after large events. • Use of technology for faster damage assessment. e.g. drones and satellite imagery. • Investment in catastrophe (CAT) modelling, incorporating forward-looking climate change scenarios (i.e. not just historical data) to better predict frequency/severity of events. Refine exposure data granularity. **For investors:** • Monitor claims handling efficiency and customer satisfaction, especially after major events. i.e. since significant delays or disputes can indicate operational strain or impact reputation. • Heightened engagement to understand climate-risk management approaches. • Increased monitoring of social license and regulatory risks.

Sector	Sub-sector	Direct and Indirect implications: physical effects of climate change	Summary View	Mitigants and Adaptation Opportunities
Materials	**Mining**	• Heightened operational disruptions and increased risks to workforce due to physical events such as cyclones, flooding and wildfires. • Greater infrastructure damage to mines, plants, rail lines, ports, tailings facilities. • Constraints on production/expansion due to water scarcity. e.g. in certain countries and parts of Australia. • Supply chain disruptions. • Increased costs due to adaptation measures, repairs, operating expenses. e.g. increased cost of energy, water.	Mining companies are all likely to have medium-levels of risk, concentrated around key assets and linked to disruptions in their value chains. Commodity pricing is likely to have an outsized impact on the relative impact of climate-related events.	**For companies:** • Resilient Infrastructure: engineering design standards to ensure assets can withstand physical events. • Investment in desalination, water efficiency (e.g. recycling, securing diverse/alternative sources, advanced modelling). • Integrating climate modelling into mine planning, supply chain logistics. • Tailings management in response to physical events. • Emergency response plans. • Heat stress protocols for worker safety in extreme heat. • Exploring less water-intensive processing technologies. **For investors:** • Understanding and engagement on key asset risk mitigation strategies and water management.
Materials	**Chemicals**	• Damage/shutdown or production interruptions from physical events. • Increased environmental risk, including via risk of hazardous material release being exacerbated by extreme weather. • Logistics and supply chain disruptions affecting availability and distribution of inputs and finished products. • Production constraints or increased costs due to water scarcity. • Increased worker safety concerns.	Chemicals companies are at higher risk of increasing liabilities around environmental incidents. e.g. contamination, more safety incidents. Higher risks partially mitigated through resilient infrastructure planning.	**For companies:** • Resilient infrastructure. • Water efficiency (e.g. recycling, secure water sources, onsite storage). • Emergency / contingency plans, including containment for potential spills/runoff during floods/storms, logistics planning, mitigating for transport route vulnerabilities. • Consider climate modelling in site planning: vegetation management (fire) and drainage improvements (flood). • Protocols & engineering solutions for worker safety and process cooling. **For investors:** • Greater engagement on safety and environmental risks tied to physical events, water management plans and potential magnitude of key asset disruption.

Sector	Sub-sector	Direct and Indirect implications: physical effects of climate change	Summary View	Mitigants and Adaptation Opportunities
Transport	**Transportation**	• Operational disruptions to due to storms, floods, heat, fires, rough seas; route closures/detours. • Infrastructure damage to ferry terminals, jetties, bus depots, vehicles, vessels. • Increased safety risks to passengers and staff during extreme weather events or heat. • Increased costs to repair or replace of damaged assets, higher insurance premiums, adaptation costs, increased cooling/fuel costs. • Reduced demand for tourism services if natural attractions are degraded or access is disrupted.	Expect medium levels of risk associated with increased frequency and severity of events leading to infrastructure damage and increased safety issues.	**For companies:** • Resilient infrastructure: hardening/designing depots, terminals, jetties for climate impacts (wind, flood, sea level rise); reviewing asset locations; ensuring sufficient cooling/ventilation (AC) for heat; monitoring vessel suitability for changing sea conditions; working with transport/port authorities on resilient infrastructure. • Use of advanced weather forecasting, dynamic scheduling, emergency response plans for extreme events, route diversification/contingencies • Safety protocols: enhanced procedures during extreme heat, storms, floods, fires. • Insurance: adequate asset and business interruption insurance. **For investors:** • Understanding relative impact of risks and mitigation strategies.
	Automotive supply	• Supply chain disruptions. • Operational disruptions – manufacturing, warehousing, and distribution impacted by physical events. • Infrastructure damage to plants, warehouses. • Indirect effects on workers.	Risk driven largely by either geographical exposure of key asset/manufacturing or distribution facility and/or supply chain disruption.	**For companies:** • Supply chain management: geographic diversification of suppliers, dual sourcing, supply chain mapping/risk assessment, potentially increased inventory. • Site-specific risk assessments (flood, fire), potential hardening of facilities, Business Continuity Planning (BCP). • Water efficiency. • Logistics contingency planning for transport disruptions. • Focus on products suited to changing physical conditions. • Appropriate insurance for assets and business interruption. **For investors:** • Understanding approach to risk management.

Sector	Sub-sector	Direct and Indirect implications: physical effects of climate change	Summary View	Mitigants and Adaptation Opportunities
Utilities	**Energy**	• Increasing global temperatures and climate variability will have some impact on physical asset risk across Australia's East coast, particularly in Qld. • Physical damage to operating assets/infrastructure from increased frequency of coastal flooding, heatwaves, and severe storms. • Limited exposure to water stress in hydro and water-cooling assets. Coal Seam Gas requires groundwater extraction which could become subject to more regulatory and stakeholder pressure. • Indirect risks could include general supply chain disruptions and workforce productivity.	Short-term low risk from severe weather impacting operations. Learning from global examples, equipment causing physical events, such as wildfires can lead to devastating long-term impacts. Utilities need to be performing regular maintenance and safety checks of equipment and have good emergency management plans in place. Within the 5-10 year window, it is anticipated that Australia's exit from coal-fired power stations will be complete, which materially reduces any single asset concentration for Australia's major energy companies.	**For companies:** • Ensure operating equipment maintenance to reduce potential for liabilities arising from contributing to physical events (e.g. wildfires). • Engage with communities, regulators, and network operators on grid resilience and regional adaptation needs. Investigate new products/services that help customers manage their own climate-related energy risks (e.g. backup power solutions). **For investors:** • Engage to better understand adaptation plans, including approach to upgrading or safeguarding operating assets, approach to demand-side management, and whether groundwater extraction presents a material risk to LNG business. • Understand stock price implications of equipment-driven fires, engage on risk exposures and mitigation strategy.
Industrials	**Building and Construction**	• Project delays: physical events impacting timelines and budgets. • Asset and infrastructure damage to projects under construction, supply chains and managed assets (e.g. roads, rail, utilities, depots, fleet). • Increased liabilities: risks to health and safety. • Logistics disruptions: staff, materials, equipment.	For some companies, increased insurance claims due to physical events can improve volumes and drive profitability. Surges in demand may strain resources and supply chains, creating reputational risk. For others, the impact on profitability is likely neutral as transition costs offset opportunities in climate-related infrastructure. Overall, there is potential for significant weather events to delay projects, with cost implications.	**For companies:** • Leverage expertise in building and maintaining infrastructure to take leadership in climate-resilient solutions (e.g. upgraded drainage, stabilised slopes, resilient road surfaces, renewable energy infrastructure construction). **For investors:** • Understand company strategy in relation to growth opportunities around climate adaptation and infrastructure resilience. • Monitor and engage on risk mitigation relating to physical events.