

This section describes the main structure of the TCFD, including the purpose and considerations of its four core pillars. It outlines the main climate-related risks and opportunity types, with examples. It ends by exploring how climate-related risks and opportunities can often translate into financial risks or impacts.

Key messages

- There is an urgent and unequivocal need for action on climate change. Limiting the impacts of climate change requires immediate action.
- The TCFD categorises climate-related risks into physical and transition risks, while climate-related opportunities are sub-categorised into five key aspects. One of the main goals of the TCFD is to quantify the financial impacts of climate-related risks and opportunities.
- Climate-related risks and opportunities often translate into financial risk or impacts, both at a macro- and microeconomic level.
- **Physical risks** affect the economy in two ways: Acute impacts from extreme weather events can lead to business disruption and damages to property. These events can increase underwriting risks for insurers, possibly leading to lower insurance coverage in some regions, and impair asset values. Chronic impacts, particularly from increased temperatures, sea levels rise and precipitation, may affect labour, capital, land, and natural capital in specific areas.
- **Transition risks** will affect the profitability of businesses and wealth of households, creating financial risks for lenders and investors. They will also affect the broader economy through investment, productivity and relative price channels, particularly if the transition leads to stranded assets.

1 Structure

The TCFD recommendations have four key themes for how organisations operate: Governance, Strategy, Risk Management, and Metrics and Targets (Figure 2).

Figure 2: Core elements of the TCFD recommendations

[View Figure 2](#)

These four pillars are inherently interconnected and work with one another to ensure oversight and consideration of climate change within business decision-making and disclosures. These pillars are enhanced by 11 recommended disclosures to assist financial and non-financial companies in managing climate change and pursuing the related opportunities, as outlined in Table 3. The purpose of these climate disclosures is for organisations to inform investors and other external stakeholders about how climate change has been addressed in the organisation.

Table 3: TCFD recommendations and associated recommended disclosures [16]

[Table 3](#)

2 Climate change context

Box 1: The science

The global atmospheric carbon dioxide (CO₂) concentration has increased from approximately 270 parts per million (ppm) to over 400ppm since the start of the industrial revolution, as shown in Figure 3. According to the IPCC's Assessment Report of 2021/22, human activities are established as the primary cause of climate change.

Figure 3: Global atmospheric CO₂ concentration over time [17]

[View figure 3](#)

The present state is one unprecedented for thousands of years, with 2015 to 2021 known to be the seven warmest years on record, and 2022 ranked as Earth's sixth-warmest year on record. Global temperatures are already 1.2°C above pre-industrial levels. Many of the changes which have already manifested are irreversible and, in almost all emissions scenarios, global warming is expected to hit 1.5°C in the early 2030s, exceeding the expectations set by the Paris Agreement. Even with significant climate mitigation action in the near future, the Earth is locked-in to a certain amount of further changes in climate over the medium (2050) to long term (2100) (see Figure 4). This will mean unavoidable far-

reaching consequences on social, human and natural systems.

Figure 4: Forecast of global warming to 2100 [18]

[View Figure 4](#)

3 Climate risks and opportunities

One of the main goals of the TCFD is to quantify the financial impacts of climate-related risks and opportunities. To make more informed financial decisions, investors, lenders and insurance underwriters need to understand how climate-related risks and opportunities are likely to impact an organisation's future financial position – as reflected in its income statement, cash flow statement, and balance sheet (outlined in Figure 5).

Figure 5: Climate-related impacts on business financial performance [19]

[View Figure 5](#)

The TCFD categorises climate-related risks into physical and transition risks, while climate-related opportunities are sub-categorised into five key aspects.

Physical risks

Physical climate risks arise from the physical effects of increasing atmospheric levels of GHGs and are typically distinguished into two categories, namely acute and chronic.

- [Risk categories](#)
 - An **acute physical risk** is driven by a specific weather event or hazard (for example, floods, heatwaves, wildfires, and storm events). They can materialise as a shift in the frequency and magnitude of extreme events. These impacts are typically immediate or abrupt in nature.
 - A **chronic physical risk** is driven by longer-term shifts in the mean and variability of climatic patterns (such as sea level rise and mean temperature rise). Consequently, these impacts are typically more incremental and pervasive.

Climate change has already caused widespread and rapid changes to the Earth's oceans, ice and land surface, and consequential impacts on global weather systems. To illustrate this, the National Oceanic and Atmospheric Information (NOAA) National Centers for Environmental Information highlighted significant climate anomalies and events in 2022, shown in Figure 6 [20].

Figure 6: Significant climate anomalies in 2022 [20]

[View Figure 6](#)

The physical impacts of climate change at different temperature scenarios are outlined in Table 4.

Table 4: Possible implications of different temperature increases [21]

[Table 4](#)

Transition risks

Transitioning to a lower-carbon economy may entail extensive policy, legal, technology, and market changes to address mitigation and adaptation requirements related to climate change. Depending on the nature, speed, and focus of these changes, transition risks may pose varying levels of financial and reputational risk to organisations.

- [Transition risks sub-categories](#)
 - **Policy and legal risks** driven by the evolving landscape of policy, litigation, and legal frameworks within an organisation's region of operation. Examples of policy risks include the implementation of carbon pricing mechanisms (such as carbon tax) and the setting of national/regional objectives to decarbonise energy sources, including net-zero targets (see Box 2). Litigation and legal risks are associated with the failure of organisations to adequately comply or mitigate their climate risks in line with upcoming legislation. Other legal risks can include insufficient mitigation action, as well as 'greenwashing'.
 - **Technology risks** driven by improvements and continuous innovation in available and upcoming technologies which assist the transition to a lower carbon economy. The increasing feasibility of solar power – and emergence of battery storage and carbon capture – are examples of technologies that could

result in transition risks for selected organisations globally.

- **Market risks** driven by shifting markets for various products and services driven by climate change impacts and transition impacts. For example, changing supply and demand for coal is anticipated to reduce significantly with the global transition to a lower-carbon economy.
- **Reputation risks** driven by changing customer and/or community perceptions about climate-related trends and impacts. An example of a reputation risk is the disruption of business operations from community unrest over conflict over water resources in areas where water scarcity is increasing as a result of climate change. This is becoming a significant risk for sectors and businesses with high water consumption, such as agriculture. There are also reputational risks associated with inaction and/or greenwashing.

Opportunities

Climate-related opportunities provide financial incentives for an organisation through climate-related mitigation and adaptation efforts, such as improvements in operational efficiency and other cost savings.

- Key areas of climate-related opportunity realisation
 - **Resource efficiency opportunities** resulting in direct cost savings through various optimisation techniques resulting in reduced input requirements (including water, energy and feedstock), and increased product output. Common technologies include LED lighting, electric vehicles, and battery storage.
 - **Energy source opportunities** are based on the energy sector trend of decentralised clean energy sources as the key energy investment. Organisations will find opportunities by investing in renewable and low-carbon energy sources.
 - **Product and services opportunities** can benefit organisations that innovate and develop new low-emission products and services. Examples include consumer goods and services that place greater emphasis on a product's carbon footprint in its marketing and labelling.

- **Market opportunities** are harnessed by organisations leveraging market trends and adapting their business strategy to position themselves in a lower-carbon economy. Market opportunities in the finance sector include underwriting or financing green bonds and infrastructure.
- **Resilience opportunities** can present themselves where organisations optimise their adaptive capacity in light of climate change, to ensure their business strategy can withstand anticipated physical and transition climate risks. Opportunities related to resilience may be relevant for organisations with long-lived fixed assets or extensive supply or distribution networks.

Box 2: Net zero

The drive to net zero is seen as an important transition risk and opportunity for many organisations. GHG emissions need to halve by 2030, then reach net zero around 2050, which entails significant transformation of all economic sectors (Figure 7). Not all sectors may be able to reduce emissions to zero by 2050. For example, energy, industry, and transport can likely reduce their GHG emissions to zero by 2050, whereas aviation, agriculture and certain heavy industry, such as cement, may find this target out of reach. As some emissions will likely continue, requiring carbon removal technologies and innovation, the target therefore becomes ‘net zero’ for the economy as a whole.

The [Net Zero Tracker](#) assesses the status and trends of net zero target setting across countries, sub-national governments and companies. Information from the Net Zero Tracker shows that 128 countries have now set a target of reducing emissions to net zero by 2050 [22]. An increasing number of companies have set net-zero emissions targets. Towards the end of 2021, the United Nations Principles for Responsible Investment (PRI) said setting net zero by 2050 commitments (or sooner) had become the norm [21]. According to the Net Zero Tracker, 868 companies out of 2,000 of the largest publicly-traded companies by revenue have net zero targets in place [22].

There are also several net zero coalitions and alliances within industries. For example, the Glasgow Financial Alliance for Net Zero (GFANZ) is a coalition of financial institutions committed to transitioning the global economy to net-zero GHG emissions. The Net-Zero Banking Alliance (NZBA) is committed to aligning its lending and investment portfolios with net zero emissions by 2050. A total of

125 banks are members of the NZBA, including Investec Group, Commercial International Bank, First Abu Dhabi Bank, and KCB Bank Kenya, among others [23] [24].

Figure 7: 1.5°C compliant GHG emissions pathway compared to BAU [25, 26]

[View Figure 7](#)

4 Financial implications of climate change risks and opportunities

Climate-related risks and opportunities often translate into financial risk or impacts, both at a macro- and microeconomic level or channel. Transmission channels are the causal chains that explain how climate risk drivers give rise to financial risks impacting financial institutions directly or indirectly.

Transition risks will affect the profitability of businesses and wealth of households, creating financial risks for lenders and investors. They will also impact the broader economy by affecting investment, productivity, and relative price channels, particularly if the transition leads to stranded assets.

Physical risks affect the economy in two ways:

- Acute impacts from extreme weather events can lead to business disruption and damages to property. There is some evidence that increased warming could also lead to persistent longer-term economic impacts. These events can increase underwriting risks for insurers, possibly leading to lower insurance coverage in some regions, as well as impairing asset values.
- Chronic impacts, particularly from increased temperatures, rising sea levels and precipitation, may affect labour, capital, land and natural capital in specific areas. These changes will require a significant level of investment and adaptation from companies, households and governments.

This is shown in Figure 8.

Figure 8: Transmission channels of climate drivers to financial risks [27]

[View Figure 8](#)