This section provides background to the risk management pillar and outlines the disclosure requirements of TCFD. Guidance on the implementation of the risk management pillar is included, focused on how fund managers can integrate climate risk management into investment and other risk management processes. A description of materiality is provided. Step-by-step guidance on performing physical and transition risk assessments as part of screening and due diligence is included.

The guidance notes, tools and templates relevant to this section include:

- **Physical risk assessment guide**
- **ToR for climate change risk assessment**
- **Climate change risk template**
- **Transition risk assessment tool**
- **Physical risk due diligence questions**
- **List of physical and transition risk assessment tools**

Key Messages

- The risk management pillar of TCFD addresses how an organisation identifies, measures, monitors, manages, and reports climate-related risks.
- Climate risks should be the same as other risks considered by a fund manager and existing structures and processes should be applied to managing climate risks.
- The integration of climate risk for fund managers is primarily through the investment process, and actions to address climate risk management should focus on: pre-acquisition due diligence, portfolio management during the hold period, and alignment with long-term climate goals.
- The risk function of fund managers must establish a materiality threshold of climate-related risks. This is likely to be driven by several factors, such as the degree to which a portfolio/fund or portfolio company is exposed to climate risks, the timeframe of risk

crystallisation, and the magnitude of the financial impact that could result.

1 Background and TCFD requirements

Risk management is an integral component of any organisation, and this is no different for fund managers. Effective processes support fund managers to identify, assess, and appropriately manage risks. Climate risks should be approached in the same way as other risks considered by a fund manager. The existing structures and processes to manage business risks should therefore be applied to managing climate risks.

The risk management pillar of TCFD addresses how an organisation: identifies, measures, monitors, manages, and reports climate-related risks. This provides important insight into addressing climate-related risks, and should cover:

- The process for identifying and assessing climate-related risks (referencing scenario analysis when applicable)
- Current risk assessment frameworks and assessment criteria, with risk terminology defined
- The process for managing risks, including how the organisation mitigates, transfers, accepts or controls these risks
- How climate-related risks are integrated into the organisation's risk management framework

The TCFD guidance on disclosures relating to the risk management pillar is as follows [19]:

View table

2 Integrating climate change risk

2.1 Introduction and key steps

TCFD recognises that organisations implementing its recommendations come from various

industries and use a wide range of practices and techniques to manage their risks. TCFD recommends integrating climate-related risks into the existing risk management framework and provides guidance on how to do so.

TCFD guidance on integrating climate-related risks into existing processes is organised as a set of high-level, initial steps and is intended to support fund managers in identifying important considerations for integration. TCFD views these initial steps — summarised below — as iterative rather than strictly sequential.

Figure 18: TCFD guidance on integrating climate-related risks into existing processes

View Figure 18

- 2.2 Application for fund managers

  Climate risk management for fund managers is to be integrated within the existing risk management framework, including risk taxonomy, risk appetite and throughout the investment process. It can also be a key driver for the development of an investment strategy targeting investments in climate risk management solutions (e.g. mitigation and/or adaptation measures).

  A set of actions for fund managers starting out on the climate journey to integrate climate risk management in the investment process are summarised in Figure 19. Actions are focused on three levels:

  1. **Pre-acquisition/due diligence:** Fund managers must identify and assess how climate risks and opportunities will impact the value of an investment.

  2. **Hold period:** Fund managers must assess and manage the climate risks and opportunities of portfolio companies. This includes regular portfolio company engagement companies and providing necessary technical and financial support.

  3. **Long-term portfolio alignment:** Fund managers must identify, assess and manage climate change risks and opportunities at the fund level to ensure alignment with goals (for example, alignment with a 2030 or 2050 GHG reduction goal).

Figure 19: Key steps for integrating climate risk management for a fund manager

View Figure 19

- 2.3 Materiality of risks

A fund manager's assessment and evaluation of its risks is crucial for risk management and prioritisation. The TCFD notes that organisations should determine materiality for climate-related issues consistently with how they would determine the materiality of other information. However, it also warns organisations against prematurely concluding that climate-related risks and opportunities are not material based on perceptions of their longer-term nature.

In practice, materiality assessment consists of asking whether climate change can reasonably be expected to significantly impact a portfolio company's operations, supply chains, or markets [40]. For example, a natural gas producer will face a more material level of climate risk than an ICT company. The PRI technical guide for private equity suggest that typical factors for analysis include the sector, size, location and regulatory environment [40]. In conducting the materiality exercise, GPs can turn to external consultants to develop a tailor-made materiality matrix that fits with their investment philosophy, or they can use publicly-available sources such as the Sustainability Accounting Standards Board (SASB) Materiality Map [40].

Within traditional risk management, many organisations use a 'likelihood and impact' approach to gauge the severity or materiality of their risks. When prioritising risks by severity, fund managers can determine the intersection of their likelihoods and impacts, and then evaluate the severity of the risks relative to risk appetite [41].

The risk function of fund managers should establish a materiality threshold of climate-related risks. This is likely to be driven by several factors, such as the degree to which a portfolio/fund or portfolio company is exposed to climate risks, the time frame of risk crystallisation, and the magnitude of the financial impact that could result [9]. Risks should therefore be relevant to the level of aggregation being considered, for example, which risks are material to a specific portfolio company, which risks are material to a fund, and which risks could have a significant bearing on a whole portfolio or GP [9]. The determination of what is considered 'material' should be approved at board level [9].

- 2.4 Characteristics of physical and transition climate risks

  Fund managers should consider the following characteristics when identifying and assessing physical and transition climate risks in the investment process:

  Physical risks:

  - **The physical impacts of climate change are usually site-specific:** The effects of extreme weather and changing climate differ across regions and countries due to a multitude of factors including topography, local weather patterns, land cover and proximity to waterways, among others. This means the risk profile of two assets in close proximity to each other may be very different.

  - **The 'indirect impacts'** (such as the effects on customers, suppliers and employees) **can be more significant than the direct impacts:** For example, a specific asset or site may be resilient to the physical impacts of climate change but less resilient to potential disruption to the distribution of key materials onto the site or product off the site.

  - **Climate hazards may occur simultaneously:** (such as heatwaves and drought), resulting in compounding overall risks. These may also be further exacerbated by non-climatic factors (for example, socio-economic issues) interacting with each other. As an example, degraded or failing municipal infrastructure responsible for providing water to an asset will increase the risk profile of a site already experiencing drought.

  - **Timeframes are important:** Climate-related risks may materialise over a time horizon that is usually longer than conventional business planning or investment cycles, which for fund managers may typically be five to 15 years. Fund managers should, however, take a longer-term view when considering physical risks, as these risks may not realise during the holding period, but could impact the valuation of the business at the time of exit.

  Transition risks

  - When assessing climate change transition risks, it is **important to consider the value chain**. Climate change transition risks can impact an organisation's value chain, including inputs such as raw materials and finance, its own operations, as

well as customers and end consumers. Even though an organisation itself may have little or no climate impact or a small carbon footprint, it can still be impacted by value chain components that are highly GHG emission-intensive. For example, a parts supplier for fossil-fuel transport may operate its own facilities very efficiently with renewable energy, but the transition to a low carbon economy may result in losing its entire client base.

- **Timeframes for climate change transition have a high degree of uncertainty**, as they can be impacted by many factors. For example, social and reputational drivers can be impacted by current events, such as natural disasters or global conflicts gaining increased attention. Technology breakthroughs can occur rapidly, and the election of a new government may signal a policy shift. Further, a slow global response to climate change is likely to lead to less severe immediate transition risks but could result in more extreme transition risks crystallising in the medium term, countering the effect of materialising physical risks [9]. Conversely, a faster response may represent higher short-term transition risks, but would likely lead to a smoother transition to a low-carbon economy [9].

3 Physical climate risk assessment process

- 3.1 Context and definitions

A hazard can be simply defined as a physical climate process or event which can harm humans, organisations and the environment. Geography is an important factor of climate hazards, as impacts occur locally and will vary within and across countries.

Table 9: Common physical climate hazards, influenced by typical climate variables

Climate Variable	Example Hazard	Hazard Type: Chronic / Acute
Temperature: heat	Heat stress	Chronic
	Heat wave	Acute
	Wildfire	Acute
Temperature: cold	Cold wave/frost	Acute
Wind	Changing wind patterns	Chronic
	Cyclone, hurricane, typhoon	Acute
	Storms (including blizzards, dust and sandstorms)	Acute
Precipitation	Changing precipitation patterns and types	Chronic
	Heavy precipitation	Acute
	Floods	Acute
	Landslides	Acute
	Storm surge	Acute
	Water stress	Chronic
	Drought	Acute
	Wildfire	Acute
Sea level	Sea level rise	Chronic

- 3.2 Scenarios, projections and tools

Under all climate scenarios (see the Strategy section for an understanding of scenario and climate scenarios), an increase in the magnitude and frequency from climate and weather events due to the historic levels of GHG emissions is expected. This makes it important to not just consider the current hazard levels to the investment, but also how these hazards are expected to change in the future. For example, the combination of rising temperatures and reduced rainfall can lead to drought (a climate hazard). Identifying or modelling projected changes in temperature and rainfall from climate change can help determine the potential future severity of the hazard.

Forward-looking projections, however, carry a degree of uncertainty, due to the complexity and natural variability of the climate system, as well as data availability and quality. There are a range of data sources and tools to consider the future impacts from climate change. These include free, paid-for and internally-developed tools, all with potentially different applications. As a principle, climate data should come from

scientifically-recognised sources, such as academic journals, publicly-available data portals or proprietary data providers. The IPCC, UN Environment Programme (UNEP), the World Bank and the World Resource Institute (WRI) are some of the leading public data sources on physical climate risk. The guidance section **List of physical and transition risk assessment tools** has a summary of publicly-available climate risk tools.

- 3.3 Addressing physical climate risk in the investment process

The factors to consider when conducting a physical climate risk assessment aligned to IPCC recommendations are outlined below [33].

Figure 20: Process for conducting a physical risk assessment [33]

View Figure 20

It is important readers refer to the Glossary for definitions and examples of hazard, exposure and vulnerability.

The steps for conducting a physical climate risk assessment are summarised below. Specific detail on each of these steps is included in the **Physical risk assessment guide** and **Physical risk due diligence questions**.

Figure 21: Steps for conducting a physical climate risk assessment

View Figure 21

The level of detail of the physical risk assessment at screening is dependent on the information available. Determining physical climate risk should ideally be carried out at an individual point location level. However, we recognise that some fund managers may not have the information needed to complete this. As a result, while fund managers may not be able to complete Step 3 with any level of detail, it should be covered during due diligence.

At a minimum, the fund manager will need to know:

  - the broad geographic location of the assets (country, region, area); and

- the industry sector and, where possible, the industry subsector.

The assessment can then be performed at the geographic location level (country, region, area). Regional-level data sources are available, including the web-based tool thinkhazard! that aggregates risks together to give a Low-High rating. Where fund managers have more granular information, for example the specific company and the precise geographic location of operations, the screening assessment can consider this.

At the due diligence level, the fund manager is likely to know the type of business and exact location of the assets targeted. The risk assessment should be conducted at the most granular level based on available information.

The climate change risk assessment process can be conducted internally by the fund manager or outsourced to an external third party with appropriate experience during due diligence. An example ***ToR* for climate change risk assessment** at due diligence is provided along with a **Climate change risk template** to help fund managers capture and rank climate-related risks.

4 Transition climate risk assessment process

- 4.1 Context and definitions

  The transition to a low carbon economy is expected to result in social, technological, economic and policy changes. These changes are difficult to predict, particularly in relation to the timing, impact and magnitude of the risk. The crystallisation of transition risks is one of the most immediate threats in the short term for many jurisdictions as policies (for example, regulatory) are implemented to help the world transition to a low-carbon economy. The TCFD categorises transition risks into: social and reputational, technology, market and economic, and policy and legal risks [19], as described in TCFD Overview Section of the Toolkit.

- 4.2 Scenarios, projections and tools

  Climate change transition risks can be challenging to assess as there are several interdependent variables and a high degree of uncertainty involved. Specific examples

include predicting breakthroughs in low-carbon technology and the actions of future governments and policymakers. While there are few publicly-available tools for the assessment of transition-related risks, the **List of physical and transition risk assessment tools** provides a summary. This includes a description of their general use as well as the specific transition risks to which they apply.

- 4.3 Addressing transition climate risk in the investment process

A climate change transition risk assessment requires a phased and systematic approach due to the significant uncertainties about the transition to a low carbon economy. As with climate change physical risk assessments, the robustness of the assessment will depend on the level of detailed data available on the investee.

A summarised approach to conducting a transition risk assessment at screening and due diligence is outlined below and Figure 22 shows a decision tree process-flow diagram. The **Transition risk assessment tool** can be used to complete these steps.

- **Step 1: Screening risk assessment.** This first step uses sector transition risk heatmaps to determine whether a potential investee is in a low, moderate or high risk sector.
- **Step 2: Due diligence risk assessment.** The second step involves a series of qualitative questions with Yes/No answers to help fund managers consider potential transition risks in the four TCFD categories: social and reputational, technology, market and economic, and policy and legal risks.
- **Step 3: Develop and rank risks.** The third step ranks the transition risks according to significance.
- **Step 4: Investment decision.** The final step involves presenting the most material transition risks to the investment committee.

Figure 22: Flow diagram of transition risk screening and due diligence

View Figure 22