



BOARD OVERSIGHT OF CLIMATE RISKS AND OPPORTUNITIES

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With contributions from Eugene Wong and Colin Low

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EXECUTIVE SUMMARY

Like most people, corporate leaders are generally aware that climate change has caused a lot of damage and disruptions, and is bound to do far worse as it intensifies. However, few directors and senior executives understand well the specific impact that climate change has and will likely have on their businesses.

Given the widespread direct and indirect effects of global warming, all companies are exposed to climate-related risks and opportunities. There is potentially a significant risk when companies do not properly consider such risks and opportunities.

It is crucial that every company conducts a robust materiality assessment of its environmental, social and governance (ESG) risks, including climate risk.

It is also telling that in the past few years, top academic journals have turned their attention to the topic of climate change, especially in the area of climate finance. Such research can provide a deeper understanding of how climate change might shape business and financial outcomes.

The effective oversight and management of climate risks and opportunities requires the board of directors to set the right tone so that employees believe that sustainability truly matters and that their company addresses it effectively.

It starts with the board asking pertinent questions and considering key issues on the governance and management of these risks and opportunities.

Climate change: The board's top tasks

The board needs to be clear about its responsibilities relating to climate risks and opportunities. Sustainability reporting frameworks are useful starting points for identifying the key issues. To oversee the risks and opportunities, the board must install an appropriate governance structure and acquire the relevant expertise. It is essential to adequately understand the impact of climate risk on the business. In part, this requires the board ensuring that the management conducts in-depth analysis of good data relating to climate risks and opportunities relevant to the organisation. It is also up to the board to steer the company towards adopting an integrated strategic approach for addressing the climate risks and opportunities.

Beware these pitfalls

There may be harsh financial, legal and reputational consequences if a company does not do enough to assess and address its climate risks. In particular, boards should be wary of climate risk blind spots, failure to comply with regulatory requirements, and contagion risk exposure from climate change. The blind spots will be less of a problem if there is constant boardroom dialogue on climate change, coupled with a suitable governance structure and effective practices to oversee and manage climate risks and opportunities. It is equally important for the board to keep abreast of regulatory developments on ESG matters.

Business impact of climate risk

In order to respond effectively to climate change, the board must first understand how the different

types of climate risk affect the company and its business. Climate change creates physical and transition risks. The first category is associated with resource, operational or programmatic impairment of economic activity attributable to climate change. Transition risk is associated with the uncertain financial impacts that could result from a transition to net-zero emissions or a low-carbon economy. Climate change makes its presence felt in the business world in a wide range of ways. For example, it can disrupt operations, evaporate demand, impose obsolescence and shrink market share. Many recent academic studies have concluded that climate-related factors affect risk premia, cost of capital, stock returns, and other outcomes. At the same time, climate change brings business opportunities, such as those linked to climate change mitigation and adaptation solutions, and the transition to a low-carbon economy.

Keeping a company sustainable by addressing risks and opportunities

A key element of corporate sustainability today is the ability to adjust well to climate change. A company's strategic and critical measures on this front should include changing mindsets, reducing the dependency on traditional energy sources in a meaningful and substantive way, and identifying opportunities arising from the decarbonisation of the global economy. The energy transition demands an enterprise-wide mindset change, which must start with the board of directors. It is also part of the board's duties to ensure that the company's human capital strategy and hiring policy support its climate mitigation and adaptation efforts.

Twin paths of mitigation and adaptation

The journey towards net zero will require mitigation and adaptation. The mitigation pathway entails the firm adopting mitigation strategies to reduce greenhouse gases (GHGs) and energy consumption in general. Adaptation is about lowering the risks of being hit by the consequences of climate change and creating resilience. The board's primary role in this area is to set objectives and strategies for the company's mitigation and adaptation efforts.

Set your company's climate risk appetite

A company must determine its climate risk appetite before it can start figuring out how to take on this risk. The board is expected to understand the company's financial risks related to climate change, satisfy itself that the climate risk assessment process is robust, and oversee the management of these risks within the overall business strategy and risk appetite. It is best that the climate risk appetite statement covers transition and physical risks and is aligned to scientific-based climate-related objectives. Because of the nature of climate change and climate action, a company's climate risk appetite needs to constantly evolve to suit the shifting scenarios. A company may also want to set its long-term climate risk appetite because some climate risks may take far longer than the conventional strategic planning timeframes to materialise.

How to ensure effective climate risk management

After setting its climate risk appetite, a company must next adopt a framework for managing this risk and put in place the appropriate measures. This framework can be based on existing risk management frameworks created by credible international bodies, or on entity-specific risk management frameworks. Although crisis management and general risk management are usually kept separate, climate risk management requires a more pro-active holistic approach, with emphasis on business continuity and contingency plans as well. Internal audit can provide the board and management with assurance for the adequacy and effectiveness of the company's climate risk management framework and measures.

Choosing and using the right metrics and targets

The company should undertake its own materiality assessment of ESG factors so as to understand those factors that have the most impact on the business and stakeholders. For many companies, environmental- or climate-related risks would be expected to be a material ESG factor. Where they have not been identified as such, boards and management should be mindful that they are not missing climate-related blind spots.

This then paves the way for the setting of climate-related metrics and targets. A company's climate-related metrics and targets should be selected based on the climate risks and opportunities that are most relevant and material to the company and its stakeholders. One approach to identifying relevant metrics is to start with sustainability reporting standards such as those published by the Global Reporting Initiative and Sustainability Accounting Standards Board (the latter has been subsumed into the International Sustainability Standards Board). Appropriate targets related to the selected metrics, aligned with the company's goals, commitments and mandatory requirements, should then be set. Related issues are whether to link these metrics and targets to executive remuneration, and how to best monitor the progress and achievements. Adequate board oversight is key to ensuring the usefulness of the metrics and targets.

The power of disclosures

Disclosure of material climate-related financial information is key to the transition to a low-carbon economy. When a company reports this information, it sheds light on its climate risks and opportunities, and the progress of its decarbonisation initiatives. The process of gathering and presenting the information itself can nudge the company towards doing more for sustainability. There are rapid developments in the regulation of and the standard-setting for sustainability reporting. Companies must have the resources and expertise to comply with the evolving rules and standards. The board should also consider the role of assurance in ensuring high-quality sustainability reporting, including weighing the option of hiring an external assurance firm.

Avoid the taint of greenwashing

Regulators and other stakeholders are paying more attention to greenwashing. Companies that try to appear environmentally conscious when their business practices are not, have reason to feel vulnerable because greenwashing exposes companies to financial and reputational risks. Their directors may be the targets of regulatory and private actions. To mitigate the risk of being accused of greenwashing, companies and boards should first commit to being open and transparent. Their sustainability reporting should be augmented with strong governance, a robust three lines model to help ensure sturdy and proper internal controls, and independent assurance. It should be noted though that sustainability assurance cannot be regarded as a panacea for greenwashing. Engagement with stakeholders, including NGOs, can also help companies to better understand concerns about greenwashing.

10 Questions Directors Should Ask Regarding Climate Change

1. What are the board's responsibilities relating to climate risks and opportunities, and how can we effectively discharge these responsibilities?
2. What are the main pitfalls relating to climate risk that our company should be aware of, and what are the consequences if we do not address them?
3. How will the different types of climate risk affect our company and business?
4. What are the strategic and critical climate risks and opportunities that our company should address in order to remain sustainable?
5. What corporate objectives and strategies should our company adopt to address climate risks and opportunities?
6. How to set our company's climate risk appetite, especially since the transition pathway involves a journey into the future?
7. What risk management framework and measures should our company have in place to ensure effective climate risk management?
8. Are our climate-related metrics and targets appropriate, should they be linked to executive remuneration, and how to monitor the progress and achievement of these targets?
9. What information should our company disclose about our climate risk governance and management, and how to ensure that the information is reliable?
10. Is our company exposed to accusations of greenwashing and how to mitigate this risk?

INTRODUCTION

After conversations with CEOs and other senior business leaders, PwC and Strategy& (PwC's global strategy consulting business) reported in 2022 that these leaders know about the looming physical dangers of climate change in a general sense, but they have much less of an understanding of the specific impact that climate change could have on their business.¹ The potential impact includes the physical risks to operations, infrastructure or supply chains, and the business-related transition risks that come with a shift to a decarbonised world.

Although individual companies and businesses face different environmental, social and governance (ESG) risks, making it crucial for each company to have a robust materiality assessment of these risks, nearly all will be affected directly or indirectly by the risks associated with climate change.

Figure 1 is the result of research by the Sustainability Accounting Standards Board (SASB) on the presence of three primary types of climate-related financial risks in the industries covered by the SASB standards.² The Board sets standards for 77 industries. Of these, 68 industries are significantly affected in some way by climate risk.

Figure 1: Exposure to Climate-Related Financial Risk

Type of Risk	#of Industries	% by Market Cap*	Total Market Cap*
Physical Risk	36 of 77	55%	US\$28.2T
Transition Risk	57 of 77	85%	US\$43.3T
Regulatory Risk	40 of 77	29%	US\$14.7T
Any Climate Risk	68 of 77	89%	US\$45.1T

*Represents market capitalization of S&P Global 1200 companies reasonably likely to be exposed to each risk type.

Source: SASB, *Climate Risk Technical Bulletin*, updated May 2022.

The impact of climate change has also become of increasing interest to academic researchers in business and economics. For example, in 2017, the *Review of Financial Studies*, a top-ranked journal published by Oxford University Press, launched a competition among scholars to develop research proposals on climate finance that seek to support mitigation of and adaptation to climate change. This resulted in the publication of a special volume on the topic in 2020.³ Another major finance journal, *the Journal of Corporate Finance*, launched a call for papers on the finance of climate change in 2019, resulting in the publication of a special volume in 2022.⁴ While there has been a long history of academic research in corporate social responsibility and sustainability-related issues, it is only in the past few years that top journals have turned their attention to the topic of climate change, especially in the area of climate finance.

1 Emma Cox, Colm Kelly, Barry Murphy and Nicole Röttmer, Time to Get Serious About the Realities of Climate Risk, PwC and Strategy&, May 2022. https://www.pwc.com/gx/en/issues/reinventing-the-future/take-on-tomorrow/download/SBpwc_2022-05-16-Climate-r2.pdf

2 SASB, *Climate Risk Technical Bulletin*, Updated May 2022. <https://www.sasb.org/knowledge-hub/climate-risk-technical-bulletin/>

3 <https://academic.oup.com/rfs/article/33/3/1011/5735309>

4 <https://www.sciencedirect.com/science/article/abs/pii/S0929119922000050>

About this report

This report focuses on climate change primarily from the perspective of boards of directors of companies and financial institutions. It is also relevant to investors and other stakeholders in developing expectations of how boards oversee the management of climate risks and opportunities.

The report is co-written with Dr Khoo Guan Seng, who holds a PhD in Physics and has extensive academic and practice experience in climate change issues and sustainable investment, having held risk and investment roles in financial institutions, sovereign wealth funds and other organisations, with a focus on sustainability. The other co-author, Prof Mak, brings his expertise in corporate governance to explain what climate risks and opportunities mean for companies and boards, and to formulate questions that boards should ask about climate change.

Caveats

We would like to emphasise the following caveats regarding the academic research:

First, even though the research findings have been published in highly reputable journals and/or are the work of reputable scholars from some of the best universities, they are rarely conclusive. These findings should be viewed as current thinking among academics on the subject of the impact of climate change on financial outcomes. Such thinking could change over time as further studies are conducted.

Second, while these studies have used sophisticated econometric methods to attempt to rule out spurious relationships and reverse causality, the studies have not been conducted in laboratory-like settings, which means other explanations cannot be discounted.

Third, while relationships found may be statistically significant, they may not be economically significant, and factors that have been studied may only explain a small part of the phenomenon.

Nevertheless, the academic research findings can be a useful source of current thinking on this important subject. What most of these studies have found is that climate change affects financial outcomes for a range of organisations.

CLIMATE CHANGE: THE BOARD'S TOP TASKS

In A Nutshell

What are the board's responsibilities relating to climate risks and opportunities, and how can we effectively discharge these responsibilities?

As with any major corporate initiative, a company's response to climate change cannot be expected to succeed if not backed by stout board leadership. The board must be clear about its role and how it can best help the company to deal with climate risks and opportunities.

Measures for the board to consider:

- Understand and focus on the key issues related to climate risk
- Put in place an appropriate governance framework for overseeing the relevant climate risks and opportunities
- Ensure that the board and management have appropriate expertise
- Ensure that the impact of climate risk on the business is adequately understood, considered and addressed
- Ensure that management is undertaking an in-depth analysis
- Take an integrated strategic approach to addressing climate risks and opportunities

Identify key issues related to climate risk

Sustainability reporting frameworks identify the key sustainability-related disclosures that companies should make. In the area of climate risk, the Task Force on Climate-related Financial Disclosures (TCFD) established by the Financial Stability Board provides a major reporting framework. The TCFD recommendations are at the heart of the sustainability reporting standards issued by the International Sustainability Standards Board (ISSB). Figure 2 shows the TCFD framework.⁵

⁵ TCFD, Final Report: Recommendations of the Task Force for Climate-Related Financial Disclosures, June 2017. <https://assets.bbhub.io/company/sites/60/2021/10/FINAL-2017-TCFD-Report.pdf>

Figure 2: Reporting Framework Under the TCFD

Recommendations and Supporting Recommended Disclosures

Governance	Strategy	Risk Management	Metrics and Targets
Disclose the organization's governance around climate-related risk and opportunities.	Disclose the actual and potential impacts of climate-related risk and opportunities on the organizations businesses, strategy, and financial planning where such information is material.	Disclose the organization identifies, assesses, and manages climate-related risk.	Disclose the metrics and targets used to assess and manage relevant climate-related risk and opportunities where such informations is material.
Recommended Disclosures	Recommended Disclosures	Recommended Disclosures	Recommended Disclosures
a) Describe the board's oversight of climate-related risks and opportunities.	a) Describe the climate-related risks and opportunities the organization's has identified over the short, medium, and long term.	a) Describe the organization's processes for identifying and assessing climate-related risks.	a) Describe the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.
b) Describe management's role in assessing and managing climate-related risks and opportunities.	b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	b) Describe the organization's processes for managing climate-related risks.	b) Describe Scope 1, Scope 2, and if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.
	c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	c) Describe how processes for identifying, assessing and managing climate-related risks are integrated into the organization's overall risk management.	c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.

Source: *Final Report: Recommendations of the Task Force for Climate-Related Financial Disclosures, TCFD, June 2017.*

While the TCFD framework is a reporting framework and is based on the concept of financial (single) materiality as opposed to double materiality, it is a useful starting point in identifying the key issues to focus on, not just from the standpoint of reporting, but in terms of governance and management as well.

For example, the recommended disclosure of "Describe the board's oversight of climate-related risks and opportunities" should be underpinned by the board ensuring that there is a robust governance structure in place to provide such oversight. Similarly, having to disclose the organisation's processes for identifying and assessing climate-related risks should prod the organisation into considering what risk management framework and measures it should have in place to do so.

Single materiality refers to factors that can have a material impact on a firm's financial performance, financial position, prospects or its value to investors. It is sometimes referred to as "outside-in" as it looks at external factors impacting the firm.

Double materiality focuses not only on the impact of external factors on a firm, but also the a firm's activities that have a material impact on the world around it and on stakeholders. This presents an "inside-out" perspective. Such impact includes sustainability dimensions like climate change, biodiversity and human rights. Therefore, double materiality looks at financial materiality as well as impact materiality, that is, both outside-in and inside-out.

Many of the issues discussed in this report are related to topics that have been identified as important disclosures according to reporting frameworks created by the Global Reporting Initiative (GRI), TCFD and others. However, this report approaches the topics in the context of corporate governance, rather than from a purely reporting standpoint.

Establish the appropriate governance structure

The board is responsible for putting in place an appropriate governance framework for overseeing climate risks and opportunities, and for monitoring how management is addressing the impact of climate risk on the business (outside-in). The board should also ensure that management is taking appropriate steps to reduce the impact of the business on the environment (inside-out).⁶

Good practices to consider for effective climate risk governance include:

- Effective oversight from the board through an appropriate sustainability governance structure.
- Appropriate allocation of senior management responsibility.
- Clear roles, responsibilities, and accountability across all three lines of defence: management and internal controls; risk management and compliance monitoring and reporting; and internal audit.
- Risk frameworks and policies for relevant risk types through which climate risks manifest.
- Board-approved risk appetite and management reporting metrics.
- Effective implementation of clear risk authorities that reflect the materiality of risks.
- Controls embedded into relevant processes covering risk identification, assessment, acceptance/approval, controls, monitoring, and reporting.
- Education and awareness building to develop climate risk understanding at all levels of the organisation.

A recent report published by SFIA and Governance for Stakeholders found that large listed companies in Australia, Malaysia and Singapore adopt a variety of sustainability governance structures.⁷ The report suggests a number of questions that boards of directors should ask when evaluating what structure to adopt.

For example, where sustainability responsibilities, including responsibilities relating to climate risks and opportunities, are not formally embedded into the responsibilities of the board of directors, the board should ask the following questions:

- Is the board adequately discharging its fiduciary responsibilities for sustainability issues, such as with respect to climate risk?
- Are sustainability considerations being factored into board's composition, practices and decision-making?
- Is the impact of sustainability-related risks and opportunities on the business based solely on management's input?

6 European Commission, Guidelines on Reporting Climate-related Information, 2019.
https://ec.europa.eu/finance/docs/policy/190618-climate-related-information-reporting-guidelines_en.pdf

7 Mak Yuen Teen., Who Governs Sustainability?: Sustainability Governance Structures and Practices of Large Australian, Malaysian and Singaporean Companies, Governance for Stakeholders and SFIA, February 2023.
https://www.sfinstitute.asia/wp-content/uploads/2023/03/Who-Governs-Sustainability-SFIA_Final_Mar2023.pdf

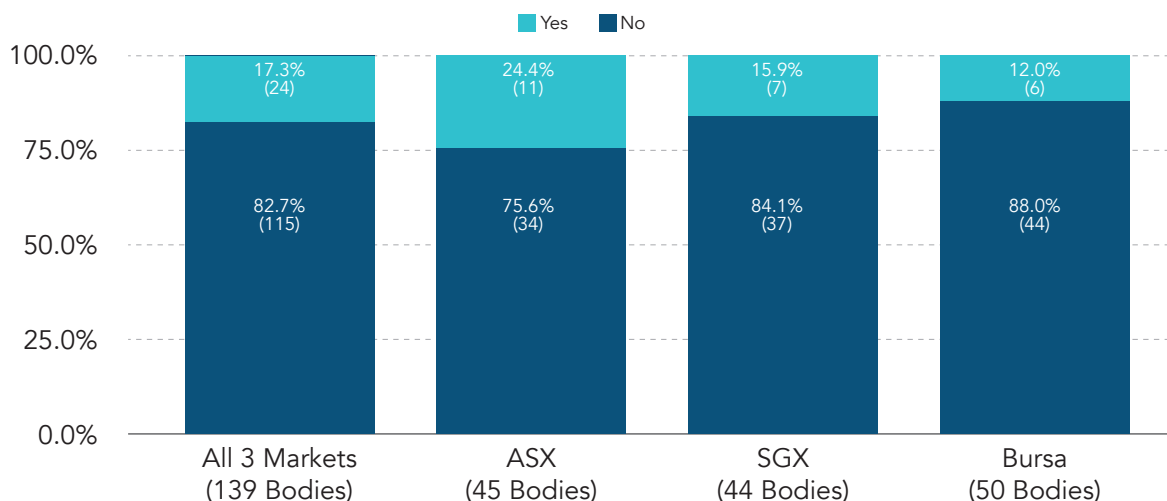
- Are the company’s strategies, policies and practices adequately incorporating considerations of sustainability risks and opportunities?

The board should consider whether to establish a separate board committee to assist in overseeing sustainability risks and opportunities, including those that are climate-related.

Responsibility for managing climate risk should be assigned to someone with a senior management role, such as the chief risk officer, chief financial officer, chief investment officer or chief sustainability officer. It is important that this individual has sufficient authority, stature and support in the organisation to lead the management of climate risk.

The report by SFIA and Governance for Stakeholders found that a small minority of the 150 large companies in the three countries have formed management bodies that are focused specifically on climate and the environment, as shown in Figure 3.

Figure 3: Companies with management bodies focusing on climate and environment



Source: *Who Governs Sustainability?: Sustainability Governance Structures and Practices of Large Australian, Malaysian and Singaporean Companies, Governance for Stakeholders and SFIA, February 2023.*

Have the appropriate expertise in the board and management

Boards of directors need to ensure that they have directors and management who have the appropriate climate-related expertise. This can be supplemented by good external advice.

A report published by the NYU Stern Center for Sustainable Business, based on a study of 1,188 Fortune 100 board directors in 2019, found that while 29% had relevant ESG credentials, most were under the “social” or “S” category and few had climate-related expertise, as shown in Figure 4.⁸

8 Tensie Whelan, US Corporate Boards Suffer from Inadequate Expertise in Financially Material ESG Matters, NYU Stern Center for Sustainable Business, January 2021. <https://www.stern.nyu.edu/sites/default/files/assets/documents/U.S.%20Corporate%20Boards%20Suffer%20From%20Inadequate%20Expertise%20in%20Financially%20Material%20ESG%20Matters.docx%20%282.13.21%29.pdf>

Figure 4: ESG credentials, including climate expertise, of Fortune 100 directors

S Categories	% With Relevant Credentials	E Categories	% With Relevant Credentials	G Categories	% With Relevant Credentials
Workplace Diversity	5.0% (60)	Energy	1.2% (14)	Accounting Oversight/Experts	2.6% (31)
Health Care (Physicians, Hospital, Clinic Boards, Etc.)	3.5% (41)	Conservation/ Nature	1.2% (14)	Regulatory Body (SEC, FCC)	1.0% (12)
Health Challenges/Advocacy	1.9 % (22)	Sustainable Business	.8% (10)	Cyber/Telecom Security	.6% (8)
CSR/ESG	1.5% (18)	Sustainable Development	.8% (10)	Risk	.4% (5)
Civil/Human Rights	1.5% (18)	Environmental Law	.5% (6)	Ethic/Corruption/ Corporate Responsibility	.3% (4)
Youth Education, Health Safety	1.2 (14%)	Environmental Protection	.5% (6)	Fiduciary/Director Responsibility	.3% (4)
Economic/ Community Development	1.1% (13)	ESG Investing	.3% (4)	Governance	.1% (2)
Human Resources	.8% (10)	Climate	.2% (3)		
Adult Education	.7% (9)	Water	.2% (3)		
Nonprofit CEO	.7% (9)				
Philanthropy	.7% (9)				
Sustainable Development	.5% (6)				
Media/Arts	.3% (4)				
Public Policy	.3% (4)				
Affordable Housing	.2% (3)				
Workplace Benefits	.1% (2)				
Nutrition	.1% (2)				
Workplace Safety	.08% (1)				
ESC Investing	.08% (1)				

Source: *US Corporate Boards Suffer from Inadequate Expertise in Financially Material ESG Matters*, NYU Stern Center for Sustainable Business, January 2021.

Colin Low, an independent director and senior advisor with boardroom and executive management experiences across US, Europe and Asia, feels that it is important that directors have more than just general background knowledge of ESG and climate issues. He said, "Directors must have the knowledge and experiences to ask management teams insightful and pertinent questions relevant to climate change. To come up with such questions, directors need to be fully cognisant and knowledgeable about climate change. It is not just about asking questions. Directors must be in a position to mentor, share and coach the management team on the subject. Thus, they must have the knowledge and understand the tools of climate change adaptation. Management is there to execute and bring the sustainability plans to fruition."

Academic Insights

An academic study using a sample of 3,293 firms from 41 countries found that board renewal through majority voting for directors and the introduction of a female director helps to renew a board's thinking on sustainability, leading to significantly higher future environmental performance. Board renewal is more strongly associated with environmental performance in settings with better institutions and more motivated institutional investors.⁹

⁹ Alexander Dyck, Karl V. Lins, Lukas Roth, Mitch Towner and Hannes F. Wagner, Renewable Governance: Good for the Environment?, *Journal of Accounting Research*, March 2023.
<https://onlinelibrary.wiley.com/doi/epdf/10.1111/1475-679X.12462>

Directors should participate in appropriate professional development programmes to keep abreast of fast-changing developments related to the impact of climate change on business and to acquire relevant new knowledge.

The Importance Of Director Education In Climate Change

Rising pressure from regulators, investors and other stakeholders is compelling corporate leaders to learn more about climate change and other ESG issues.

This has led to a growth in ESG education programmes for directors and executives. For example, the Diligent Institute launched in 2022 an ESG certificate programme with corporate leaders in mind. The institute is the corporate governance research arm and think tank of Diligent Corporation, a New York-based governance software provider.

The ESG Leadership Certificate Programme is conducted online. Its interactive e-learning modules feature videos, fireside chats with global ESG experts, curated reading material, and a comprehensive examination. An updated version that includes Asia Pacific content is expected to be launched soon.

Colin Low, a director of several companies in various countries and a member of the institute's advisory board, explains why he signed up for the programme and how it has benefitted him in his role as a director.

Why he attended the programme: "I am interested in understanding the progress, pace of change, and practices in the EU and US. It is important for me to learn about ESG practices in regions outside of Singapore, where I live. A global board director needs to be sensitive to and understand legal and fiduciary responsibilities of directors, and affiliations with multinational holding companies and structures outside of primary operating markets. Legal liabilities for directors of affiliated US and EU companies may include extraterritorial responsibilities for both EU and US sustainability requirements."

What he found particularly interesting: "Gaining a better understanding of climate change; the United Nations' Sustainable Development Goals (SDGs); the many UN bodies and other not-for-profit organisations involved in climate action, such as SBTi (Science Based Targets initiative), GFANZ (Glasgow Financial Alliance for Net Zero) and CDSB (Climate Disclosure Standards Board); and how they interact and interface

amongst each other when implementing sustainability initiatives. Of course, since then, there has been a consolidation of a number of these bodies into the International Sustainability Standards Board, which indicates how quickly this area is evolving.”

How it has benefitted him as a director: “Attending the programme has helped me to be more knowledgeable about the oversight of climate risk and sustainability initiatives. It has better equipped me to recommend and support the appropriate sustainable reporting frameworks.

“Insights gained from the programme are useful for boards and remuneration committees in considering aligning management metrics and incentives with commitments to and achievement of climate action targets. What I have learned about carbon credits, carbon markets and carbon pricing enables me to evaluate the strategies that companies can use to accomplish net zero by 2050.”

“The knowledge from the programme has immediately translated to my directorships. I am able to question the pace and level of compliance of the companies’ sustainability initiatives, in line with stock exchange requirements and industry mandates.”

Whether such programmes are useful for directors in a wide range of sectors: “The programme I attended is industry agnostic. For instance, it provides an understanding of the interconnections among the countries that have signed the COP26 pledges (the Glasgow Climate Pact) and the Paris Agreement, which require nations to map out and execute national-level climate plans. Companies in various industries have different target time frames for setting their agendas and plans to comply with both industry mandates and country-level net zero requirements by 2050. These corporate commitments are pegged legislatively to country-level emission requirements in phases. So, the programme is relevant to any board director, not simply those in oil and gas companies. Climate change affects every country, every company and every economic sector!”

There are many ESG programmes available and directors should carefully assess the credentials of the organisations and individuals delivering the programmes.

Ensure that the impact of climate risk on the business is adequately understood, considered and addressed

Direct claims against directors for acts or omissions relating to climate change is an emerging risk for boards, especially in certain countries.¹⁰ In February 2023, environmental organisation ClientEarth filed a derivative action against the board of directors of Shell at the High Court of Justice in England and Wales. The lawsuit alleges that the board has failed to manage material and foreseeable climate risks, therefore breaching UK company law.¹¹ This followed the groundbreaking decision by the Hague District Court in

¹⁰ Allen & Overy, Risks for Directors in the Spotlight: Climate Litigation, July 2022.

<https://www.allenoverly.com/en-gb/global/news-and-insights/publications/risks-for-directors-in-the-spotlight-climate-litigation#:~:text=against%20such%20risks.-,Download%20PDF,-Overview>

¹¹ Maria Antonia Tigre and Cynthia Hanawalt, The Fiduciary Duty of Directors to Manage Climate Risk: An Expansion of Corporate Liability Through Litigation?, Climate Law (blog), Columbia Law School, February 2023.

<https://blogs.law.columbia.edu/climatechange/2023/02/15/the-fiduciary-duty-of-directors-to-manage-climate-risk-an-expansion-of-corporate-liability-through-litigation/>

May 2021 to order Shell to reduce emissions from its own operations and the end-use of its products by 45% below 2019 levels by 2030. Shell is appealing that decision.

It remains to be seen whether shareholder actions would be successful (the action by ClientEarth failed), would be successful, or whether regulators around the world will hold directors accountable for breach of duty when boards fail to adequately oversee climate risks related to their companies. However, what is indisputable is that directors' duties have evolved and directors are now judged not on the basis of actual knowledge and conduct but instead on what they ought to have known or done. The test currently applied to directors is an objective test of what the reasonable person ought to know about a variety of topics, including those pertaining to climate change.¹²

A KPMG survey of 467 corporate directors and C-suite executives in 2021 found that only 17% of boards are considering to a great extent the impact of climate change in their oversight of strategy.¹³ However, more recent surveys of C-suite executives by Deloitte and of directors by PwC indicate a significant increase in the extent to which climate risk is being considered in strategy.^{14,15}

Board members need to consider all the ways climate change could impact their business. If they do not have an adequate understanding of climate risks and opportunities, they may fail to see the bigger contagion risks, including those in their blind spots.

Ensure that management is undertaking in-depth analysis

Management should look closely at data on how a changing climate could affect their business. For instance, they should seek to understand how global heat stress could increase the cost of their raw materials or how extreme weather events experienced by customers could hit revenue.

These risk calculations can be based on a relatively conservative assumption about global warming – less than 2°C above pre-industrial levels, or as it is becoming more common place, 1.5°C. These risks are not far in the future. They could become a reality this decade.

For an individual firm, understanding climate risk also depends on transparency around the geographic exposure of assets and operations.¹⁶ The location of the assets is one key factor in determining the extent of some of these risks, especially physical risk. For example, if a multinational enterprise has factories or farms around the world, some of these may be in regions susceptible to floods, drought or forest fires. Company exposure and resilience does not conform to clear patterns, highlighting the need for in-depth analysis to evaluate climate risk at the asset and company level.¹⁷ Banks must aim to embed climate-risk factors into decision making across their front- and back-office activities and for both financial and non-financial risks (including operational, legal, compliance, and reputational risks).¹⁸

12 Ashurst, The Evolution of Directors' Duties in the Context of Climate Change, Legal Governance Advisory Update, March 2022.
<https://www.ashurst.com/en/news-and-insights/legal-updates/the-evolution-of-directors-duties-in-the-context-of-climate-change/>

13 KPMG, Seeing Climate as a Critical Business Issue for the Board, September 2021.
<https://boardleadership.kpmg.us/relevant-topics/articles/2022/seeing-climate-as-critical-business-issue-for-board.html>

14 Deloitte 2023 CxO Sustainability Report, January 2023.
<https://www.deloitte.com/content/dam/assets-shared/legacy/docs/2023-deloitte-cxo-sustainability-report.pdf>

15 PwC's 2022 Annual Corporate Directors Survey, October 2022.
<https://www.pwc.com/us/en/services/governance-insights-center/assets/pwc-2022-annual-corporate-directors-survey.pdf>

16 S&P Global, The Big Picture on Climate Risk, January 2020.
<https://www.spglobal.com/en/research-insights/featured/special-editorial/the-big-picture-on-climate-risk>

17 Ibid.

18 Joseba Eceiza, Holger Harreis, Daniel Härtl and Simona Viscardi, Banking Imperatives for Managing Climate Risk, McKinsey & Company, June 2020. <https://www.mckinsey.com/capabilities/risk-and-resilience/our-insights/banking-imperatives-for-managing-climate-risk>

Some central banks are also starting to encourage the banking sector to incorporate Environmental & Social Risk Management Frameworks into their strategies and operations.

Academic Insights

Although climate change impacts most regions, firm-level climate risk is somewhat unpredictable and undiversifiable, according to one study that examined how a company's physical location and geographic diversification affect this risk. Further, geographic dispersion increases a firm's exposure to extreme climate event risks. This effect is more pronounced in industries in which environmental issues are financially material and is mitigated by better environmental performance of the firm. In addition, the effect increases with investor awareness.¹⁹

¹⁹ Li Ai and Lucia S. Gao, Firm-Level Risk of Climate Change: Evidence from Climate Disasters, *Global Finance Journal*, February 2023. <https://doi.org/10.1016/j.gfj.2022.100805>

The company's in-depth analysis can also help identify opportunities. For instance, the management may discover that it could create significant new revenue streams by adding weather-resistant product lines.

Forward-thinking firms and their leaders are managing their climate strategies by defining clear pathways to decarbonising the business. That is, they are managing their impact on the climate while also focusing on the climate's impact on their businesses.

Hence, the board of directors should determine whether management's approach to understanding the impact of climate change on the company is robust and underpinned by in-depth analysis of good and relevant data.

Take an integrated, strategic approach

As with any form of disruption, climate change is creating risks and opportunities for business in diverse ways. Investors, regulators and other stakeholders are challenging companies to take an integrated, strategic approach to addressing climate change.

While good governance should already include effective climate governance, general governance guidance is not necessarily sufficiently detailed or nuanced for effective board governance of climate issues. This is because climate change is a new and complex issue for many boards. It entails grappling with scientific, geopolitical, macroeconomic and policy uncertainties across broad timescales and beyond board terms.

The following are suggested steps that companies can take in adopting an integrated strategic approach:

1. First, they need to understand the ramifications of climate change and its systemic impact on their business models and society at large.
2. Second, companies can use impact chains²⁰ to manage climate risk by developing cause-oriented

²⁰ Marc Zebisch, Stefano Terzi, Massimiliano Pittore, Kathrin Renner and Stefan Schneiderbauer, *Climate Impact Chains—A Conceptual Modelling Approach for Climate Risk Assessment in the Context of Adaptation Planning*, Springer Climate book series, January 2022. https://link.springer.com/chapter/10.1007/978-3-030-86211-4_25

climate risk and vulnerability assessments. Impact chains are based on cause-effect models that include all major factors and processes leading to specific climate risks in a specific context (e.g., regional and/or sectoral). For example, a flood (the cause) leads to property damage and business interruption (the effect). Or a climate risk (e.g., drought damage in agriculture) results from the interactions between climate-related hazards (e.g., droughts) with exposure (e.g., agriculture land) and vulnerability (e.g., drought resistance of crops, presence or absence of irrigation) of the social-ecological systems. Adaptation strategies can reduce climate risks, mainly by reducing vulnerabilities, but also by reducing exposure or the climate hazard itself.

3. Third, the adoption of the net zero target which should be accompanied by a transition pathway.

Boards have an important role to play in ensuring that an integrated strategic approach is used to address climate risks and opportunities.

BEWARE THESE PITFALLS

In A Nutshell

What are the main pitfalls relating to climate risk that our company should be aware of, and what are the consequences if we do not address them?

No company is immune to the effects of climate change. Ignoring or underestimating climate risk can be costly. Here are key problem areas for the board to bear in mind:

- Climate risk blind spots
- Failure to comply with regulatory requirements
- Contagion risk exposure from climate change

There is no ready answer to this question that is appropriate for every company. Nevertheless, every company should be aware that climate change is already underway and will only accelerate, with knock-on effects on global supply chains, current business models and profitability, economies, and geopolitics. Hence, all companies, big and small, are potentially exposed to climate change and its impacts. There is no immunity, even for companies with low or negligible carbon emissions.

There are three pitfalls that all companies should be particularly mindful of: climate risk blind spots, failure to comply with regulatory requirements, and contagion risk exposure from climate change.

Climate risk blind spots

The question of climate-related blind spots will be important for companies going forward. If not recognised and addressed, the impact and consequences could be devastating and pose a threat to the companies' long-term sustainability.

In the introduction, we cited a report by PwC and Strategy& published in 2022 which found that business leaders know about the looming physical dangers of climate change in a general sense, but have much less of an understanding of the specific impact that climate change could have on their business. This suggests that companies may be vulnerable to climate risk blind spots.

A survey of 861 finance academics, professionals, and public sector regulators and policy economists, conducted in July 2021, identified regulatory risk as the top climate risk to businesses and investors over the next five years, but physical risk was viewed as the top risk over the next 30 years. Financial markets are arguably also vulnerable to blind spots as respondents by an overwhelming margin believe that asset prices underestimate climate risks rather than overestimate them.²¹

To help mitigate the risk of developing climate blind spots, the board should ensure that climate change topics are ongoing items for discussion at board meetings, and that the company has an appropriate sustainability governance structure and effective practices in place to oversee and manage climate risks and opportunities.

²¹ Johannes Stroebe and Jeffrey Wurgler, What Do You Think About Climate Finance?, *Journal of Financial Economics*, November 2021. <https://www.sciencedirect.com/science/article/abs/pii/S0304405X21003494>

Food For Thought

A critical aspect of managing ESG risks is the materiality assessment of ESG factors. Companies should ensure they have a robust process for the materiality assessment, with the involvement of the board of directors, as stakeholders with pertinent views and as part of their oversight role.

A review of the four largest listed Malaysian companies in a sector that has faced accusations of poor labour management practices shows that only one of the four included at least one environmental-related factor among the most material ESG factors in terms of impact or significance for stakeholders and the company. Among the most material ESG factors identified by this company are environmental compliance, climate change, and waste and effluent management.

There could be good reasons for companies in the same sector singling out different sets of material ESG factors. Nevertheless, boards need to be mindful that they do not underestimate the importance of certain ESG factors, particularly those that are climate-related because such factors require longer-term commitments. In comparison, other ESG factors tend to get more attention because they demand immediate action.

Increasing regulatory requirements

Publicly listed companies are under greater ESG scrutiny today, especially those in high-risk industries such as banking, oil and gas, industrials, and transportation. However, the impact of increasing regulatory requirements will eventually be felt across various sectors and by most businesses, including unlisted companies and SMEs. In some cases, part of the impact is due to rules imposed on customers and business partners.

Some countries and stock exchanges have mandated or will soon mandate certain ESG disclosures, including those that are climate-related. Here are examples:

- The UK, France, Switzerland, and several other European countries require companies to report according to the TCFD framework.
- The European Union's Corporate Sustainability Reporting Directive requires large and most listed companies in the EU to issue a formal set of annual non-financial disclosures based on the double materiality perspective in accordance with the European Sustainability Reporting Standards. This applies to EU companies, non-EU companies meeting certain thresholds for net turnover in the EU, and companies (even those outside the EU) with securities listed on a regulated EU market.²²
- The US Securities and Exchange Commission (SEC) has proposed new rules for company disclosures regarding ESG policies. At the time of writing, these rules have yet to be finalised, but SEC officials have signalled that financial services firms that are facing SEC examinations should prepare for a round of reviews in which ESG concerns will be a high priority. The regulator has also been working for over a year on requirements for businesses to disclose how they identify and manage climate risks, how these risks can affect the companies, the relevant scenario analysis, and how the board oversees these risks.

²² Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting.
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2022.322.01.0015.01.ENG&toc=OJ%3AL%3A2022%3A322%3ATOC

- Stock exchanges in six ASEAN countries – Indonesia, Philippines, Malaysia, Singapore, Thailand and Viet Nam – mandate sustainability disclosures. GRI is the predominant framework in use.
- In June 2023, the International Sustainability Standards Board (ISSB) announced the issuance of its first two standards for disclosure of sustainability-related financial information – IFRS S1 (general requirements) and IFRS S2 (climate). This is accompanied by transitional reliefs that enable companies to focus initial efforts on ensuring that they meet investor information needs around climate change. This means that companies can prioritise putting in place reporting practices and structures to provide high-quality, decision-useful information about climate-related risks and opportunities in the first year of reporting using the ISSB Standards.²³

Failure to conform to regulatory requirements could lead to the imposition of financial penalties or litigation risks, in addition to reputational damage and loss of business.

Contagion risk exposure

When considering the potential impact of climate change, regulators and the business community also have to take into account the possibility of system-level events and scenarios whose risks could be latent or even totally unknown at present.

For example, climate change does not just alter weather patterns, such as temperature or rainfall. It also triggers holistic or system-level changes in oceans and land surfaces. As a result, mountain glaciers shrink, the ice melt in Antarctica and the Arctic accelerates, and plant life cycles shift. This can occur over decades or even longer.

Take the case of how the lack of rainfall, which has seen water levels drop in the two artificial lakes that supply the Panama Canal, has forced the canal to reduce shipping traffic. This water crisis is threatening the future of this important maritime route that connects the Atlantic and Pacific oceans.²⁴

²³ ISSB Decides to Prioritise Climate-related Disclosures to Support Initial Application, press release, April 2023.

<https://www.ifrs.org/news-and-events/news/2023/04/issb-decides-to-prioritise-climate-related-disclosures-to-support-initial-application/>

²⁴ Panama Canal: Drought Threatens One of the World's Most Important Shipping Routes. Euronews Green/AFP, April 2023.

https://www.euronews.com/green/2023/04/26/panama-canal-drought-threatens-one-of-the-worlds-most-important-shipping-routes?utm_source=newsletter&utm_medium=green_newsletter&utm_op=eyJndWlkjoiZWRkMjhhkZjgxmjVhYzgwNjMwNmMwNGM2MzlxZmZIMDQif-Q%3D%3D

BUSINESS IMPACT OF CLIMATE RISK

In A Nutshell

How will the different types of climate risk affect our company and business?

In order to respond effectively to climate change, there first ought to be a deep understanding of the physical and transition risks and the opportunities that it creates.

Key issues for the board to consider:

- Physical and transition risks and how they may impact the company and business
- Opportunities for our company arising from these risks

Physical and transition risks

Climate change creates two types of risks for businesses:

- Physical risk is risk associated with resource, operational or programmatic impairment of economic activity attributable to climate change, and the corresponding impact on asset performance. Physical risks are either acute or chronic. Examples include those related to extreme weather events (acute) or rising sea-levels (chronic).
- Transition risk is risk associated with the uncertain financial impacts that could result from a transition to net-zero emissions or a low-carbon economy. Essentially, it can be thought of as climate risk arising from mitigation challenges as societies decarbonise. It could arise from new regulations, changes in consumer sentiments, or technological disruptions.

Academic Insights

One study developed a framework to assess the ability of electric utilities to sustain the forced impairment of carbon-emitting power plants and applied it to European electric utilities. It applied the framework to these utilities under scenarios set out by the European Commission to limit global warming by imposing net zero carbon emissions constraints on companies. The authors concluded that most European utilities have the financial capacity to meet the requirements under the scenarios with timely actions. However, a delay of as little as five years could cause serious financial problems across the sector.²⁵

²⁵ Conor Hickey, John O'Brien, Ben Caldecott, Celine McInerney and Brian Ó Gallachóir, Can European Electric Utilities Manage Asset Impairments Arising from Net Zero Targets?, Journal of Corporate Finance, October 2021. <https://www.sciencedirect.com/science/article/abs/pii/S0929119921001978#:~:text=We%20conclude%20that%20most%20European,the%20scenarios%20with%20timely%20action.>

Impact on businesses

These risks can impact businesses in a number of ways, such as:

- Specific or combination of weather hazards that might impact businesses across their whole value chains, be it the procurement of raw materials, supply chain disruptions, and even demand-side disappearance, as a result of business interruptions, discontinuity or loss of market share, etc.
- Transition risk can lead to stranded assets that continue to lose their value, or business obsolescence due to technological disruptions, or even loss of market share due to regulations or the inability to adapt to a greener or low-carbon business environment by offering sustainable products and services, etc.

A report by PwC and Strategy& cited some real-life examples of the wide-ranging impact of climate change, including a conglomerate facing a large increase in costs in its supply chain due to extreme weather events; a large retailer with dozens of critical facilities at elevated risk of extreme weather that could more than double the company's transportation costs by 2030; a global industrial equipment maker having to redesign its flagship product and then retrofit its installed base to avoid its product malfunctioning in areas where climate change is making conditions wetter; and drought and declining snowpack levels threatening low-cost hydroelectric power sources in the western US, forcing a number of technology companies to reappraise their mix of sustainable energy sources to fuel their power-hungry data centres.²⁶

Academic Insights

A recent academic study examined the impact of physical climate risks on firms' financial performance and operational risk management in global supply chains.²⁷ It found that weather shocks at supplier locations reduce the operating performance of suppliers and their customers. Customers may respond to perceived changes in suppliers' climate-risk exposure by changing their suppliers to those with lower climate risk exposures. When actual weather shocks exceed prior expectations, customers are 6 to 11% more likely to terminate existing supplier relationships. The impact depends on certain factors, such as repetition in such weather shocks, and increases with industry competitiveness and decreases with supply chain integration. This study is one of the first to document statistically how physical risk affects both customers and suppliers, and shows that suppliers that face higher physical risk could be replaced.

²⁷ Nora M.C. Pankratz and Christoph M. Schiller, Climate Change and Adaptation in Global Supply-Chain Networks. Finance and Economics Discussion Series, Federal Reserve Board, August 2022. <https://www.federalreserve.gov/econres/feds/files/2022056pap.pdf>

²⁶ Emma Cox, Colm Kelly, Barry Murphy and Nicole Röttmer, Time to Get Serious About the Realities of Climate Risk, PwC and Strategy&, May 2022. https://www.pwc.com/gx/en/issues/reinventing-the-future/take-on-tomorrow/download/SBpwc_2022-05-16-Climate-r2.pdf

Academic Insights

A substantial number of recent academic studies have found that climate-related factors affect risk premia, cost of capital, stock returns, and other outcomes.

One study using data for S&P 500 companies from January 2010 to June 2018 found that on days with an unexpected increase in climate change concerns (measured using a daily Media Climate Change Concerns index constructed by the researchers), green firms' stock prices tend to increase while brown firms' prices decrease. This effect holds for both transition and physical climate change risk. An unexpected increase in climate change concerns was also found to be associated with an increase in the discount rate of brown firms and a decrease in the discount rate of green firms.²⁸

Another study using US firms and data from 2005 to 2015 found that an investment strategy of "long carbon-efficient firms and short carbon-inefficient firms" earned abnormal returns of 3.5 to 5.4% per year. Carbon-efficient firms tended to be "good firms" in terms of financial characteristics and corporate governance. The results were not limited to a small set of industries, variations in oil prices or the low interest-rate regime environment at that time.²⁹

Researchers who relied on statutory disclosures to measure firm-level climate risk exposure of US listed companies, found evidence consistent with a lower market value and a higher cost of capital for firms with higher exposure to climate risk.³⁰ Another study using carbon dioxide emission rates of publicly traded US electric companies concluded that the costs of equity and debt financing increase with the level of exposure to climate risk.³¹

Studies that include non-US firms have also found similar results. One study found that green assets delivered higher returns in recent years, reflecting unexpectedly strong increases in environmental concerns, not high expected returns. German green bonds outperformed their higher-yielding non-green twins as the green premium widened, while US green stocks outperformed brown as climate concerns strengthened.³² [Note: These studies would not have included returns during the recent energy crisis, during which oil and gas firms achieved high short-term returns.]

Another study found that as the world transitions away from fossil fuels, companies are exposed to carbon-transition risk. Based on a study of 14,400 firms in 77 countries, carbon premia related to emissions growth was found to be greater for firms located in countries with lower economic development, larger energy sectors, and less inclusive

28 David Ardia, Keven Bluteau, Kris Boudt and Koen Inghelbrecht, Climate Change Concerns and the Performance of Green Versus Brown Stocks, *Management Science*, April 2023. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3717722

29 Soh Young In, Ki Young Park and Ashby Monk, Is 'Being Green' Rewarded in the Market?: An Empirical Investigation of Decarbonization and Stock Returns, Stanford Global Project Center working paper, August 2019. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3020304

30 Henk Berkman, Jonathan Jona and Naomi S. Soderstrom, Firm-Specific Climate Risk and Market Valuation, working paper, March 2023. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2775552

31 Linda H. Chen and Lucia Silva Gao, The Pricing of Climate Risk, *Journal of Financial and Economic Practice*, Spring 2012. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1940727

32 Ľuboš Pástor, Robert F. Stambaugh and Lucian A. Taylor, Dissecting Green Returns, *Journal of Financial Economics*, November 2022. <https://www.sciencedirect.com/science/article/abs/pii/S0304405X22001672>

political systems. Premia related to emissions levels, however, are higher in countries with stricter domestic climate policies, with such premia having increased with investor awareness about climate change risk.³³

Using a sample of more than 13,000 firms in 93 countries from 1995 to 2019, one study found that increasing exposure to extremely high temperatures, based on number of hot days, reduces firms' revenues and operating income. Deviation in analyst estimates from actual financial performance and earnings announcement returns become more negative when firms' heat exposure increases. These findings indicate that investors do not fully anticipate the economic repercussions of heat as a first-order physical climate risk.³⁴

Drought risk increases the cost of equity capital, according to another study. The cost of equity capital for firms affected by severe drought conditions is estimated to be 92 basis points higher.³⁵

One study found that following Australia's ratification of the Kyoto Protocol, which mandates the country to reduce carbon emissions and thereby exposing Australian firms to increased carbon risk, there was a decrease in financial leverage of heavy carbon-emitting firms. The decrease was more pronounced for financially constrained firms. Increased carbon risk was found to increase financial distress risk, motivating firms to decrease financial leverage.³⁶

33 Patrick Bolton and Marcin T. Kacperczyk, *Global Pricing of Carbon-Transition Risk*, *Journal of Finance*, forthcoming. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3550233

34 Nora M. C. Pankratz, Rob Bauer, and Jeroen Derwall, *Climate Change, Firm Performance, and Investor Surprises*, working paper, April 2022. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3443146

35 Thanh D. Huynh, Thu Ha Nguyen and Cameron Truong, *Climate Risk: The Price of Drought*, *Journal of Corporate Finance*, December 2020. <https://www.sciencedirect.com/science/article/abs/pii/S0929119920301942>

36 Justin Hung Nguyen and Hieu V. Phan, *Carbon Risk and Corporate Capital Structure*, *Journal of Corporate Finance*, October 2020. <https://www.sciencedirect.com/science/article/abs/pii/S0929119920301577>

Impact on banking and finance

In the case of financial institutions (FIs), particularly banks, the main implications of climate change are:

- Adverse impact on the credit, market, operational, legal, reputational, and strategic risks faced by these FIs as well as on the financial stability of the banking system.
- Since the banking sector is by far the largest channel of financial intermediation in most countries, including in emerging markets, the banks will have to manage their financial exposure affected by climate change and at the same time, mitigate the impact of global warming by financing a green agenda. The banks' cost of capital may increase.
- As risks associated with climate change and natural capital degradation increase, and the availability and cost of insurance worsen, the resulting reduction in credit quality and collateral value of loans will significantly impact the banking sector.

Academic Insights

Several empirical studies have found that banks' lending policies and risks are affected by physical and transition risks of their customers.

One US study covering more than 2,600 firms over the period from 2000 to 2016 found that loans initiated after the firms' first adverse climate-related incidents, such as oil spills, excessive carbon emissions and deforestation projects, had significantly higher spreads, shorter maturities, more covenant restrictions, and higher likelihood of being secured by collateral. The intensity and influence of these adverse incidents exacerbated the pricing of bank loans.³⁷

Another study of 32,999 unique bank loans issued to 5,243 unique US firms from 1986 to 2017 found that firms in locations with higher exposure to climate change paid significantly higher spreads on their bank loans. The exposure of a firm's customers to climate risk also adversely affected that firm's cost of borrowing.³⁸

A report by the Federal Reserve Bank of Chicago documented changes in bank loan portfolios since 2012 in response to climate change. It found that the largest US banks significantly reduced lending to areas more impacted by climate change starting around 2015. However, there was considerable heterogeneity. Banks reduced lending more for the riskier loans and to borrowers with high credit risk. At the same time, they expanded lending, including riskier loans, to borrowers with the lowest credit risk in areas more impacted by climate change.³⁹

A staff report of the Federal Reserve Bank of New York investigated US banks' exposures to transition risks. The preliminary findings show that while banks' exposures are meaningful, they are manageable. Exposures vary by model and policy scenario, with the largest estimates coming from a model based on disorderly transition scenario. There is a downward trend in banks' exposures to the riskiest industries, which appears to be at least in part due to banks gradually reducing funding to these industries.⁴⁰

A study used the Clean Air Action Plan implemented by the Chinese government in 2013 as a quasi-experiment, and examined more than one million loans granted to all non-financial firms from 2010 to 2016 in six prefectures in Jiangsu, one of China's most densely populated provinces. It found that the default rates of high-polluting firms rose by around 80%. Joint equity commercial banks with lower degree of policy commitment and better corporate governance structure were able to appropriately manage their exposure to transition risks, while the state-owned banks failed to factor in such risks when extending credit to the borrowers targeted by the environmental

37 Deniz Anginer, Karel Hrazdil, Jiyuan Li and Ray Zhang, Adverse Climate Incidents and Bank Loan Contracting, working paper, October 2020. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3723771

38 Siamak Javadi and Abdullah-Al Masum, The Impact of Climate Change on the Cost of Bank Loans, *Journal of Corporate Finance*, August 2021. <https://www.sciencedirect.com/science/article/abs/pii/S0929119921001401>

39 Ralf R. Meisenzahl, How Climate Change Shapes Bank Lending: Evidence from Portfolio Reallocation, working paper, Federal Reserve Bank of Chicago, March 2023. https://www.chicagofed.org/-/media/publications/working-papers/2023/wp2023-12.pdf?sc_lang=en

40 Hyeyoon Jung, João A. C. Santos and Lee Seltzer, US Banks' Exposures to Climate Transition Risks, staff report, Federal Reserve Bank of New York, April 2023. https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr1058.pdf?sc_lang=en

regulation.⁴¹ A study in Poland found that banks exposed to more climate policy-relevant sectors were more sensitive to changes in environmental risk drivers and were subject to higher credit risk than those exposed to less carbon-emitting sectors.⁴²

41 Bihong Huang, Maria Teresa Punzi and Yu Wu, Do Banks Price Environmental Transition Risks?: Evidence from a Quasi-Natural Experiment in China, *Journal of Corporate Finance*, August 2021. <https://www.sciencedirect.com/science/article/abs/pii/S0929119921001048#:~:text=If%20banks%20are%20well%20informed,from%20the%20tightened%20environmental%20regulation>

42 Marcin Borsuk, Climate-Policy-Relevant Sectors and Credit Risk, *Journal of Credit Risk*, March 2023. <https://www.risk.net/journal-of-credit-risk/7956264/climate-policy-relevant-sectors-and-credit-risk>

Notwithstanding the downside risks discussed above, a firm understanding of climate risk also helps banks and other FIs to identify opportunities arising from climate change, particularly in the areas of resource efficiency, energy sources, new products and services, new markets, and improved resilience and security of supply chains. These opportunities are focused on climate change mitigation and adaptation solutions, and the transition to a lower-carbon economy, especially in the following business models and activities:

- Participation in the carbon market
- Development and/or expansion of low-emission goods and services
- Development of climate adaptation and insurance risk solutions
- Development of new products or services through R&D and innovation
- Access to new markets
- Use of public-sector incentives
- Access to new assets and locations needing insurance coverage
- Participation in renewable energy programmes and adoption of energy efficiency measures
- Resource substitutes/diversification

Climate change brings opportunities too

Non-financial companies can also benefit from these opportunities arising from climate change.

Case Study: Xcel Energy⁴³

Xcel Energy provides an example of how a non-FI capitalised on a climate-related opportunity in the area of clean energy transition, to enhance customer experience and keep customer bills low through green financing. This helps to advance the company's strategic priorities.

Xcel Energy has issued 11 green bonds since 2018, totalling nearly US\$4.7 billion, to

43 Xcel Energy, Green Financing: Impact Report, September 2021. https://s25.q4cdn.com/680186029/files/doc_downloads/irw/Green_Bonds/XEL-Green-Bond-Report-Sept-2021-Update.pdf

finance a portion of their national-leading wind energy buildout. The proceeds funded 14 wind projects that will reduce the company's environmental impact and provide customers with additional clean energy options. Because they reduce fuel costs and make use of federal tax credits, the projects also lower the customers' energy costs. With more than 3 gigawatts of total renewable energy funded through green financing, the projects help propel the company towards its goals of reducing carbon emissions by 80% by 2030 from 2005 levels, and ultimately delivering 100% carbon-free electricity by 2050. Annually, Xcel Energy expects to avoid more than 5 million tons of carbon emissions from green bond-funded projects, totalling more than 140 million tons over the lives of the projects.

Case Study: AET Tankers

Business model change for the mid to long term

AET Tankers is an energy logistics solution company that provides ship leasing, management, and operation of petroleum tankers for transporting petroleum and crude oil to energy majors, refineries, and trading houses. Among its business priorities are the energy transition and a sustainability plan for net zero by 2050. The company's current climate change and sustainability initiatives include:

1. Dual-fuel ships on all new builds in DPST, VLCC and Aframax class ships.
2. Focus on energy-efficient operations over the short-term (2021-2025) and medium term (2021-2030). Progressive fleet renewal to decarbonised fuel.
3. Develop low-carbon or zero-emission vessels that are ammonia-powered. This is an industry leading initiative that may change the industry paradigm and the technology for zero-carbon ships. Since April 2022, AET has announced plans for five ammonia-powered vessels.
4. Investment in a digital venture company based in Singapore for efficient fleet, spares management and ship operations. Strategic investment in climate tech startup Daphne Technology with the aim of reducing methane slip.

Strategic thinking for the long term

Besides reducing its carbon footprint in the current business model, AET must change that business model because petroleum reserves are finite. Based on current consumption and exploration estimates, the crude oil supply is expected to run out between the late 2030s and early 2040s. It is very critical for AET to find a new business, whilst managing its energy transition and meeting the UN SDG goals. New areas of business may include:

- Renewable energy sectors that involve skill sets that can be transferred from the current petroleum logistics and ship leasing and management business
- Carbon capture and storage
- Zero-emission logistics
- Logistics and transport of greenhouse gases

There is an immediate need to identify a new sustainable platform for AET. In parallel with managing the current business, the company has to do test bedding and business modelling, and build a sizeable talent pool for the new growth business by 2030. It is the responsibility of the board and management to do so.

Source: Colin Low, independent director, AET Tankers

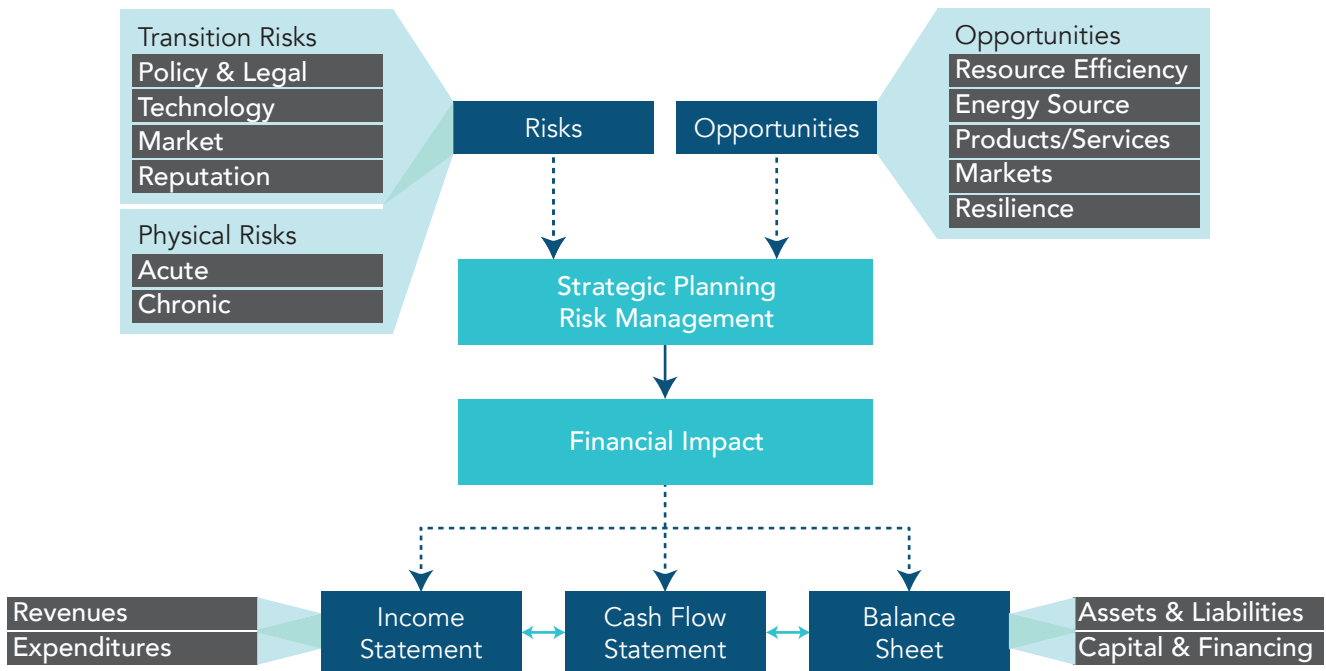
Academic Insights

One academic study examined 1,189 corporate green bonds issued around the world from 2013 to 2018 and found that investors respond positively when the issue of the bonds is announced. The green bonds were most prevalent in China, the US and Europe (especially in the Netherlands, France and Germany). This response is stronger for first-time issuers and for bonds certified by third parties. Issuers of such bonds were found to have improved their environmental performance post-issuance (based on higher environmental ratings and lower CO2 emissions), and have experienced an increase in ownership by long-term and green investors.⁴⁴

44 Caroline Flammer, Corporate Green Bonds, Journal of Financial Economics, November 2021. <https://www.sciencedirect.com/science/article/abs/pii/S0304405X21000337>

Figure 5 below provides a broad overview of the climate-related risks, opportunities and financial impact.⁴⁵

Figure 5: Climate-related Risks, Opportunities and Financial Impact



Source: Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures, TCFD, June 2017.

45 TCFD, Final Report, Recommendations of the Task Force on Climate-related Financial Disclosures, June 2017. <https://assets.bbhub.io/company/sites/60/2021/10/FINAL-2017-TCFD-Report.pdf>

KEEPING A COMPANY SUSTAINABLE BY ADDRESSING RISKS AND OPPORTUNITIES

In A Nutshell

What are the strategic and critical climate risks and opportunities that our company should address in order to remain sustainable?

One of the factors determining a company's sustainability today is the strength of its climate change adaptation. Key issues for the board to consider:

- How to address the legacy culture and change mindsets
- How to reduce the company's dependency on traditional energy sources in a meaningful and substantive way
- Strategic opportunities that the company can capitalise on to support the transition away from traditional energy sources, such as in green infrastructure

Addressing a legacy culture by changing mindsets

It is a priority for companies to address the existing or legacy issues related to the corporate and risk culture of their firms. They need to embark on an enterprise-wide mindset change as the energy transition involves a different mindset.

Earlier, we discussed the importance of renewal, appropriate sustainability-related expertise, and continuing education for the board of directors. These, together with diversity of perspectives, are important to facilitate mindset change, which must start with the board of directors. Boards should not underestimate the challenge of changing culture and mindsets, especially when the company is doing well and the thinking may be "If it ain't broke, why fix it?". Directors and management who are familiar and comfortable with their existing business may be resistant to change.

Boards also need to ensure that their companies' human capital strategies and hiring policies are aligned with their energy transition goals.

Case Study: Belgian ESG leaders⁴⁶

A recent study by global consultancy Bain & Company found that increasing numbers of executives in Belgium are reshaping how companies operate to benefit from ESG's financial and societal value. While there has been tremendous progress in this area, the executives recognise that they still need to go faster and act more boldly. They also acknowledge the need to overcome complex challenges and barriers to greater action.

⁴⁶ Jean-Charles van den Branden, Piet de Paepe, Magali Deryckere, and Jelle Dhaen, Belgian Companies Use ESG to Create Value and Differentiate, Bain & Company, February 2023.
<https://www.bain.com/insights/belgian-companies-use-esg-to-create-value-and-differentiate/>

Short-term headwinds, such as the war in Ukraine, add to the difficulty.

These emerging ESG leaders are acting decisively to capture both short-term and long-term value. They share best practices, showing the way for others to create a more sustainable society. They are driving a fundamental change in their companies' approach to ESG issues. Once regarded as a risk to be mitigated, ESG is now appreciated as one of the biggest value-creation opportunities and industry shifts of our time.

Of the 29 executives from top Belgian companies interviewed, 62% said they have quantified their ESG ambitions, 95% recognise they can or should do more, and 86% believe taking action on ESG issues creates additional commercial and societal value over and above reinforcing their licence to operate.

The respondents explained how ESG creates value in many ways, helping them to cut costs; sell more and increase prices; attract and retain talent; and increase their company value. Importantly, 54% see ESG as a way to develop new businesses beyond their core, which might be achieved by reinventing the core, such as serving their existing customer base with an alternative product; launching new products in an adjacent market; and/or launching a new business aimed at different customers while drawing on existing knowledge from within the original one.

Academic Insights

Bringing in new skill sets can help overcome legacy issues, change mindsets, and improve firm performance. One academic study found that firms that invest more in green human capital (based on the concentration of green skills required as specified in their job postings) have higher future profitability, and generate more green patents. Those patents are of higher quality and receive more citations.⁴⁷

⁴⁷ Alper Darendeli, Kelvin K. F. Law and Michael Shen, Green New Hiring, *Review of Accounting Studies*, September 2022. <https://link.springer.com/article/10.1007/s11142-022-09696-y>

Moving away from traditional energy sources

Decarbonising the global economy is a huge challenge because our fossil fuel-based energy sources cannot be easily replaced yet. This is exacerbated by the lack of storage, logistics and transportation networks and infrastructures that work for new sources of energy as cost-effectively as the existing infrastructures.

Green infrastructure will be very much in demand. We can expect to see the growth of a whole new ecosystem of low-carbon and green infrastructure, including waste management components. However, talent shortage, complex regulations and unavailability of materials currently pose a significant obstacle to executing green and sustainable infrastructure projects.

Boards need to consider the challenges their companies may face in moving away from traditional energy sources and how to address these challenges. There are also opportunities from investing in or supporting the development of green infrastructure.

Case Study: Multi-city Green Infrastructure project⁴⁸

A 2018 study looked at a number of case studies of green infrastructure implementation in cities around the world, including in the US. These are stormwater management projects.

These case studies identified robust, well-developed performance metrics describing an impressive range of environmental, social, technical, and economic outcomes. All but one prioritised improvements to habitat and ecology as key indicators of environmental success. Their findings also supported the linkages between green infrastructure and improvements in soil health and water and air quality. They found that the projects identified a suite of well-developed social metrics despite little mention of social motivation as a reason for undertaking the projects.

Many social metrics also included a rigorous quantitative component. For instance, some projects tracked the decreased number of deaths associated with the urban heat island effect. These social metrics could be particularly useful for impact investors interested in quantifying the social benefit of green infrastructure projects.

Many US green infrastructure implementation projects related economic performance to reduced stormwater management costs and decreased energy use. Interestingly, far more international cities tracked increased residential and commercial property values and employment. Additionally, there were a number of economic performance metrics specifically tailored to enable different financing mechanisms (e.g. reverse auction, average rebate per property).

The combination of robust social and economic metrics, in addition to more developed environmental metrics, highlights the multi-sector nature of green infrastructure projects. Measuring these benefits can attract investors with diverse social, environmental and sustainability interests.

48 Beatrice L. Gordon, Kimberly J. Quesnel, Robin Abs and Newsha K. Ajami, A Case-Study-Based Framework for Assessing the Multi-Sector Performance of Green Infrastructure, *Journal of Environmental Management*, October 2018. <https://www.sciencedirect.com/science/article/abs/pii/S0301479718306716?via%3Dihub>

TWIN PATHS OF ADAPTATION AND MITIGATION

In A Nutshell

What corporate objectives and strategies should our company adopt to address climate risks and opportunities?

In the move towards net zero, a company needs to cut GHGs and energy consumption. It also has to lower its vulnerability and increase resilience to the consequences of climate change. The issues to consider include:

- Mitigation strategies that can be adopted to address climate risks.
- New products and services that can be introduced or developed to implement the mitigation strategies.
- Adaptation strategies that can be adopted to address climate risks.
- Activities and measures that can be adopted to implement the adaptation strategies.

Mitigation is the key to a net zero target in 2050. However, while mitigation is needed for decarbonisation, adaptation is needed to deal with the effects of climate change.

Mitigation pathway

The mitigation pathway requires the firm to adopt mitigation strategies to reduce greenhouse gases (GHGs) and energy consumption in general. Some of these strategies could be product-based or in the form of services, or are hybrids.

For a bank, its board can set objectives to introduce or develop products and services to support the reduction of emissions or the reduction of energy consumption. For instance:

- Loan portfolio rebalancing towards greener or low-carbon assets by introducing, say, a green premium or internal carbon pricing to incorporate the climate risk premium.⁴⁹
- Carbon offset services, where FIs can offer developed countries or companies emitting above the target level, a channel to buy credible carbon credits from clean developments, reforestation activities on degraded land, or other real assets in emerging economies.⁵⁰
- Project funding or financing of more renewables as well as microgeneration activities which are typically small-scale 'green' energy generation through renewable resources such as the

⁴⁹ Sjoerd Blijlevens, Are Climate Change Risks Properly Captured in the Prudential Framework?, Zanders blog, February 2023. <https://zandersgroup.com/en/insights/blog/are-climate-change-risks-properly-captured-in-the-prudential-framework>

⁵⁰ Gabon is First African Country Paid to Protect Its Rainforest, BBC, June 2021. <https://www.bbc.com/news/world-africa-57567829?>

sun, wind and water flow, e.g., small or microhydropower systems⁵¹ or microsolar farms.⁵² This reduces the need for energy from highly polluting fossil fuels such as oil and coal.

- Offering better financing or leasing terms for the purchase of more fuel-efficient vehicles or household appliances with higher efficiency standards.
- More financing to companies involved in non-fossil energy sources, such as those in photovoltaic cell manufacturing, wind and solar power generation, geothermal and tidal.
- Supporting industries in applying low-carbon processes.

Case Study: MISC Berhad⁵³

In April 2023, MISC, an energy-related maritime solutions and services company listed on Bursa Malaysia, secured a US\$527 million sustainable-linked syndicated loan for the financing of six Very Large Ethane Carriers. Standard Chartered Bank is the structuring bank, sustainability coordinator and hedge coordinator.

The 11-year term loan is MISC's first sustainability-linked loan and is structured to align with its long-term business strategy and sustainability aspirations. MISC has committed to achieving net-zero GHG emissions by 2050. It aims to transition to transport solutions with low-carbon emissions and eventually with zero-carbon emissions.

The loan incorporates key performance indicators (KPIs) covering both environmental and governance factors. The environmental KPI is benchmarked to go beyond the emissions target outlined in the International Maritime Organisation's 2050 decarbonisation trajectory and the Poseidon Principles. It includes measuring the carbon intensity of MISC's Gas Assets & Solutions fleet through the annual efficiency ratio. MISC will benefit from annual adjustments of the loan interest rate based on the company achieving the pre-agreed KPIs.

53 Standard Chartered leads MISC's USD527 million sustainable-linked term loan financing, joint press release, MISC Berhad and Standard Chartered PLC, April 2023. <https://misc.com.my/media/354938/press-release-standard-chartered-leads-misc-s-usd527-million-sustainable-linked-term-loan-financing.pdf>

Academic Insights

A study based on a large international sample of syndicated loans over the period 2011 to 2019 found that firms that were more environmentally conscious (green firms) were rewarded by green banks in the form of cheaper loans. However, this happened only after the ratification of the Paris Agreement in 2015. Such loans were also more likely to be term loans, with fewer covenants and reflecting the firms' project choices.⁵⁴

54 Hans Degryse, Roman Goncharenko, Carola Theunisz and Tamas Vadasz, When Green Meets Green, *Journal of Corporate Finance*, February 2023. <https://www.sciencedirect.com/science/article/abs/pii/S0929119923000044>

51 Microhydropower Systems, Energy Saver website, US Department of Energy, undated. <https://www.energy.gov/energysaver/microhydropower-systems>

52 Microsolar Farm, Goparity website, undated. Goparity is an impact finance and investment app. <https://goparity.com/project/microsolar-farm-255>

Adaptation pathway

Adaptation is about responding to climate change and is often perceived as reactive. Its activities and measures are designed to lower the risks posed by the consequences of climate change and increase resilience. The capacity to adapt varies from place to place and is often dependent on the financial and technological resources available at that location. Here are examples of climate adaptation:

- Building design – improved efficient and energy-saving air conditioning and circulation in buildings⁵⁵.
- Emerging diseases – monitoring and control of the spread of tropical diseases and transmission channels.
- Coastal management – improved sea defences or managed retreats from low-lying coastal areas.
- Agriculture – better water management systems, crop selection and enhanced land management.
- Setting aside land to conserve and enhance biodiversity and promote living in harmony with nature and wildlife.

Similar to mitigation, some of the adaptation strategies could be product-based, in the form of services, or a hybrid. Other examples of adaptation measures include flood defences, vaccination programmes, desalination plants, and planting of crops in previously unsuitable climates.

Apart from ensuring that a company has the right adaptation strategies for itself, a company's board of directors should consider setting adaptation objectives and strategies that lead to the company introducing or developing products and services that address vulnerabilities arising from climate change.

One possibility is to finance the construction of infrastructural "defences" to weather the adverse effects of climate change, for example, in non-mainstream eco-alternative sectors like aquaculture, vertical and diversified farming, agroforestry and other nature-based defensive "infrastructures".⁵⁶

⁵⁵ European Environment Agency, Cooling buildings sustainably in Europe: exploring the links between climate change mitigation and adaptation, and their social impacts, November 2022. <https://www.eea.europa.eu/publications/cooling-buildings-sustainably-in-europe>

⁵⁶ McKenna Davis, Ina Krüger and Mandy Hinzmann, Coastal Protection and SuDS – Nature-Based Solutions, policy brief, RECREATE, November 2015. RECREATE was a European Commission-funded research and innovation project that ran from 2013 to 2018. https://ec.europa.eu/environment/integration/green_semester/pdf/Recreate_PB_2015_NBS_final_druck10-02-2016.pdf

KNOW YOUR COMPANY'S CLIMATE RISK APPETITE

In A Nutshell

How to set our company's climate risk appetite, especially since the transition pathway involves a journey into the future?

Without a sturdy risk appetite framework to rely on, a company is flying blind when tackling climate risk. The climate risk appetite must be set first. Key issues for the board to consider:

- How to set the company's climate risk appetite.
- Whether climate should be treated as a standalone risk category or together with other existing risk categories.
- How the climate risk appetite can be integrated into the existing risk appetite framework.
- The essential elements of a climate risk appetite statement.
- How to develop a transition pathway given the many uncertainties that may affect the pathway.
- What climate scenarios and stress tests can be used to develop and assess the appropriateness of the transition pathway.
- How to set the company's long-term climate risk appetite.

Tackling climate risk has to be underpinned by a climate risk appetite framework. The board should understand the financial risks related to climate change that affect the firm and how its operations affect climate risk, be satisfied that the climate risk assessment process is robust, and effectively oversee the management of these risks within the firm's overall business strategy and risk appetite.

Setting climate risk appetite

Setting the risk appetite will depend on whether climate risk is treated as a standalone category or as a cross-cutting risk that is considered together with other existing risk categories. If it is a standalone, there should be a clear risk appetite statement with metrics. If climate risk is considered along with other risk categories, this clear statement may not be possible. However, there should still be metrics, such as "the company's climate risk appetite is for its annual carbon emission not to increase by not more than 45 metric tons per year till 2025 and subsequently, not more than 20 metric tons per year till 2035 and carbon neutral by 2040".

Integration with existing risk appetite framework

Different firms may take different approaches as to how climate risk appetite is presented internally. For example, a subset of metrics may be included within a risk appetite statement (RAS) at either the enterprise or entity level. Or there may be a standalone climate or ESG RAS. These approaches are not mutually exclusive.

It is good practice to align the approach for addressing climate risk with the approach for existing risk categories or cross-cutting risks.

A climate RAS should ideally consider the following elements:

- Transition risk
- Physical risk
- Alignment (to either net zero, a temperature target or some other strategic or scientific-based climate-related objective)

Developing and assessing the transition pathway

There is no historical precedent for addressing climate risk amid the journey to net zero by 2050. Any risk appetite set would be subject to factors such as the vagaries of the weather and climate, consumer sentiments, technological disruptions, and changes in regulations and policies. Hence, a firm's climate risk appetite needs to constantly evolve to suit the shifting scenarios, some of which would have been totally unexpected.

Clearly, climate scenarios and stress tests will have a significant role to play and perhaps a reverse stress testing approach might best fit the analysis of an uncertain future.

What is reverse stress testing?⁵⁷

A reverse stress test is a stress test that starts from the opposite end – with the identification of a pre-defined outcome. This might be the point at which an entity can be considered as failing, or when its business model becomes unviable. Plausible scenarios that could result in that outcome can then be explored.

In general terms, reverse stress tests need to answer three questions:

- What would it take for the entity to fail?
- What event or combination of events might lead to this outcome?
- What can we do now to avoid this happening?

⁵⁷ ICAEW, Why all businesses should reverse stress test, June 2020. <https://www.icaew.com/insights/viewpoints-on-the-news/2020/june-2020/why-all-businesses-should-reverse-stress-test>

Climate risk appetite setting during the transition journey

During the transition, companies have to learn to modify their behaviour and environment to reduce the harmful impact of climate hazards and to take advantage of local climatic conditions. They could start by observing how biophysical and socio-economic systems respond automatically to climate, and by

trying to understand and manage these responses. This social learning is the basis of planned adaptation.⁵⁸

Climate change adaptation policies and actions are being developed and implemented at regional, national and urban levels. Case studies are important because they examine the actual implementation of adaptation measures and can therefore support local and regional decision-makers in dealing with the effects of climate change.

These measures are often initiated to meet a range of policy objectives centred upon adaptation and resilience. They also bring co-benefits, such as habitat restoration, preservation of biodiversity, urban redevelopment, improved health and well-being in cities, and disaster risk reduction.

All organisations should undertake planned adaptation, but the degree of application and the methods may vary from place to place. As the extension from TCFD to TNFD (Task Force on Nature-related Financial Disclosures) gathers momentum, there will be growing demand for natural and nature-based solutions, and technology may merely be one of the enablers rather than the solution itself.

It should be noted that with net zero pledges by customers, governmental and regulatory actions to address climate change, as well as societal climate change action, companies that are not undertaking sufficient net zero efforts may find themselves excluded from the supply chain and face higher costs of capital or difficulties in accessing capital.

Setting long-term climate risk appetite

An RAS is usually based on a three- to five-year horizon. However, risks related to climate change, especially transition risks, may take far more than five years to materialise. For longer-term scenarios, a mature risk appetite setting should consider the impacts over a longer period, for example, a 30-year timeframe with interim milestones. This should also include long-term qualitative statements built upon the results of scenario analysis and impact assessments or trend analysis based on key globally monitored climate change milestones.⁵⁹

Companies can set their long-term climate risk appetite by considering climate change risks in their strategies and capital allocation, as recommended by the TCFD. This can help investors reassess core assumptions and may lead to significant capital reallocation.

Although the materiality of climate-related financial risks is uncontested, there are different approaches on how to measure these risks. There is a consensus, however, that traditional backward-looking methods, based on historical data and fitted distributions, are not suited to assess the unprecedented risks of climate change. Against this background, various risk metrics providers have started to develop new forward-looking approaches that can be used by financial market participants to assess and manage climate-related financial risks.

Yet, the methodologies, data and assumptions underpinning these new risk assessment approaches can vary substantially from one metric to another.⁶⁰ This heterogeneity can generate divergence in climate risk assessments across metrics and thus requires conscious decisions by investors, financial institutions, central banks and financial supervisors on which metrics to use.

58 Johnathan Ensor and Blane Harvey, *Social Learning and Climate Change Adaptation: Evidence for International Development Practice*, WIREs Climate Change, June 2015. <https://wires.onlinelibrary.wiley.com/doi/10.1002/wcc.348>

59 UK Environment Agency, *Climate change: risk assessment and adaptation planning in your management system*, April 2023. <https://www.gov.uk/guidance/climate-change-risk-assessment-and-adaptation-planning-in-your-management-system>

60 Julia Bingler and Chiara Colesanti Senni, *Taming the Green Swan: How to Improve Climate-Related Financial Risk Assessments*, working paper, March 2021. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3795360

Hence, data on metrics and indicators of asset risk exposure during transition are still inadequate, and transparency alone is insufficient to drive the required asset reallocation in the absence of clear regulatory frameworks,⁶¹ which for the moment are mainly based on prescribed macro-scenarios, rather than for company-specific or sector-specific factors.

Companies should make it a priority to focus on long-term approaches to climate change risk reduction. They should resist the tendency to favour short-term adaptation because this will be ineffective for climate change risk reduction over the long term.⁶²

In summary, firms can take the following steps in order to define the short-term and long-term climate risk appetite:

- Consider business strategies, the existing portfolio and the type of climate risks faced.
- Develop and approve a qualitative RAS.
- Identify metrics for tracking the firm's climate risks and determining appropriate appetite or tolerance thresholds.
- In the longer term, assess how metrics can best include the results of scenario analysis and impact assessments.
- The board is engaged and ask questions regarding specific aspects of risk appetite. See the box below for examples of such questions.

Examples of questions about risk appetite

Defining the ambition and targets

- What global frameworks do we want to commit to or support? e.g., Paris Agreement, TCFD, Principles for Responsible Banking.
- What does this mean in practical terms?
- Do we have the right data and systems in place to report against these targets?
- What additional data do we need?
- How do we validate the quality of the data on which we base decisions?

Aligning the business model

- What does aligning with the Paris Agreement mean in terms of the structure of our portfolio and the companies that we finance (in the case of banks) or how to we run our business and operations?
- Which sectors and companies will we have to reduce exposure to? What does it mean for our own operations and people?
- Are we willing to exit profitable customers or sectors?
- What timeframe is our exit strategy over?
- Which exit/reduction strategies could we implement?

61 OECD, Financial Markets and Climate Transition: Opportunities, Challenges and Policy Implications, October 2021. <https://www.oecd.org/finance/Financial-Markets-and-Climate-Transition-Opportunities-challenges-and-policy-implications.htm>

62 Intergovernmental Panel on Climate Change, Sixth Assessment Report (AR6), 2022. https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Chapter01.pdf

Measuring and embedding risk management

- What is the agreed methodology for defining high transition risk and high physical risk across the portfolio?
- Do we see climate risk appetite driven by corporate responsibility, transparency requirements, financial threats, or opportunities?

Enabling through people, clear accountability and training

- To what extent are climate risks and opportunities incorporated into the board's understanding of directors' duties?
- Who is responsible for climate risk management at board level?
- Does the composition of the board allow for informed and differentiated debate and objective decision-making on climate change issues?

HOW TO ENSURE EFFECTIVE CLIMATE RISK MANAGEMENT

In A Nutshell

What risk management framework and measures should our company have in place to ensure effective climate risk management?

After determining a company's climate risk appetite, it is equally important to have the right framework and measures to manage this risk. Key issues for the board to consider:

- The framework the company should adopt for climate risk management
- What measures have been put in place to effectively manage climate risks
- How to ensure effective implementation of the climate risk management framework and measures

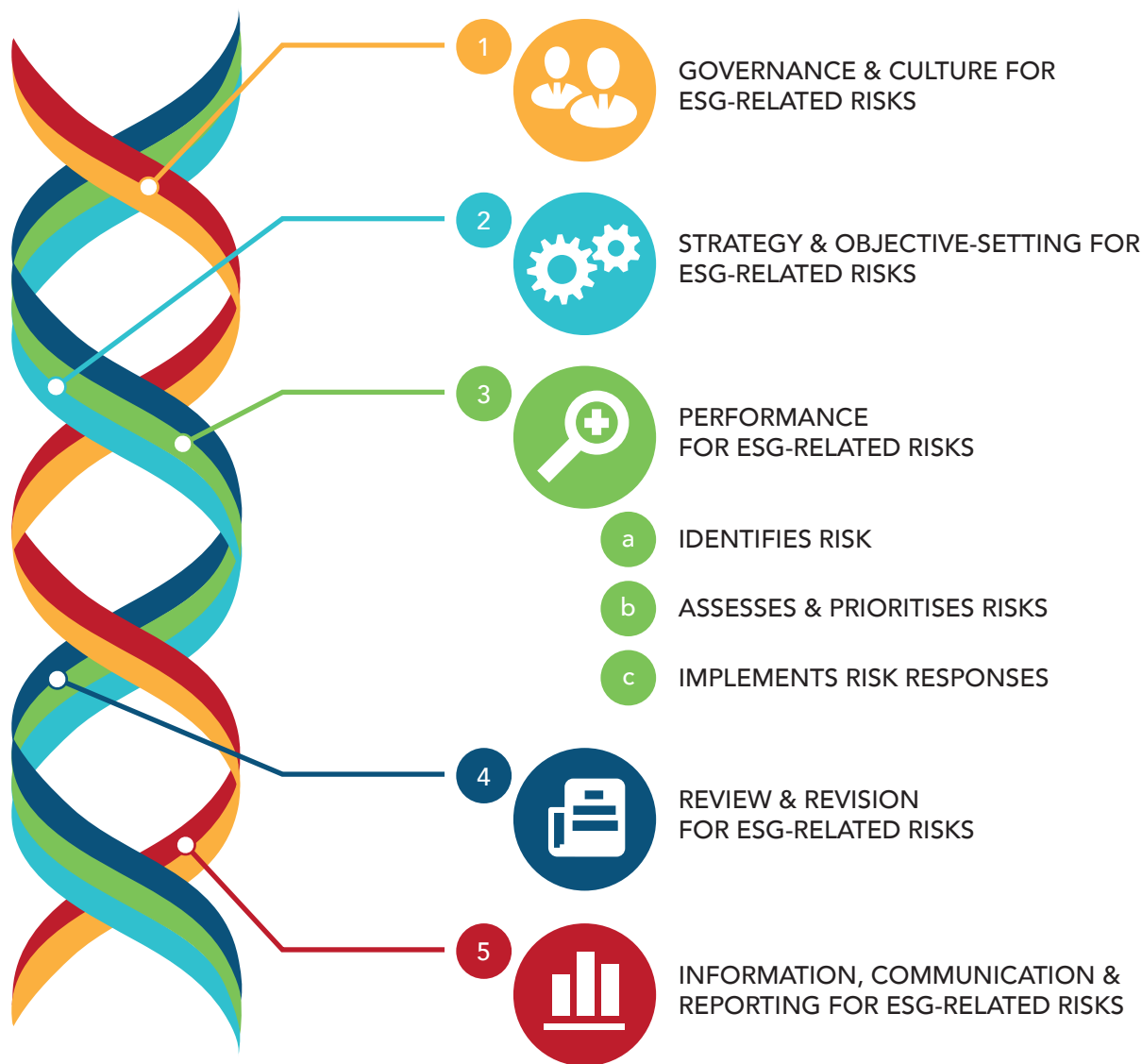
Risk management framework

The management of ESG risks, including climate risk, can be based on an existing risk management framework, such as the COSO Enterprise Risk Management (ERM) Framework, ISO 31000, FERMA's Sustainability ERM Principles or entity-specific risk management frameworks, without the need for a separate climate risk management framework. COSO and World Business Council for Sustainable Development (WBCSD) have published guidance on applying the COSO ERM Framework to ESG risks.⁶³ The guidance is also intended to offer a practical approach for entities that are using other risk management frameworks. COSO is the Committee of Sponsoring Organizations of the Treadway Commission and FERMA is the Federation of European Risk Management Associations.

Figure 6 shows how the five components of the COSO ERM Framework can be applied to the management of ESG-related risks.

⁶³ COSO and WBCSD, Enterprise Risk Management: Applying Enterprise Risk Management to Environmental, Social and Governance-Related Risks, October 2018. <https://www.wbcsd.org/Programs/Redefining-Value/Making-stakeholder-capitalism-actionable/Enterprise-Risk-Management/Resources/Applying-Enterprise-Risk-Management-to-Environmental-Social-and-Governance-related-Risks>

Figure 6: Management of ESG-Related Risks Based on the COSO ERM Framework



Source: COSO and WBCSD, *Enterprise Risk Management: Applying Enterprise Risk Management to Environmental, Social and Governance-Related Risks*, October 2018.

Measures to manage climate risks

As the volatility, velocity and magnitude of climate risks (both physical and transition risks) increase, many organisations could be unprepared for any cascading impact of the developing climate risks and a polycrisis, that is, multiple events occurring close together in time, space or both. The Panama Canal crisis, discussed earlier in this report, is an example.

Early and effective actions aimed at increasing resilience can have a beneficial compounding effect. Such actions in one area can have a multiplier effect on overall preparedness.

Crisis management is often viewed separately from general risk management activities. However, with climate change posing short-term risks (primarily physical risks) and longer-term transition risks, climate risk management requires a more pro-active approach, with emphasis on business continuity and contingency plans. These contingency plans constitute an essential part of climate risk mitigation and adaptation measures. At the same time, they enhance the company’s business and operational resilience.

Figure 7 below provides some examples of measures to enhance climate resilience.

Figure 7: Overview of Measures to Enhance Climate Resilience

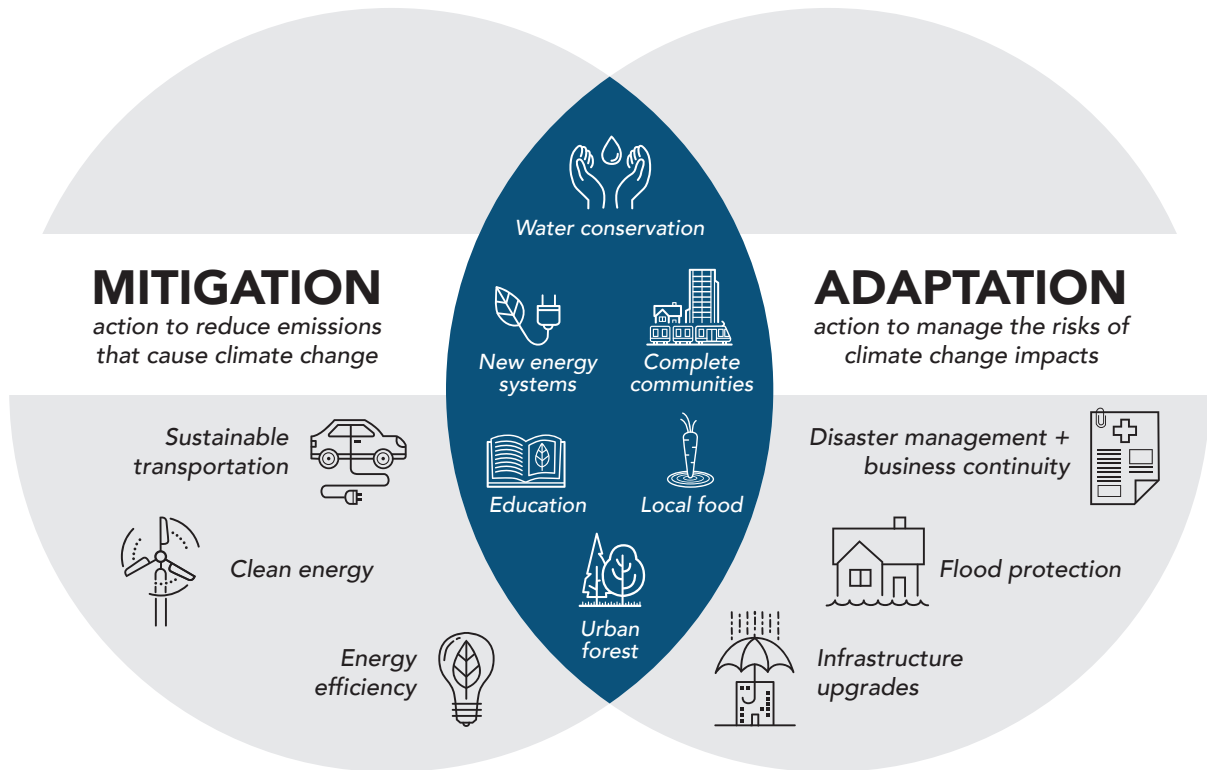
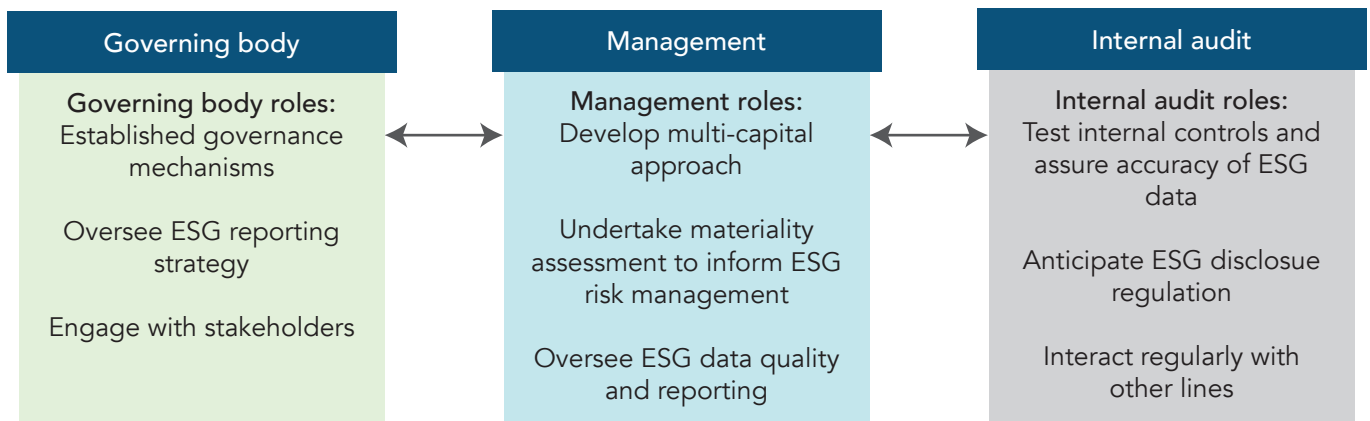


Image from Calgary Canada Climate Program⁶⁴

Independent assurance

The guidance issued by WBCSD and Institute of Internal Auditors (IIA) sets out roles of the governing bodies, management and internal audit under the three lines model in the context of sustainability and ESG, as shown in Figure 8 below.

Figure 8: Three Lines Model Incorporating ESG Considerations



Source: WBCSD and IIA, Embedding ESG and Sustainability Considerations Into the Three Lines Model, July 2022

⁶⁴ <https://www.calgary.ca/UEP/ESM/Pages/Energy-Savings/Climate-Change.aspx?redirect=/climateprogram>

It should be noted that the three lines have broader roles in ensuring effective governance and management of sustainability risks and opportunities, including climate-related ones, beyond reporting.

An independent, well-resourced and competent internal audit function can provide the board and management with assurance for the adequacy and effectiveness of the company's climate risk management framework and measures.

CHOOSING AND USING THE RIGHT METRICS AND TARGETS

In A Nutshell

Are our climate-related metrics and targets appropriate, should they be linked to executive remuneration, and how to monitor the progress and achievement of these targets?

A company's climate-related metrics and targets should reflect the climate risks and opportunities most relevant to the company. Key issues for the board to consider:

- The primary types of climate risk applicable to the industry and the specific climate risks most relevant to the company.
- Adoption of appropriate climate-related metrics and targets.
- Consider whether and how to link climate-related metrics and targets to executive remuneration.
- Monitor progress and achievement of climate-related targets.

The climate-related metrics and targets that a company selects and discloses should be related to the climate risks and opportunities most relevant to the company. Standards, recommendations and guidance published by bodies such as ISSB, GRI, SASB and TCFD are useful in this regard.

In this section, we illustrate a possible approach to selecting appropriate climate-related metrics and targets.

Understand the industry's primary types of climate risk

The SASB's Climate Risk Bulletin presents a Climate Risk Map showing the presence of the three primary types of climate risk (physical, transition, and regulatory risk) in each of the 77 industries for which the SASB issues standards.⁶⁵ Figure 9 shows an extract from the Climate Risk Map for industries within three sectors – Consumer Groups, Financials and Healthcare.

⁶⁵ SASB, Climate Risk Technical Bulletin, SASB Standards, Updated 2022.
<https://www.sasb.org/knowledge-hub/climate-risk-technical-bulletin/>

Figure 9: SASB Climate Risk Map – Selected Industries

SECTOR	INDUSTRIES	CLIMATE RISK CATEGORY		
		PHYSICAL	TRANSITION	REGULATORY
CONSUMER GOODS	Apparel, Accessories & Footwear	High	High	Low
	Appliance Manufacturing	Medium	High	Low
	Household & Personal Products	High	High	Low
	Building Products & Furnishings	Medium	High	High
	E-Commerce	High	High	Low
	Multiline & Specialty Retailers & Distributors	Medium	High	Low
	Toys & Sporting Goods	Medium	Medium	Low
FINANCIALS	Asset Management & Custody Activities	Medium	High	Low
	Commercial Banks	Medium	High	Low
	Consumer Finance	Medium	Medium	Low
	Insurance	High	High	Low
	Investment Banking & Brokerage	Medium	High	Low
	Mortgage Finance	High	Medium	Low
	Security & Commodity Exchange	Medium	Medium	Low
HEALTH CARE	Biotechnology & Pharmaceuticals	Medium	Medium	Low
	Health Care Delivery	High	High	Low
	Health Care Distributors	Medium	High	Low
	Managed Care	High	Medium	Low
	Medical Equipment & Supply	Medium	High	Low
	Drug Retailers	Medium	High	Low

Source: SASB, Climate Risk Technical Bulletin, SASB Standards, Updated 2022

The SASB's 77 industry-specific standards identifies financially material sustainability topics for each industry. The topics are grouped under "Environment", "Social Capital", "Human Capital", "Business Model & Innovation" and "Leadership & Governance".

Take the case of the "Apparel, Accessories & Footwear" industry. The relevant SASB standard identifies "Product Quality & Safety", "Supply Chain Management" and "Materials Sourcing & Efficiency" under the "General Issue Category". These issues are considered to apply broadly to the sector and are therefore industry-agnostic. In terms of disclosure topics which are specific to the "Apparel, Accessories & Footwear" industry, it identifies "Management of Chemicals in Products", "Environmental Impacts in the Supply Chain", "Labor Conditions in the Supply Chain" and "Raw Materials Sourcing".

It is important to note that although none of the disclosure topics for this industry falls under "Environment" – which means that this area was not identified in the standard-setting process as most likely to affect enterprise value – the SASB Climate Risk Map nevertheless identifies physical risk and transition risk as relevant to the industry. This indicates that physical and transition risks may not necessarily come under the "Environment" banner.

Companies should also use other major reporting frameworks, such as the GRI standards, to identify the primary types of climate risk.

Understand the specific climate risks most relevant to the company

Standards such as those published by the GRI and SASB provide a good starting point for identifying the climate-related issues that a broad range of stakeholders consider to be important for each industry. Nevertheless, each company should undertake its own materiality assessment, particularly because different climate-related risks may apply to different companies within the same industry, for example, due to differences in business model or location of operations.

We cannot over-emphasise the importance of a robust materiality assessment of ESG factors in the oversight and management of sustainability-related risks and opportunities. Therefore, it is important for the board of directors to be engaged in the materiality assessment, which is generally led by management, and to review the results. Otherwise, metrics and targets set may be disconnected from the company's most material ESG factors.

Identify metrics and targets to adopt

The TCFD has published guidance to help companies consider what to disclose in respect of metrics, targets and transition plans related to climate issues.⁶⁶ On why the guidance is necessary, the TCFD says: "Although analysis of public company reporting shows that metrics and targets is one of the highest areas of disclosure, the majority of respondents to a 2019 Task Force survey on implementation found the Metrics and Targets recommendation 'somewhat difficult' or 'very difficult' to implement."

The TCFD has identified a set of climate-related metrics that all organisations should disclose, where data and methodologies allow. However, it does not prescribe the exact metrics and units of measure to be used. Organisations should operationalise the metric categories in ways that are most relevant to their industry, capabilities and business model. This balances improved comparability with flexibility.

The TCFD's climate-related metrics are grouped into seven categories: GHG emissions, transition risks, physical risks, climate-related opportunities, capital deployment, internal carbon prices, and remuneration. Companies may find it useful that the guidance provides examples of units of measure and metrics for each category.

The TCFD recognises that for some categories, implementation may take time as data and methodologies evolve.

According to the TCFD: "Based on the consultation on metrics, targets, and transition plans, the Task Force has updated its 2021 annex to specify that '[t]he Task Force believes all organisations should disclose absolute Scope 1 and Scope 2 GHG emissions independent of a materiality assessment. The disclosure of Scope 3 GHG emissions is subject to materiality; however, the Task Force encourages organisations to disclose such emissions.' The other cross-industry, climate-related metric categories remain subject to materiality. Organisations should determine materiality for climate-related metrics consistent with how they determine the materiality of other information included in their financial filings."

⁶⁶ TCFD, Task Force on Climate-Related Financial Disclosures: Guidance on Metrics, Targets, and Transition Plans, October 2021. https://assets.bbhub.io/company/sites/60/2021/07/2021-Metrics_Targets_Guidance-1.pdf

Assess the appropriateness of the metrics and targets

Drawing on the TCFD guidance on characteristics of effective climate-related metrics, boards should ask the following questions:

- Are the metrics selected by our company decision-useful?
- Are they clear and understandable?
- Are they reliable, verifiable and objective?
- Are they consistent over time, in terms of current, historical and forward-looking time horizons?

Link between climate metrics and targets and executive remuneration

The TCFD recommends remuneration as one of the climate-related metrics that all organisations should disclose, specifically the proportion of executive management remuneration linked to climate considerations. Example metrics provided are “portion of employee’s annual discretionary bonus linked to investments in climate-related products”, “weighting of climate goals on long-term incentive scorecards for Executive Directors” and “weighting of performance against operational emissions’ targets for remuneration scorecard”.

A report authored by Prof Mak covers the very important topic of integrating ESG factors into executive remuneration.⁶⁷ It recommends that remuneration committees and boards of directors consider 10 questions in assessing whether and how to do so. We have adapted those questions to the issue of linking climate metrics to executive remuneration, as below:

1. Should the company link climate-related factors to executive remuneration?
2. What specific climate-related factors should be considered?
3. What specific climate-related metrics should be defined relative to each factor?
4. Should quantitative or qualitative metrics be used?
5. Should climate-related metrics be standalone, part of an ESG scorecard, or part of an overall scorecard?
6. Should climate-related performance directly determine remuneration, modify payouts otherwise earned, or be a precondition for payouts?
7. How much should climate-related metrics be weighted?
8. Should climate-related metrics be incorporated into short-term incentives, long-term incentives or both?
9. Should climate-related performance be measured against pre-set internal targets or external benchmarks?
10. How can the remuneration committee balance objectivity and judgment when evaluating climate-related performance in determining executive remuneration?

⁶⁷ Mak Yuen Teen, Integrating ESG Factors Into Executive Remuneration, CPA Australia and SFIA, May 2022.
<https://www.sfinstitute.asia/wp-content/uploads/2022/05/integrating-esg-remuneration-final-version.pdf>

Monitoring progress and achievement of the targets

The board should ensure that there is monitoring of the progress and achievement of climate-related targets. How this is done will depend on the company's sustainability governance structure.

Where there is a separate board committee for sustainability, this committee can assist the board in reviewing how progress and achievement of targets is monitored, the extent to which the targets are achieved, and whether the company is on track to deliver on its climate-related commitments. Otherwise, this may be tasked to a separate committee or to the board as a whole.

Need for board involvement

While the board will have to rely on management to a great extent to identify relevant metrics and set appropriate targets, it is important that the board is engaged in overseeing the selection of metrics and targets, and monitoring their progress and achievement.

Where climate-related factors are linked to executive remuneration, inappropriate metrics and targets may be selected if the board does not exercise adequate oversight. This may lead to excessive remuneration or increased risk of greenwashing, even if unintended.

THE POWER OF DISCLOSURES

In A Nutshell

What information should our company disclose about our climate risk governance and management, and how to ensure that the information is reliable?

Climate-related disclosures are gaining currency as information that supports investment and financing decisions. Such disclosures encourage transparency about exposure to climate risks and opportunities, and commitment to decarbonisation. Key issues for the board to consider:

- Standards the company should use as the basis for disclosing information on climate risks and opportunities.
- The specific information that the company should disclose.
- Use of internal and external assurance to improve reliability of disclosures.

As we move towards a low-carbon economy, disclosure of material climate-related financial information can help support investment and financing decisions. It makes it easier to compare the exposure of different companies to climate risks and opportunities. At the same time, it enhances the transparency of the company's commitments to decarbonisation.

The disclosures can also highlight progress to date, or lack thereof, and provide greater transparency on the exposure of companies to climate risk and whether they are aligned to net zero trajectories.

The process of preparing for disclosure can help a company gauge what it needs to do to address climate risks and opportunities in terms of organisation, operations and people.

Stakeholders, including customers and regulators, will expect companies to strategically use the information reported to demonstrate their embrace of the sustainability agenda. Increasingly, the sustainability performance of companies will come under scrutiny. Stakeholders will hold companies to account over the failure to achieve net zero targets or to effectively manage environmental, social and economic risks. It is also likely that stakeholders will encourage companies to actively pursue the myriad business opportunities associated with sustainability.

Academic Insights

A recent article examined the effects of the US Greenhouse Gas Reporting Programme, which requires thousands of industrial facilities to measure and report their GHG emissions.⁶⁸ Facilities were found to reduce their GHG emissions by 7.9% following the disclosure of emissions data. This indicates that benchmarking, whereby facilities use the disclosures of their peers to assess their own relative GHG performance, spurs

68 Sorabh Tomar, Greenhouse Gas Disclosure and Emissions Benchmarking, *Journal of Accounting Research*, May 2023. <https://onlinelibrary.wiley.com/doi/full/10.1111/1475-679X.12473>

emission reductions. Further tests show that emission reductions were not achieved just by curbing or offshoring economic activity. Rather, firms increased capital expenditures, suggesting that they made investments to reduce GHG emissions. The firms' concerns about future legislation appear to motivate this behaviour. If not paired with disclosure, measurement alone does not appear to reduce emissions.

Specific information to be disclosed

There are myriad reporting frameworks (including those prescribed by stock exchanges) currently used by companies for sustainability reporting, including for climate-related risks and opportunities. Stock exchanges currently generally reference GRI.⁶⁹ In terms of international reporting frameworks, they are expected to converge around the sustainability reporting standards issued by the ISSB (which has an MOU with GRI), the European Financial Reporting Advisory Group (EFRAG) and the US SEC. While the ISSB and US SEC standards are based on financial (single) materiality, the GRI and EFRAG standards are based on double materiality.

Although companies face a variety of ESG issues, standard setters have prioritised the reporting of information relating to climate risks and opportunities. More regulators are mandating climate-related disclosures, including regulators that have traditionally adopted a "comply or explain" approach to sustainability reporting. It is therefore important for companies to be equipped to make the climate-related disclosures.

Boards should ensure that the necessary resources are available to support such reporting, and that the required and recommended disclosures are made.

Internal and external assurance

Earlier in the report, we discussed the role of internal audit in providing independent assurance for the adequacy and effectiveness of the company's risk management framework and measures, in the context of climate risks and opportunities.

Such assurance from internal audit is also important in the disclosure of climate-related information. As suggested by WBCSD and IIA, the work can include testing internal controls and assuring the accuracy of climate-related data, anticipating disclosure regulations, and interacting regularly with the board and management.

Many companies are also using third parties to provide external assurance for their sustainability disclosures. IOSCO has published a report on international work to develop a global assurance framework for sustainability-related corporate reporting.⁷⁰ Independent third-party assurance has also been made mandatory by the EC from 2025 for 2024 year-end reports. The opinion will be based on a limited assurance engagement, with plans to move to reasonable assurance after assessing whether reasonable assurance is feasible.⁷¹

⁶⁹ Sustainable Stock Exchanges Initiative, ESG Disclosure Guidance Database, as at July 2023. <https://sseinitiative.org/esg-guidance-database/>

⁷⁰ International Organization of Securities Commissions, IOSCO sets out key considerations to promote an effective global assurance framework for sustainability-related corporate reporting, media release, March 2023. <https://www.iosco.org/news/pdf/IOSCONEWS686.pdf>

⁷¹ Accountancy Europe, FAQs: All you need to know about the Corporate Sustainability Reporting Directive, November 2022. <https://www.accountancyeurope.eu/publications/faqs-on-corporate-sustainability-reporting-directive/>

The International Auditing and Assurance Standards Board (IAASB) has issued a proposed standard for sustainability assurance (ISSA 5000), while the International Ethics Standards Board for Accountants is developing globally applicable ethics and independence standards to support sustainability reporting.

Issued by the IAASB in 2013, the International Standard on Assurance Engagements 3000 (Revised), Assurance Engagements Other than Audits or Reviews of Historical Financial Information applies to assurance engagements on sustainability reporting. In addition, the IAASB has issued non-authoritative guidance on applying the standard to address key stakeholder-identified challenges commonly encountered in applying the standard in sustainability assurance engagements.

Nevertheless, the current usefulness of sustainability assurance has its limits because of the absence of specific standards, which raises issues such as the lack of standardisation in reporting standards and scope, limited assurance versus reasonable assurance, and lack of standardisation in report formats.

While this is not to say that companies should not provide external assurance for their sustainability reports, including their climate-related disclosures, they have to assess whether the external assurance firms have the necessary competencies and requisite independence to improve trust in the disclosures.

With the involvement of board committees tasked with overseeing sustainability reporting (if any), boards should conduct these assessments before engaging external assurance firms for this purpose.

Preliminary findings from research conducted by Prof Mak,⁷² based on the 50 largest listed companies in each of Australia, Malaysia and Singapore, found that 60% of Australian companies, 40% of Malaysian companies and 30% of Singaporean companies use a third party to provide reasonable or limited assurance over selected sustainability disclosures. The percentages of these companies with external assurance that used the same firm (or affiliate) as the firm providing the external audit services were 67%, 10% and 33% respectively. External assurance firms may be accounting or non-accounting firms.

72 Mak Yuen Teen., *Who Governs Sustainability?: Sustainability Governance Structures and Practices of Large Australian, Malaysian and Singaporean Companies*, Governance for Stakeholders and SFIA, February 2023.
https://www.sfinstitute.asia/wp-content/uploads/2023/03/Who-Governs-Sustainability-SFIA_Final_Mar2023.pdf

AVOID THE TAIN OF GREENWASHING

In A Nutshell

Is our company exposed to accusations of greenwashing and how to mitigate this risk?

Regulators have started cracking down on greenwashing. Companies caught in greenwashing controversies stand to suffer financially and reputationally, and their directors may be penalised or sued. Key issues for the board to consider:

- Whether the company is a potential target of accusations for greenwashing
- In what areas, if any, is the company vulnerable to accusations of greenwashing
- How the company can mitigate the risk of accusations of greenwashing

Put simply, greenwashing refers to attempts by businesses to appear environmentally conscious when their business practices are not.

Globally, greenwashing is in the spotlight, with UN experts warning at COP27 about its prevalence. At COP27, the United Nations unveiled a set of standards to help assess whether claims by companies about their environmental credentials are genuine or greenwashing.⁷³ Research has found that over a two-year period, one in every five cases of ESG risk incidents was linked to greenwashing.⁷⁴

In November 2022, the three European Supervisory Authorities (ESAs) launched a call for evidence seeking views on potential greenwashing practices in the whole EU financial sector, including banking, insurance and financial markets.⁷⁵ This was in response to a European Commission's request for input relating to greenwashing risks and supervision of sustainable finance policies.

A recent article reported that companies risk penalties as Asia and Australia are increasingly enhancing regulations targeting greenwashing issues.⁷⁶ In Australia, the Australian Securities & Investments Commission has launched its first greenwashing case against a pension fund, while Hong Kong and Singapore are looking into introducing stricter ESG rules. The Monetary Authority of Singapore has said that it is tightening scrutiny of companies that claim to have put in place plans to fight climate change.⁷⁷

73 Sayumi Take, UN targets 'greenwashing' with new standards for companies, Nikkei Asia, November 2022.

<https://asia.nikkei.com/Spotlight/Environment/Climate-Change/COP27/U.N.-targets-greenwashing-with-new-standards-for-companies>

74 Matt Mace, One in Five Cases of ESG Risks Linked to Greenwashing, edie, July 2022.

<https://www.edie.net/one-in-five-cases-of-esg-risks-linked-to-greenwashing/>

75 European Banking Authority, European Insurance and Occupational Pensions Authority and European Securities and Markets Authority, ESAs Call for Evidence On Better Understanding Greenwashing, November 2022.

https://www.esma.europa.eu/sites/default/files/library/esas_call_for_evidence_on_greenwashing.pdf

76 Reuters, Companies Risk Penalties as Asia and Australia Target Greenwashing, The Straits Times, April 2023.

<https://www.straitstimes.com/world/asia-and-australia-target-greenwashing-as-companies-risk-penalties>

77 Dylan Loh, Singapore To Tighten 'Greenwashing' Audit as Climate Finance Grows, Nikkei Asia, April 2023.

<https://asia.nikkei.com/Spotlight/Environment/Climate-Change/Singapore-to-tighten-greenwashing-audit-as-climate-finance-grows>

“Efforts to tackle greenwashing are not just happening in the US and Europe – some Asian countries may actually be moving faster than the US,” said Kathlyn Collins, vice-president and head of ESG at investment firm Matthews Asia.⁷⁸

Consequences of greenwashing accusations

Greenwashing exposes companies to financial and reputational risks. If hit by allegations of greenwashing, businesses stand to lose customers and investors. There is a rising likelihood of financial penalties in the form of fines, restitutions and other legal liabilities, coming into play. Companies that are found guilty are vulnerable to business discontinuity and even insolvency risks. Directors may also face liability from regulatory actions and private actions by stakeholders.

Forms of greenwashing

A recent article on climate greenwashing liability risks in Australia discusses two forms of greenwashing: disclosure-based greenwashing, where entities embellish their environmental credentials and selectively disclose the existence and management of the climate risks they face, whether intentionally or negligently; and target-based greenwashing, where entities make commitments to, and imply progress towards achieving, net zero emissions or other climate targets without having in place the internal business, risk and governance practices required to meet those targets.⁷⁹

Greenwashing in Southeast Asia

“A number of greenwashing problems have already surfaced in Southeast Asia,” according to a 2022 research study by ISEAS-Yusuf Ishak Institute.⁸⁰

A glaring example of greenwashing cited in the article is observed in automotive manufacturing, where several Thai, Vietnamese and Indonesian companies are poised to ride the new wave of electric vehicle production. Apparently, while the electric vehicles on the streets of Southeast Asia conjure up a green image, the actual scenario may in fact be misleading. While the electrification of automobiles may reduce carbon emissions, the generation of hydrogen fuel for these electric vehicles often relies heavily on the use of dirty coal. Unless this form of power generation capacity in future is drawn from renewable sources, the use of electric vehicles will remain carbon-intensive and claims made about their contribution to environmental sustainability will remain questionable.

Another problematic area is the use of carbon capture and storage as a way to produce so-called “clean coal.” An intensive producer of GHG emissions, coal remains

80 Michael T. Schaper and Ryan Wong Yee Yang, Greenwashing: A Market Distortion Needing Serious Attention in Southeast Asia, ISEAS Yusof Ishak Institute, April 2022.
<https://www.iseas.edu.sg/articles-commentaries/iseas-perspective/greenwashing-a-market-distortion-needing-serious-attention-in-southeast-asia-by-michael-t-schaper-and-ryan-wong-yee-yang/>

78 Reuters, Companies Risk Penalties as Asia and Australia Target Greenwashing, The Straits Times, April 2023.
<https://www.straitstimes.com/world/asia-and-australia-target-greenwashing-as-companies-risk-penalties>

79 Scott Atkins., Actions Speak Louder Than Words: Climate Greenwashing Liability Risks in Australia, Norton Rose Fullbright, November 2022.
<https://www.nortonrosefulbright.com/en/knowledge/publications/978440f9/actions-speak-louder-than-words-climate-greenwashing-liability-risks-in-australia>

a major energy source throughout the region. The effectiveness of carbon capture technology in remediating the overall level of GHG emission is still uncertain at best and often highly contested at worst, especially at an industrial scale. However, energy companies – both state-owned and private – rarely acknowledge this matter in their strategic plans or marketing.

Numerous smaller-scale greenwashing practices can also be found amongst other businesses. These include cases of manufacturing companies mixing plastics into paper bottles; the use of scientifically unsupported claims about aluminium being greener than plastic; and ambiguous marketing slogans about recycling. Some issues are also cultural. For example, many small-scale retailers in the region profess to subscribe to sustainability, but often wrap consumer products in substantial amounts of plastic and other packaging materials, a practice still usually expected by purchasers.

Environmental claims in the financial services sector are also becoming increasingly significant. Many firms are now pursuing investor funds with bold claims as to their environmental and sustainability credentials, but on a number of occasions, these have been proven to be dubious. There are also numerous rating systems claiming to impartially evaluate the ESG impact of various investment products for investors in Southeast Asia, but they often operate using quite different metrics and are difficult to compare. A number of regulators have begun to focus on this area.

The role of policy and regulation is one area that is developing quickly. Litigation over spurious environmental claims is becoming increasingly common, using not only national laws, but also decisions now provided by multilateral bodies. BP, for example, was obliged to withdraw a major advertising campaign in 2020 after a public interest law firm complained that the oil and gas company breached the OECD's Guidelines for Multinational Enterprises, creating a misleading impression about its move to renewable energy and away from fossil fuels. Consumer protection laws in this area, however, are sometimes weak.

Other articles have highlighted many examples of greenwashing elsewhere in the world, including by major companies.^{81,82,83}

81 Penningtons Manches Cooper, Greenwashing and the Rise of Green-Hushing, January 2023.

<https://www.penningtonslaw.com/news-publications/latest-news/2023/greenwashing-and-the-rise-of-green-hushing>

82 Eric Koons, Greenwashing Examples 2022: Top 10 Greenwashing Companies, Energy Tracker Asia, July 2022.

<https://energytracker.asia/greenwashing-examples-of-top-companies/>

83 Deena Robinson, 10 Companies Called Out for Greenwashing, Earth.Org, July 2022. <https://earth.org/greenwashing-companies-corporations/>

A Greenwash?

Singapore government-linked company Sembcorp Industries Ltd (Sembcorp) was accused of greenwashing by the Anthropocene Fixed Income Institute (AFII), a UK non-profit climate finance-focused organisation, regarding the sale of Sembcorp Energy India Ltd (SEIL) to Tanweer Infrastructure Pte Ltd, a consortium led by Oman Investment Corporation, for US\$1.5 billion. SEIL operates two coal-fired plants in India that generated 2.6 Gigawatt (GW) of power.⁸⁴

In a report published on 6 November 2022, AFII argued that Sembcorp was merely shifting the onus of reporting carbon emissions to Tanweer while fully financing the sale at an interest rate that is below market rates. It detailed reasons why Sembcorp should only derecognise the emission from SEIL after the loan has been fully repaid by Tanweer.

Via a technical services agreement (TSA), a wholly-owned subsidiary of Sembcorp would become a technical advisor to SEIL upon the completion of the sale and would receive a regular fee. AFII said this meant that Sembcorp retained operational influence on SEIL.

Sembcorp extended to Tanweer a deferred payment note (DPN) amounting to S\$1.5 billion for the sale of SEIL. The DPN has an initial maturity term of 15 years, which would be extended by a period of two years automatically and up to a limit of nine years if the loan has not been fully repaid. The TSA lasts until either the loan has been fully repaid or voided, whichever comes earlier.

A number of market observers agreed with AFII. One called the sale of coal plants “purely a greenwashing exercise” saying: “It’s the same facilities, same group of employees, same polluting activities, just under a different name”.⁸⁵ Another said that “NGOs, banks and investors should scrutinise to ensure that companies are not just using financial engineering to reduce their greenhouse gas emissions”.⁸⁶

In response to queries by *The Business Times*,⁸⁷ Sembcorp denied any ambiguity about its commitments. It said: “The sale of SEIL underpins Sembcorp’s brown-to-green transformation strategy and also progresses us towards one of our 2025 targets - the reduction of our greenhouse gas emissions intensity to 0.40 tonnes of carbon dioxide equivalent per megaWatt hour (tCO₂e/mWh) from 0.54 tCO₂e/mWh in 2020.” It added: “Our commitments to our stakeholders, including our bondholders, are very clear and are not subject to interpretation. Every step we take advances us towards the transition of our portfolio, underscoring our conviction to meeting our commitments.”

84 Ulf Eerlandsson and Cedric Rimaud, Sembcorp: “Carbon Footprint Arbitrage of A Lifetime”, AFII, November 2022. https://img1.wsimg.com/blobby/go/946d6aac-e6cc-430a-8898-520cf90f5d3e/AFII_Sembcorp_061122-819d41d.pdf

85 Bloomberg, Sembcorp Industries is ‘greenwashing’ with sale of coal-fired plants in India, academics say, *The Edge Singapore*, November 2022. <https://www.theedgesingapore.com/news/environmental-social-and-governance/sembcorp-industries-greenwashing-sale-coal-fired-plants>

86 Financial Times, Sembcorp coal deal raises concerns about distortions in green bonds, November 2022. <https://www.ft.com/content/78565764-5ada-419e-a55f-c617319a9105>

87 Kenneth Lim, Sembcorp Should Still Account for Emissions of India Coal Business Even After Disposal: Non-Profit Organisation, *The Business Times*, November 2022. <https://www.business-times.com.sg/companies-markets/mobile-spotlight/sembcorp-should-still-account-emissions-india-coal-business-even>

Mitigating risk of greenwashing accusations

There are measures that companies and boards can take to mitigate the risk of greenwashing accusations. Being open and transparent is a crucial first step. Augmenting disclosures in accordance with sustainability reporting standards, with strong sustainability governance; a robust three lines model to help ensure sturdy and proper internal controls; and independent assurance can also help a company avoid greenwashing. However, sustainability assurance, if not done right, could in fact worsen greenwashing.

It's not simple arithmetic

In July 2022, *The Business Times* reported that Top Glove Corporation Bhd, the world's largest glove manufacturer and listed on Bursa Malaysia and Singapore Exchange, has come under fire after reporting a negative figure for total Scope 3 emissions in its last financial year.⁸⁸ In its calculations, the company had included avoided emissions from recycling. This was flagged as among the "most outrageous" errors found in the climate disclosures of listed companies in Singapore and Malaysia, based on a study by Malaysian climate tech startup Pantas. The Pantas CEO said companies were not supposed to claim negative emissions from recycling. Although Pantas did not name any companies in its study findings, *The Business Times* did its own checks and identified Top Glove.

Top Glove was alleged to have also erred by including the combustion of biomass under Scope 1 and excluding emissions from company-owned or controlled vehicles from Scope 1. This shows the significant technical challenges that emissions reporting pose to companies and investors alike.

To its credit, Top Glove responded to the allegations in a measured way. It said it was "restudying" its carbon emissions calculations to ensure alignment with GHG Protocol's Scopes 1 and 2 requirements. For Scope 3, the company admitted that its disclosure "did not fully meet" GHG Protocol reporting and TCFD standards, but asked for understanding that it was a "maiden effort".

It said the disclosure was part of its 'first step towards making voluntary disclosures' and added that it 'is committed to continue improving its reporting.'

Top Glove also stressed that it "has been reporting its carbon emissions in line with requirements as well as best practices in sustainability", while highlighting its aim to submit its net zero carbon target to the Science Based Target initiative by FY2024.

It said: "As the world's largest glove manufacturer, Top Glove is mindful of its responsibilities as a corporate citizen and remains fully committed to continual learning and improvement in its sustainability practices".

It should be noted that Top Glove's sustainability disclosures were externally assured – a lesson that sustainability assurance does not necessarily assure against greenwashing accusations.

⁸⁸ Wong Pei Ting, Top Glove's 'Negative' Emissions Come Under Fire; Issue Underscores Minefield in Emissions Reporting, *The Business Times*, July 2022.

Sustainability assurance – not a panacea for greenwashing

A recent study conducted by the Oxford Rethinking Performance Initiative (ORP) at the Saïd Business School at the University of Oxford painted a dim picture of the current state of sustainability assurance.⁸⁹ The study examined sustainability assurance practices at FTSE100 companies in 2020 and 2021. In the UK, about half of sustainability audits are done by the Big Four accounting firms, while the rest are serviced through specialised environmental or sustainability consulting firms. Globally, the Big Four are estimated to serve more than 60% of the market.

Although the authors observed “a narrative of ambitious promises” by the firms providing sustainability assurance services, they said: “What we found in our investigations belied these statements.”

The authors concluded that while auditing and assurance can and should facilitate better sustainability-related disclosure, the practice in its current form instead often creates doubt and confusion in an already highly disorganised space. They added: “Reporting that claims to verify sustainability practices but undermines, rather than affirms, those practices is ultimately just a form of greenwashing.”

Interestingly, the two positive examples of sustainability assurance cited by the authors were undertaken by a UK-based sustainability consultancy that is part of Accenture, and by ERM CVS, an independent assurance firm.

For directors who are overseeing the appointment of independent third parties to provide sustainability assurance, what the research suggests is that it is not necessarily the case that the Big Four accounting firms are the only ones equipped to provide robust sustainability assurance.

⁸⁹ Carmichael, D., Soonawalla, K. and Stroehle, J.C., Sustainability assurance as greenwashing, Stanford Social Innovation Review, Winter 2023. https://ssir.org/articles/entry/sustainability_assurance_as_greenwashing

Companies should engage with relevant stakeholders, including NGOs, to better understand greenwashing concerns that may arise. They should however resist developing close business relationships with NGOs that are actively involved in targeting companies for greenwashing as this may raise other ethical concerns. Companies should also review if they have systems in place for employees to report greenwashing risks without fear, such as through a whistleblowing mechanism.

We conclude by emphasising that the effective oversight and management of climate risks and opportunities, as with other risks faced by a company, requires the board setting the right tone. The employees must believe that sustainability truly matters and addressing it is not just a public relations exercise.

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Dr Khoo Guan Seng, PhD

Dr Khoo has over 28 years of experience in the design and implementation of enterprise-wide investment, banking and risk management models, systems and processes, including ESG/responsible investing. He gained deep practical insights from a career with financial institutions in the US, Canada, UK and Singapore, including the Man Group, where he was the Principal Scientist, designing and running an algorithmic AI-based hedge fund; and American Bourses Corporation, which provided robo-based analytical solutions and financial info-utilities to traders and investors. He has also served at ATOS Origin, RHB Capital, Singapore Exchange, Standard Chartered Bank, Temasek Holdings, Alberta Investment Management Corporation (AIMCo), Changi Airports International, and the Alliance to End Plastic Waste (AEPW). He holds a PhD in Computational Physics (Material Science) from the National University of Singapore, with post-doctorate R&D in AI-based data mining and applications in Japan and the US.

When he was the Head of ERM/GRC at AIMCo, he was also the Head of Proxy Voting and a member of the investment committee involved in approving investments via relationship investing/stakeholder engagement, e.g., in Environmental Resources Management and Glass Lewis. He also helped establish AIMCo's Responsible Investing Unit in 2011.

Over the last few years, he has led initiatives in sustainability-related project and impact financing and education, including at AEPW, and in sustainable investing seminars for the investment management and banking industries, at SMU, Salmon Thrust and London Business School's SWF Academy.

As an academic at Nanyang Technological University, he co-designed the first environmental science module (as a free elective for all NTU undergrads) in 1997, which included teaching on the effects of climate change on human society and biodiversity.

He published *A Guide to the Flora and Fauna of Schools in Singapore* in 1991 and also participated in a Malaysian Nature Society scientific expedition to the Endau-Rompin forest reserve in Malaysia in 1989 to investigate and research the changing state of biodiversity due to climate change and human interactions.

Professor Mak Yuen Teen, PhD, FCPA (Aus.)

Mak Yuen Teen is Professor (Practice) of Accounting at the NUS Business School, National University of Singapore (NUS). He was a former Vice Dean of the School and the founder of the first corporate governance centre in Singapore at NUS. He holds first-class honours, master and PhD degrees in accounting and finance, and is a fellow of CPA Australia.

Prof Mak has served on three of the four corporate governance committees set up by the Singapore authorities to develop and revise the code of corporate governance for listed companies, including the first committee in 2000 and the most recent committee under the Monetary Authority of Singapore (MAS), which released the 2018 Singapore Code. He currently serves on the Corporate Governance Advisory Committee under MAS aimed at continually raising corporate governance standards for listed companies in Singapore.

He has served as director, chairman and deputy chairman of large not-for profit boards in Singapore,

and as member of the audit advisory committee of two United Nations agencies based in New York, and the governing council of the Singapore Institute of Directors. He is currently a member of the international advisory board of the Hawkamah Institute for Corporate Governance in Dubai and a senior adviser and advisory council member of the Vietnam Independent Directors Association.

He developed the first corporate governance rating for Singapore companies called the Governance and Transparency Index and the first Singapore governance rating for REITs and business trusts. He was nominated by MAS as the Singapore expert in the development of the ASEAN CG Scorecard.

Prof Mak has extensive experience conducting training for directors, regulators and other professionals in Singapore and Malaysia, including the mandatory accreditation programme for Malaysian directors, the FIDE programme for directors of Malaysian financial institutions, and programmes for listed company directors relating to nomination and remuneration matters, compliance and value creation roles of boards, governance of company groups, and corporate governance and sustainability.

He is also a regular commentator on corporate governance and ESG issues in the Singapore and international media, and regularly posts articles and commentaries on his website, Governance for Stakeholders.

He is one of only two individuals in Singapore to have been given the Corporate Governance Excellence Award by the Securities Investors Association (Singapore) for his contributions to improving corporate governance in Singapore. The Singapore Institute of Directors has also recognised him as a CG Pioneer. He also received the corporate governance excellence award from the Minority Shareholders Watchdog Group in Malaysia for his contributions to corporate governance in the region.

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