





# **GETTING STARTED ON TCFD**

A practical guide to environmental stewardship



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# **Overview**

The purpose of this report is to guide companies who are getting started with the Task Force on Climate-related Financial Disclosures (TCFD) journey. This report begins with a TCFD roadmap to help companies determine which stage of environmental maturity they are at. Companies can utilize this roadmap to identify the actions required, in relation to the TCFD recommendations, to move up the ladder towards environmental stewardship.

The report then highlights and expands on three key areas of TCFD implementation, namely governance, climate scenario analysis and climate risk management. The purpose of this section is to provide practical guidance to companies who are looking to implement TCFD recommendations within their organization.

This report consolidates some examples of good practices, which are inspired by real-world use cases. These examples are used to illustrate how the TCFD recommendations are implemented and provide insights to companies to develop their own strategy and approach. The case studies and examples included in this report do not demonstrate the only approach to implementing the TCFD recommendations, but rather serve as examples to illustrate how they have been implemented in practice, which provides companies with a point of reference. There is no one-size-fits-all approach, and companies should adapt the TCFD recommendations to their unique organizational context.

# **Interdependencies of the TCFD Pillars**

The diagram below shows the interdependencies between all four TCFD pillars and highlights the importance of reporting. The TCFD pillars are governance, strategy, risk management, and metrics and targets.

A well-established governance structure can ensure that climate issues are addressed across the organization as a matter of priority and in an effective manner. It is a prerequisite to effectively identifying, assessing and managing a wide spectrum of climate issues, as well as formulating an ambitious and practical climate strategy.

Risk management is too often seen as a compliance exercise and not truly integrated with business strategy, objectives and decision-making. To effectively address climate challenges, business strategy should take climate-related issues into consideration. Through the climate risk identification and assessment exercise, companies can identify climate risks that are material to their business and choose the appropriate risk response to address those issues. However, adopting a risk response that is not aligned with the business strategy is ineffective to address climate risks. Climate risk responses that are in line with overall business strategies can ensure all levels of the company are working together to achieve a common goal.

Additionally, the importance of climate reporting is often underestimated by companies. It is worthwhile to note that reporting is an important tool to communicate a company's performance and actions against climate-related issues. By disclosing climate-related issues in a transparent way, companies can receive valuable feedback from their internal and external stakeholders, including investors, on how they can further improve their climate governance, strategy, and risk management. Companies can then evaluate their approach and strategy on climate-related issues and update their stakeholders on any significant changes, forming an effective feedback loop.



# TCFD Journey Roadmap - identify your stage in the environmental journey

The TCFD roadmap, which is shown in the table below, describes the characteristics of four different environmental stages, namely early, developing, mature and best practice, based on the four TCFD pillars. Companies are advised to make use of this roadmap to identify the stage that they are currently in and focus on the key areas that help them progress towards the next stage, with achieving best practice as the ultimate goal.

	Early	Developing	Mature	Best Practice
Governance				
Board level oversight over key climate issues	• No board member has oversight over climate issues	• No board member has oversight over climate issues, or the company is starting to consider board level oversight, but no formal process is yet in place.	• Board has oversight over climate issues, but climate is not considered in strategic decision-making process	<ul> <li>Board has oversight over climate issues, and fully integrates these issues into governance structures, strategic planning and business models</li> <li>Mechanisms are in place to hold the board accountable for climate issues</li> </ul>
Reporting of climate issues to the board	• No reporting of climate issues to the board	• No reporting of climate issues to the board, but a plan is put in place to address it in the next two years	• Some climate issues, analyses or recommendations reported to the board by management, annually or bi-annually	• All relevant climate issues, analyses or recommendations reported to the board by management, at least quarterly
Board competence over climate- related issues	<ul> <li>No board member has competence on climate issues</li> </ul>	• No board member has competence on climate issues, but a plan is put in place to address it in the next two years	• Board has some expertise on climate issues, covering a limited range of issues material to the business	• Board has expertise on climate issues, and indicates competence in delivering climate ambition and strategy
Management responsibility over key climate issues	• No management personnel have responsibility over climate issues	• Business unit managers / sustainability managers have responsibility over climate issues	• Executive management eg C-suite has responsibility and is held accountable over climate issues	<ul> <li>Executive management eg C-suite has responsibility and is held accountable over climate issues</li> <li>Effective coordination with different business units to implement policies and mechanisms</li> <li>Effective management of environmental and financial data</li> </ul>
Incentives on climate issues	• No incentives for managers to report on climate issues	• No incentives for managers to report on climate issues, but plans are in place to introduce these in the next two years	• Non-monetary incentives in place for managers to perform against climate-related performance indicators	• Executive management eg C-suite has monetary incentives to perform against climate-related performance indicators

	Early	Developing	Mature	Best Practice
Strategy				
Identification of climate-related risks with the potential to have substantive influence over organizational strategy	• Not identified / identified but not disclosed	• Yes, and disclosure includes how identified risks and opportunities have impacted your overall organizational strategy	<ul> <li>Yes, and disclosure includes a description of how your strategy in each business area has been influenced by climate-related risks and opportunities</li> </ul>	• Yes, and disclosure includes information about <b>the most</b> <b>substantial strategic</b> <b>decision(s) made in each</b> <b>business area</b> that have been influenced by the climate-related risks and opportunities
Climate risks and opportunities identified are factored into financial planning (forward-looking)	<ul> <li>Not identified / identified but not disclosed</li> </ul>	<ul> <li>Yes, and disclosure includes qualitative assessment of how identified risks and opportunities have impacted financial planning</li> </ul>	<ul> <li>Yes, and disclosure includes qualitative assessment of which specific financial planning elements were impacted by identified risks and opportunities, and how much these are impacted</li> </ul>	<ul> <li>Yes, and disclosure includes quantitative assessment of which financial planning elements were impacted by identified risks and opportunities, and how much these are impacted</li> <li>Where certain financial planning elements are deemed not yet to be influenced by climate-related risks and opportunities, reasoning is provided and explained</li> </ul>
Time horizon(s) covered in risk and opportunities assessment	Not covered	• Short term	• Short and medium term	• Short, medium and long term
Conducting of climate scenario analysis	Not conducted	• Conducted qualitative climate scenario analysis, or plans are in place to do so in the next two years	<ul> <li>Conducted qualitative and quantitative climate scenario analysis and, provided a detailed description of the process</li> </ul>	<ul> <li>Conducted qualitative and quantitative climate scenario analysis to identify transition and physical risks</li> <li>Provides and addresses focal questions you seek to address through climate-related scenario analysis</li> <li>Provides results of climate- related scenario analysis</li> </ul>
Climate scenario applied	• N/A	• Any scenario	• 2 °C or lower	• 2 °C or lower, AND a greater than 2 °C scenario
Risk Management				
Risk management process for identifying, assessing and managing climate- related risks and opportunities	<ul> <li>No risk management process disclosed</li> </ul>	<ul> <li>Discloses a risk management process but does not specify how a company is identifying, assessing and managing climate- related risks and opportunities</li> </ul>	<ul> <li>Discloses a risk management process with details on how a company is identifying, assessing and managing climate-related risks and opportunities</li> </ul>	• Discloses an integrated corporate risk-management process with details on how a company is identifying, assessing and managing climate-related risks and opportunities

	Early	Developing	Mature	Best Practice
Frequency of reviewing the climate risk assessment	No defined frequency	Every 3 years or more	• Every 2 years or annually	• More than once a year
Types of climate risks considered in the climate risk assessment	<ul> <li>No climate risks covered</li> </ul>	• Either physical or transition risks only	• Both physical and transition risks	• All the physical and transition risks listed by TCFD
Evaluation of climate-related risks identified	• No evaluation	• Evaluate their risk type, risk driver, time horizon, likelihood, the magnitude of impact	<ul> <li>Evaluate their risk type, risk driver, time horizon, likelihood and the magnitude of impact</li> <li>Qualify and quantify their potential financial/ strategic impact</li> </ul>	<ul> <li>Evaluate their risk type, risk driver, time horizon, likelihood, and the magnitude of impact</li> <li>Qualify and quantify their potential financial/ strategic impact</li> <li>Qualify and quantify the cost of responses to risk</li> </ul>
Identification of the relative significance of climate-related risks in relation to other risks	• No	• No	• Yes	• Yes
Metrics and Targets				
Metrics used to access climate- related risks and opportunities in line with the strategy and risk management process	• No	<ul> <li>Include metrics on climate- related risks and opportunities associated with water, energy, land use, and waste management where relevant and applicable</li> </ul>	<ul> <li>Include metrics on climate-related risks associated with water, energy, land use, and waste management where relevant and applicable</li> <li>Provide forward-looking metrics for the cross- industry, climate-related metric categories listed by TCFD</li> </ul>	<ul> <li>Include metrics on climate-related risks associated with water, energy, land use, and waste management where relevant and applicable</li> <li>Provide forward-looking metrics for the cross-industry, climate-related metric categories listed by TCFD</li> <li>Incorporate related performance metrics into remuneration policies</li> </ul>
Scope 1 and 2 greenhouse gas (GHG) emissions – figures	• Does not calculate Scope 1 and 2 GHG emissions	<ul> <li>Calculate Scope 1 and 2 emissions</li> <li>Calculate Scope 1 and 2 emissions intensity Indicate the change in emissions and emissions intensity on a year-on-year basis</li> </ul>	<ul> <li>Calculate Scope 1 and 2 emissions (both location-based and/or market-based)</li> <li>Calculate Scope 1 and 2 emissions intensity</li> <li>Indicate the change in Scope 1 and 2 emissions intensity on a year-on-year basis</li> <li>Provide details on the calculation methodology</li> </ul>	<ul> <li>Calculate Scope 1 and 2 emissions (both location-based and/ or market-based)</li> <li>Calculate Scope 1 and 2 emissions intensity</li> <li>Achieve a decrease in Scope 1 and 2 emissions intensity on a year-on-year basis</li> <li>Provide details on the calculation methodology</li> </ul>

	Early	Developing	Mature	Best Practice
Scope 1 and Scope 2 GHG emissions – verification	• No	<ul> <li>Yes, but without the use of an accepted standard</li> <li>No verification documentation</li> </ul>	<ul> <li>Yes, and with the use of an accepted standard</li> <li>Have details on the type of verification, current status with appropriate documentation</li> </ul>	<ul> <li>Yes, and verify 70% or higher of their Scope 1 and 2 emissions with the use of an accepted standard</li> <li>Have details on the type of verification, current status with appropriate documentation</li> </ul>
Disclose Scope 3 greenhouse gas (GHG) emissions – emission figures	• No	• Evaluates and calculates at least one category of Scope 3 emissions	• Evaluates all 15 categories of Scope 3 emissions and calculates some relevant Scope 3 categories	• Evaluates all 15 categories of Scope 3 emissions and calculates ALL relevant Scope 3 categories
Disclose Scope 3 greenhouse gas (GHG) emissions – verification	• No verification in place	<ul> <li>Verify at least one category of Scope 3 emissions</li> </ul>	<ul> <li>Verify at least one category of Scope 3 emissions</li> <li>Use an accepted standard</li> <li>Have details on the type of verification, current status with appropriate documentation</li> </ul>	<ul> <li>Verify multiple categories of Scope 3 emissions</li> <li>Use an accepted standard</li> <li>Have details on the type of verification, current status with appropriate documentation</li> </ul>
Targets to manage climate- related risks and opportunities – general emission targets	• No	<ul> <li>Set absolute and/or intensity emissions target(s)</li> <li>Set target(s) to increase low-carbon energy</li> </ul>	<ul> <li>Set absolute and/or intensity emissions target(s) for Scope 1 and Scope 2</li> <li>Set target(s) to increase low-carbon consumption or production</li> <li>Set time frames over which the target applies</li> <li>Set the base year from which progress is measured</li> <li>Key performance indicators used to assess progress against targets</li> </ul>	<ul> <li>Set a company-wide absolute or intensity emissions reduction target for Scope 1, Scope 2 and Scope 3</li> <li>Set target(s) to increase low-carbon consumption or production</li> <li>Set time frames over which the target applies</li> <li>Set the base year from which progress is measured</li> <li>Key performance indicators used to assess progress against targets</li> </ul>
Targets to manage climate- related risks and opportunities – science-based targets	• No	• No	• Committed to having a 1.5°C-aligned science-based target over the next two years	<ul> <li>Validated a 1.5°C-aligned science-based target</li> <li>Committed to a net-zero emissions target linked to a company-wide absolute or intensity target with a target year before 2050</li> </ul>
Targets to manage climate- related risks and opportunities – performance against targets	• No	<ul> <li>Has demonstrated progress towards the target(s)</li> </ul>	<ul> <li>Is on track to meet the target(s)</li> </ul>	• Outperforms the target(s)

# **Key Action Points**

# **Governance structure and mechanisms**

### Roles and responsibilities of the board and management

The board and the management play different roles in overseeing a company's climate-related issues. The board's role is to set the strategic direction of the company's climate goals. Also, the board is responsible for approving and monitoring policies and mechanisms; and ensuring that the company is adequately resourced to achieve these goals. Management's role, on the other hand, is to implement such policies and mechanisms efficiently and effectively. Management is responsible for ensuring alignment between different departments and committees through active communication and coordinating on the implementation of climate strategies.

### Examples of common governance structures

#### Integrated Approach – Company X



### Dedicated approach – Company Y

Audit

	Board Chair	
	Board Sustainability Committee	
_	<ul> <li>Consists of board directors and CEO</li> <li>Responsible for overseeing sustainability strategy and reviewing climate performance</li> </ul>	
	Sustainability Team	
	• Chief Sustainability Officer as chairperson	
	<ul> <li>The team is supported by an advisory committee comprised of executives from all departments in a multidisciplinary approach</li> </ul>	
	<ul> <li>Responsible for implementation of climate strategies, assessing and managing climate risks and opportu- nities and target setting</li> </ul>	
	• Communicates with different committees regularly to ensure they are aware of latest climate issues affecting the company	
Committee	Nomination Committee Remuneration Committee	Governance Committe

- Senior management of respective business units as committee representatives
- These committees are able to influence operations and resources invested in climate strategy



# **Guiding principles**

# Climate considerations should be effectively integrated into board committee structures.

Based on organizational context, companies should consider whether climate considerations should be integrated into existing committee(s) (integrated approach), or addressed by a dedicated climate/sustainability committee (dedicated approach). Factors to consider:

i. Is the **management style and culture** of your company more conducive to a collaborative approach, or specialized approach?

ii. Do existing committees have the requisite **expertise** to scrutinize climate risks and opportunities?

iii. Is there **capacity** for existing committees to expand their scope of work into climaterelated efforts, in terms of leadership, time and resources?

# 2 Board member(s) responsible for climate change issues should be in positions that will allow them to influence board decisions (eg committee chairs).

- Company X: The Corporate Governance Committee and Risk Management Committee, which comprises of four board members, have direct responsibility over approval of nearand long-term climate targets, renewable energy projects and internal carbon pricing mechanisms. The board chair manages and resolves the climate change mitigation conflicts between the Corporate Governance Committee and Risk Management Committee.
- Company Y: The Board Sustainability Committee, which comprises of three independent directors and the Group CEO, has direct advisory supervision over the company's sustainability, workplan and performance targets. The Committee meets with the Sustainability team at least twice a year for scheduled meetings to review the company's ESG performance, pre-empt potential risks and opportunities, and set strategic direction for implementation.

# The way climate considerations are embedded into the board, should allow for effective interaction with relevant members of executive management.

Company X: The CEO chairs the Sustainability Steering Committee which oversees the corporate sustainability strategy. The CEO is also a member of the Risk Management Committee along with four board members, which facilitates effective communication and coordination between the board and executive management on climate related risk management. For instance, the CEO provides input on strategies to tackle climate-related risks and opportunities, and resources required for risk mitigation.

Company Y: Similarly, the Board Sustainability Committee comprises of three directors and the CEO and assumes an advisory role to the Sustainability Team which is spearheaded by the CSO. The Board Sustainability Committee meets with the Sustainability Team at least twice a year for scheduled meetings to review the company's ESG performance against targets established under the company's sustainability blueprint.

# Climate targets and/or goals should be integrated into management's incentivization model and should not be contradictory to other incentives.

- Company X: Management's compensation and bonuses are dependent on the meeting of corporate-level KPIs, such as energy reduction and emissions reduction targets, and external benchmarks provided by DJSI and CDP.
- Company Y: Corporate-level performance indicators which are aligned with ISO standards, GRI standards and the SDGs, as well as targets derived from the company's sustainability blueprint, are incorporated into individual KPIs. Monetary rewards of management-level staff are tied to the achievement of these KPIs.

# The board should have the necessary expertise and skills to oversee climate related issues.

Executive and non-executive directors may contribute to climate governance in different ways. Executive directors are operationally accountable and should have greater insight into the management of climate related risks and opportunities within the organization, while non-executive directors may bring certain expertise or perspectives with relation to climate change. Factors to consider:

i. Has an assessment of the climate-competence gap been conducted on board members, and are recommendations provided by subject matter experts?

ii. If internal subject matter experts are lacking, has the appointment of external parties to evaluate the effectiveness of the board been considered?

iii. Are any steps taken to ensure board members are well equipped with knowledge on climate risks and opportunities, and that climate awareness survives through succession/ leaving of vocal climate champions?

# **Climate Scenario Analysis**

### Purpose

Scenario analysis is an exercise recommended by the TCFD to help companies effectively identify and assess the potential business implications of climate-related risks and opportunities from a range of plausible future conditions. Scenarios are hypothetical pathways of development that consider how the future might look if certain trends continue or certain conditions are met. It is important to note that scenarios are hypothetical constructs intended to explore alternatives that may significantly alter the basis for 'business-as-usual' assumptions; they are not an exercise in forecasts, predictions, nor are they sensitivity analysis.

### **Guiding principles**

# 1. The scope and boundaries of scenario analysis should represent a company's material business operations.

Smaller companies may consider an analysis of their direct operations to be sufficient, while larger companies may consider expanding their analysis to their supply chain and/or customers.

#### 2. Climate scenarios selected should be high contrast, balanced and science-based.

Selected scenarios should represent the best-case and worst-case scenarios for companies to sufficiently consider risks and opportunities posed by climate change. In general, a higher emissions scenario carries higher physical risks, while a scenario that strives to achieve a lower-carbon economy carries higher transition risks.

The scenarios developed should sufficiently consider both physical and socio-economic impacts, and, when conducting data projection for the selected scenarios, projection should be made on the basis of scientific analysis, eg research findings and model simulation.

#### 3. Scenario analysis can be qualitative, quantitative or both.

The choice of approach will depend on an organization's needs, resources, and capabilities. Organizations that are likely to be significantly impacted by climate-related transition and/or physical risks and opportunities should consider some level of quantitative scenario analysis.

# 4. Physical and transition risks parameters identified should be relevant to business operations.

After appropriate scenarios are selected, companies should identify physical and transition risks and opportunities parameters that matter to their operations. Factors to consider:

- Do different types of physical risks affect the company's operations, labor or supply chain?
- Do different types of transition risks affect the company's compliance to regulatory requirements, operational cost, earnings, depreciation of assets or revenue?
- To what extent do these risks impact the company's business operations?

# Publicly available scenarios

Source	Characteristics	Pathways
Intergovernmental Panel on Climate Change (IPCC)	<ul> <li>Focuses on physical impacts</li> <li>Simulates future scenarios based on varying levels of GHG concentration</li> </ul>	<ul> <li>Representative Concentration Pathways (RCP)</li> <li>Stringent pathways: RCP 1.9, RCP 2.6</li> <li>Intermediate pathways: RCP 4.5, RCP 6.0</li> <li>High emissions pathway: RCP 8.5</li> </ul>
	<ul> <li>Focuses on socio-economic impacts</li> <li>Provides narrative descriptions of alternative futures as a result of varying socio-economic challenges to adaptation and mitigation</li> </ul>	<ul> <li>Shared Socioeconomic Pathways (SSP)</li> <li>Stringent pathway: SSP 1</li> <li>Intermediate pathways: SSP 2, SSP 3, SSP 4</li> <li>High emissions pathway: SSP 5</li> </ul>
International Energy Agency (IEA)	• Focuses on energy and emissions scenarios describing the future energy mix	<ul> <li>Stringent pathway: Sustainable Development Scenario (SDS)</li> <li>Business-as-usual pathway: Stated Policy Scenario (SPS)</li> </ul>
Network for Greening the Financial System (NGFS)	• Explores a set of six scenarios that take into account transition risks, physical risks and the implementation of climate policies	<ul> <li>Orderly pathways: Net-Zero 2050 scenario, Below 2°C scenario</li> <li>Disorderly pathways: Divergent Net-Zero scenario, Delayed Transition scenario</li> <li>Hothouse world pathways: Nationally Determined Contributions scenario, Current Policies scenario</li> </ul>
United Nations Principles for Responsible Investment (UNPRI)	<ul> <li>Provides narrative descriptions of alternative futures as a result of policy response to climate change implications for energy, agriculture and land use sectors</li> <li>Primary focus on transition risks</li> </ul>	<ul><li>IPR Forecast Policy Scenario</li><li>IPR 1.5C RPS Scenario</li></ul>

# Case Study: Identifying physical and transition risks under IEA's Sustainable Development Scenario (SDS) - a qualitative analysis

Physical/ transition risk	ls it relevant?	Reason	Examples of relevant parameter
Current regulation	×	There are currently no national-level regulations mandating the reporting or managing of emissions in the private sector. Therefore, current regulations do not pose a significant compliance risk.	/
Emerging regulation	5	While only state-owned enterprises are required to report on GHG emissions, it is likely this mandate will expand to the high-emitting industries in the private market. The nation is also developing a national carbon price, as part of a wider emissions trading scheme. This will likely increase our operational costs.	<ul> <li>Regulations on high-emitting sectors</li> <li>Regulations on private sector</li> <li>Carbon price</li> </ul>
Technology	1	Technological improvement in terms of energy efficiency (eg photovoltaic panels, steam turbine motors, $CO_2$ -based chemicals) will be crucial in helping us reduce emissions and transition to a lower carbon economy, since our operations are highly dependent on fossil fuels. However, this will also increase our capital costs due to investment and installation; operational costs due to the running of new technologies.	<ul> <li>Photovoltaic panels</li> <li>Steam turbine motors</li> <li>CO<sub>2</sub>-based chemicals</li> </ul>
Legal	1	The government is developing laws for carbon pricing, such as the Climate Change Act, Greenhouse Gas Reporting Law, and Emission Trading System Law. The Thailand Greenhouse Gas Management Organization was also assigned to design a management and planning system, and to develop the carbon credit mechanism and Emission Trading System among entrepreneurs in the Eastern Economic Corridor (EEC) area. These national and regional level policies will impact current operational costs and new investment projects. Non-compliance will entail costly lawsuits.	<ul><li>Carbon price</li><li>GHG reporting</li><li>Emissions trading</li></ul>
Market	5	Thai consumers, especially young consumers have become more environmentally conscious, which has led to a decline in single plastic use and a rise in the use of biodegradable packaging (eg paper) and recycled plastics. This phenomenon has reduced the demand for plastic pellets which contributes to a sizable portion of our revenue. If we are unable to service this generation of consumers, we are likely to lose revenue and market share.	<ul><li>Single-use plastics</li><li>Eco-friendly packaging</li></ul>
Reputation	1	There is ongoing discussion on single-use plastic bans, and it is likely that this policy will pass through. If we are unable to position ourselves as a leader in our sector, and provide alternative solutions to our current product offering, our reputation will be negatively impacted, which will then impact our revenue.	• Plastic bans
Acute Physical	1	Changing precipitation patterns may result in water stress. Since our operations are highly dependent on freshwater which comes from reservoirs, water stress and shortage is highly likely to disrupt our production processes. This would result in revenue loss.	• Water stress
Chronic Physical	1	Sea level rise in the long term may result in the destruction of our production facilities (eg refinery plants) in low lying areas. If so, this would result in the loss of assets, and considerable costs to re-build our plants. To avoid this outcome, we aim to either retrofit our current plants to mitigate flooding risks or to build new plants in areas with higher elevation, which would also entail considerable cost.	<ul><li>Flooding</li><li>Retrofitting of facilities</li></ul>

# **Climate-related Risk Management**

# A. Risk identification

# Common types of climate risks

Climate-related risk<sup>1</sup> refers to the potential negative impacts of climate change on an organization. They are divided into two major categories: physical risks and transition risks. Physical risks are associated with the physical impacts of climate change, while transition risks are related to the transition to a low-carbon economy.

Below are the lists of physical and transition risks suggested in the TCFD recommendations.

# **Physical risks**

Physical risks from climate change can be event-based (acute) or longer-term climate pattern shifts (chronic). Physical risks can have direct financial implications for organizations such as direct damage to assets, and indirect impacts including supply chain disruption.

Acute risks	• Increased severity of extreme weather events such as cyclones and floods
Chronic risks	<ul> <li>Changes in precipitation patterns and extreme variability in weather patterns</li> <li>Rising mean temperatures</li> <li>Rising sea levels</li> </ul>

# **Transition risks**

The road to a low-carbon economy will involve addressing the mitigation and adaptation requirements related to climate change. This is likely to materialize in the form of extensive policy, legal, technology and market changes.

Policy and legal risks	<ul> <li>Increased carbon pricing</li> <li>Enhanced emissions reporting obligations</li> <li>Mandatory regulation of existing products and services</li> <li>Exposure to litigation</li> </ul>
Technology risks	<ul> <li>Substitution of existing products and services with lower emissions options</li> <li>Unsuccessful investment in new technologies</li> <li>Costs to transition to lower emissions technology</li> </ul>
Market risks	<ul> <li>Changing customer behavior</li> <li>Uncertainty in market signals</li> <li>Increased cost of raw materials</li> </ul>
Reputation risks	<ul> <li>Shifts in consumer preferences</li> <li>Stigmatisation of industry sector</li> <li>Increased stakeholder concern or negative stakeholder feedback</li> </ul>

## Common approach for climate risk identification

# Understand the internal and external environment

- Adopt different approaches to understand the internal and external environment and identify climate risks that would have potential impacts on your business. For example, megatrend analysis, SWOT analysis, impacts and dependency mapping, stakeholder engagement, materiality assessment, and industry review. Please refer to the COSO's 'Enterprise Risk Management: Applying enterprise risk management to environmental, social and governance-related risks' for details of these approaches.
- Make use of available resources to identify climate risks that would have potential impacts on your business. For example, the list of physical and transition climate risks included in the 'Recommendations of the Task Force on Climate-related Financial Disclosures' published by TCFD, the Global Risks Reports released by World Economic Forum and sector-specific risk-related publications.

# Build a climate risk inventory

- Build a climate risk inventory based on pre-defined criteria for including any risks in the inventory. For example, any climate risk that presents potential impacts on the business strategy, objectives and performance will be included in the climate risk inventory.
- The climate risk inventory shall include a precise description of the climate risks identified and the drivers of the risks. It shall articulate how the risks are relevant to your business.
- A climate risk inventory can facilitate the climate risk assessment, prioritization and management process.

# Review and revise the climate risk identification approaches and climate risk inventory

- Review and revise the climate risk identification approaches on a regular basis.
- Adopt new risk identification approaches or modify and remove any of the current risk identification approaches if necessary.
- Review and revise the climate risk inventory on a regular basis to ensure it is holistic and relevant to your business.

### Case study - Climate Risk Identification

The climate risk inventory of Company X is regularly reviewed and updated by a cross-functional team. The team is composed of designated personnel from different departments such as Legal, Finance, Sustainability, Operational, and Human Resources.

The team builds the climate risk inventory by three major methods, namely peer review, research study and stakeholder engagement. Peer review is conducted by reviewing the publications of peer companies such as their sustainability report and CDP response. This allows the team to understand what climate risks identified by peers are missing from the current climate risk inventory. The team also studies the latest reports published by well-recognized organizations such as the Global Risks Report published annually by the World Economic Forum and publications released by industry associations, to understand the latest global and industry-specific challenges. Through internal and external stakeholder engagement, the team can keep abreast of the latest climate-related regulations, and emerging climate-related risks resulting from their suppliers or internal operation, etc.

The team reviews the current climate risk inventory by the three major methods indicated above on an annual basis and revises the climate risk inventory appropriately. For instance, when potential new climate risks have been identified, the team will identify the potential relevance for the company and decide whether to include them in the climate risk inventory.



# B. Risk assessment and prioritization

### Common risk assessment and prioritization approaches

### 1. Set the criteria for climate risk assessment

Companies shall develop a set of assessment criteria and scales to assess climate risks. Wellestablished assessment criteria and scales can facilitate the analysis of climate risks and the risk prioritization process. Common criteria used for risk assessment include likelihood, magnitude of impact, adaptability and recovery.

A rating scale can be applied to each criterion, which enables quantitative comparisons of the climate risks. For example, likelihood can be divided into five different categories: rare (1), unlikely (2), possible (3), likely (4), and very likely (5). Each category is assigned a score. The number in the bracket represents the score. The higher the score, the more significant the risk. A well-defined rating scale is essential for consistent interpretation of the materiality of the climate risks identified.

Criteria	Description	Example of a rating scale
Likelihood	Probability of the impact on your business occurring within a specific time horizon	Rare (1), unlikely (2), possible (3), likely (4), very likely (5)
Magnitude of impact	Magnitude describes the extent to which the impact, if it occurred, would affect your business	Insignificant (1), minor (2), moderate (3), major (4), significant (5)
Adaptability	Capacity of an entity to adapt and respond to risks	Very low (1), low (2), medium (3), high (4), very high (5)
Recovery	Capacity of an entity to return to tolerance	Very slow (1), slow (2), medium (3), fast (4), very fast (5)

#### Common criteria used for risk assessment

### 2. Select appropriate approaches and tools to support the climate risk assessment

The climate risk identification process lays the foundation to conduct further detailed analysis and assessment of the climate risks. Companies shall identify the approaches and tools available for climate risk assessment and understand their strengths and weaknesses. After selecting the appropriate approaches and tools, companies can make use of them to assess and rate the risks in the climate risk inventory based on defined assessment criteria and scale.

Approaches/ Tools for risk assessment	Description
Expert input	Harness the experience and knowledge of internal or external subject-matter professionals in assessing the risks
Scenario analysis	Address the potential implications of a range of long-term future states for risks under conditions of uncertainty
Forecasting and valuation	Leverage historical data to estimate the potential impacts of risks on revenues, costs or profit
Climate-specific tools	Use tools for quantifying climate risks such as WBCSD Water Tool, WRI Aqueduct, etc
Primary data	Use data from internal departments, survey results, interviews or focus groups as input into risk assessment
Secondary data	Use data from academic research, government or think tank data, industry or peer organization data or reports, existing analysis, etc as input into risk assessment

#### Common approaches or tools for risk assessment

### 3. Analyse the climate risk assessment result and prioritize risks

Based on the result of the climate risk assessment, a risk matrix can be constructed to visualize and analyse the materiality of all the climate risks, determining the priority of risks. Companies can determine the x-axis and y-axis of a risk matrix according to their own set of assessment criteria and scales.

The example of a risk matrix below shows a two-dimensional graph plotting vulnerability against hazard exposure. Hazard exposure refers to a company that is in a vulnerable setting or position while vulnerability is related to notions of resilience, flexibility and adaption. It refers to the propensity or predisposition of a company to suffer adversely from its exposure to hazards. Another example of a risk matrix can be a two-dimensional graph, in which the x-axis denotes impact, and the y-axis denotes likelihood.



### Example of a risk matrix

Companies can categorize the risks based on their overall score and assign different levels of materiality to each category of risk. The example of a risk matrix above shows that the overall score of a risk is calculated by multiplying the hazard exposure rating by the vulnerability rating. For example, a risk gets four scores in hazard exposure and five scores in vulnerability. Its overall score is 20, which is multiplying four by five. Companies should develop their own calculation methodology and define different levels of materiality and its criteria. A risk matrix can be used to identify risks with different materiality levels and facilitate the risk prioritization process. With limited resources, companies may decide to prioritize addressing risks with high to highest materiality.

### Case study – Climate Risk Assessment and Prioritization

The risks in the climate risk inventory are assessed by Company X's expert team in terms of likelihood, time horizon, financial impact and response to risk. Company X has its own definition of time horizon. Short-term is defined as less than one year. Mid-term is defined as more than one year but less than three years. Long-term is defined as three to nine years.

Company X forms an expert team, which includes representatives from different teams such as Sustainability, Procurement, Finance, Operations, Marketing and an external expert on climate issues. The expert team is responsible for identifying climate risks and assessing the risks. A primary screening is conducted to remove risks that fall behind the long-term time horizon, or that fall within the time horizon but are below the financial materiality threshold of US\$50 million.

The primary screening results of the assessment are shared with C-suite executives and senior management across different departments for discussion and, when relevant, complementary works to update the first assessment done. Once all relevant parties have validated the climate-related risks assessed, the Strategy Planning Department includes the risks in the climate risk inventory and goes through the annual company risk integration process, which involves further assessment of the climate risks validated and integrates into the existing enterprise risk management system. The Risk Management team leads different departments to conduct the in-depth risk assessment exercise, quantifying and qualifying the impacts and likelihood of the risks. The risk management result, incorporated with climate risks, is reported to the Executive Committee and Audit Committee, which is involved in the risk prioritization process and evaluation of business strategy and objectives.

# C. Risk response

### Assign a risk owner

An individual at the management level shall be assigned as the risk owner of a specific risk. He or she holds the accountability of managing and monitoring the risk assigned as well as reporting to the senior management or the board. The risk owner shall assemble a cross-functional team to effectively support risk management plan development, implementation and monitoring progress.

### Choose risk responses

Risk owners and their cross-functional teams shall select appropriate risk responses for those material risks identified. According to the COSO ERM Framework, risk responses fall within the categories of accept, avoid, pursue, reduce and share. Companies shall consider a number of factors such as business context, costs and benefits, obligations and expectations, etc, when selecting appropriate risk responses.

Types of risk response	Description
Accept	Take no action to change the severity of the risk
Avoid	Remove the risk
Pursue	Convert risk into opportunities
Reduce	Take action to reduce the severity of the risk
Share	Transfer a portion of the risk or collaborate externally

### Develop a plan

The plan for implementing a risk response shall have clearly defined objectives, action points, timelines, key performance indicators, required resources and estimation of costs and benefits. An effective risk response implementation plan should be incorporated into business strategy at the company level. For example, a company considers achieving net-zero by 2050 as a risk response to climate risks. This overarching target should be supported and incorporated into the overall business strategy, which would involve actions and support from different levels of the company. Metrics should be developed to evaluate the effectiveness of the plan ahead of the execution stage.

### Execute the plan and monitor its effectiveness

A designated team with well-defined responsibilities should execute the plan according to the timeline, report progress to management and monitor the effectiveness of the plan on a regular basis. In order to effectively execute the implementation plan, regular reviewing and monitoring of the plan is essential. The relevant departments should report the progress of the plan to management so they can assess the effectiveness of the plan and make adjustments where necessary.

### Case study – Climate Risk Response

In company X, risks are assigned to risk owners, who hold the accountability to manage the risks and report to the Executive Team and the Board. Risk owners are given appropriate authority and resources for effective risk management. They are authorized to assemble a cross-functional team depending on the scope covered by the risks. The team may involve personnel from different departments and regions across the organization. The team works together to develop measures and plans to address specific risks based on the risk response chosen. The planning process would provoke discussion about how the measures and plans should be supported by the overall business strategy. This facilitates the consideration and integration of climate risks in business strategy planning.

Company X identified carbon pricing as a material transition risk as it operates energyintensive manufacturing sites in different regions like the UK, EU, US and China. Each region is subjected to different carbon pricing policies. The risk owner chooses "reduce" as the risk response to address the risk of carbon pricing. Regional teams are set up to develop measures and plans to reduce the severity of the risks brought by the regional carbon pricing policies. It has introduced energy-efficiency machinery and sourced renewable energy to reduce GHG emissions. Metrics such as annual GHG emissions are developed to evaluate the effectiveness of the measures. The risk owners and their crossfunctional team conduct a quarterly evaluation of the effectiveness of the measures based on the pre-defined metrics and adjust the plan if necessary. The risk owners have to report to the Executive team and the Board on major issues regarding risk management on an annual basis.

As Company X anticipates stricter regulations on carbon pricing in the long term, it has set a net-zero target by 2050 as one of the business strategies at the company level. This is to ensure different levels of employees within the company are aware of the company goal and take action to pursue the same goal together. Company X believes in long-term value created by integrating climate-related considerations into its business strategy.

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# **Glossary of Terms**

Acronym	Term	Description
CO2	Carbon Dioxide	a greenhouse gas, that comes from the extraction and burning of fossil fuels (such as coal, oil, and natural gas), from wildfires, and from natural processes like volcanic eruptions
coso	Committee of Sponsoring Organizations of the Treadway Commission	an organization that develops frameworks and guidance on enterprise risk management, internal control, and fraud deterrence for businesses to improve organizational performance and governance
CSO	Chief Sustainability Officer	a senior member of staff responsible for an organization's objectives and initiatives relating to sustainability
DJSI	Dow Jones Sustainability Indices	a family of benchmarks for investors who have recognized that sustainable business practices are critical to generating long-term shareholder value and who wish to reflect their sustainability convictions in their investment portfolios
EEC	Eastern Economic Corridor	a special economic zone of three provinces in eastern Thailand – Chonburi, Rayong, and Chachoengsao
ERM	Enterprise Risk Management	the culture, capabilities, and practices, integrated with strategy-setting and its performance, that organizations rely on to manage risk in creating, preserving, and realizing value
ESG	Environmental, Social, and Governance	a collection of corporate performance evaluation criteria that assess the robustness of a company's governance mechanisms and its ability to effectively manage its sustainability issues
GHG	Greenhouse gas	gas in the earth's atmosphere that trap heat
GRI	Global Reporting Initiative	an independent, international organization that helps businesses and other organizations take responsibility for their impacts, by providing them with the global common language to communicate those impacts
IEA	International Energy Agency	the global energy authority, providing data, analysis and solutions on all fuels and all technologies
IPCC	Intergovernmental Panel on Climate Change	an intergovernmental body of the United Nations, which provides regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation
IPR	Inevitable Policy Response	a climate transition forecasting consortium that aims to prepare institutional investors for the portfolio risks and opportunities associated with a forecast acceleration of policy responses to climate change
ISO	International Organization for Standardization	an international nongovernmental organization made up of national standards bodies that develops and publishes a wide range of proprietary, industrial, and commercial standards
KPIs	Key Performance Indicators	measurable and quantifiable metrics used to track progress towards a specific goal or objective

Acronym	Term	Description
NGFS	Network for Greening the Financial System	a group of central banks and supervisors committed to sharing best practices, contributing to the development of climate –and environment– related risk management in the financial sector and mobilising mainstream finance to support the transition toward a sustainable economy
RCP	Representative Concentration Pathways	four different 21st century pathways of greenhouse gas emissions and atmospheric concentrations, air pollutant emissions and land use used for the IPCC Fifth Assessment Report (AR5)
SDS	Sustainable Development Scenario	a scenario which describes the broad evolution of the energy sector that would be required to reach the key energy-related goals of the United Nations, including the climate goal of the Paris Agreement, universal access to modern energy by 2030, and a dramatic reduction in energy-related air pollution and the associated impacts on public health
SGDs	Sustainable Development Goals	a collection of objectives by the United Nations that serves as the blueprint to achieve a better and more sustainable future for all. They address the global challenges we face, including poverty, inequality, climate change, environmental degradation, peace and justice
SPS	Stated Policy Scenario	a scenario which reflects current policy settings based on a sector-by-sector and country-by-country assessment of the specific policies that are in place, as well as those that have been announced by governments around the world
SSP	Shared Socioeconomic Pathways	a set of five scenarios grounded by assumptions of future population growth, economic activity and urbanisation used for the IPCC Sixth Assessment Report (AR6). They allow for greater comparability of scenario assumptions and assessments of future natural resource requirements and pollution levels
SWOT analysis	Strengths, Weaknesses, Opportunities, and Threats analysis	a framework used to evaluate a company's competitive position and develop strategic planning
TCFD	Task Force on Climate- Related Financial Disclosures	a global organization formed to develop a set of recommended climate-related disclosures that companies and financial institutions can use to better inform investors, shareholders and the public of their climate-related financial risks
UNPRI	United Nations Principles for Responsible Investment	an international organization that works to understand the investment implications of environmental, social and governance factors; to support its international network of investor signatories in incorporating these factors into their investment and ownership decisions
WBCSD	World Business Council for Sustainable Development	the premier global, CEO-led community of over 200 of the world's leading sustainable businesses working collectively to accelerate the system transformations needed for a net zero, nature-positive, and more equitable future
WRI	World Resources Institute	a global non-profit organization that works with leaders in government, business and civil society to research, design, and carry out practical solutions that simultaneously improve people's lives and ensure nature can thrive

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#### About CDP

CDP is a global non-profit that runs the world's environmental disclosure system for companies, cities, states and regions. Founded in 2000 and working with over 590 investors with \$110 trillion in assets, CDP pioneered using capital markets and corporate procurement to motivate companies to disclose their environmental impacts, and to reduce greenhouse gas emissions, safeguard water resources and protect forests. Nearly 20,000 organizations around the world disclosed data through CDP in 2022, including more than 18,700 companies worth half of global market capitalization, and over 1,100 cities, states and regions. Fully TCFD-aligned, CDP holds the largest environmental database in the world, and CDP scores are widely used to drive investment and procurement decisions towards a zero carbon, sustainable and resilient economy. CDP is a founding member of the Science Based Targets initiative, We Mean Business Coalition, The Investor Agenda and the Net Zero Asset Managers initiative.

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